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GEORGE OTIS SMITH, Director

Water-Supply Paper 471

# SURFACE WATER SUPPLY OF THE UNITED STATES

## 1918

## PART I. NORTH ATLANTIC SLOPE DRAINAGE BASINS

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# SURFACE WATER SUPPLY OF THE NORTH ATLANTIC SLOPE DRAINAGE BASINS, 1918.

## AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1918.

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, 1895–1919.*

| | |
|---|---|
| 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 |

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 page 11.

Measurements of stream flow have been made at about 4,510 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1918, 1,180 gaging stations were being maintained by the Survey and the cooperating organizations. Many

miscellaneous discharge measurements are 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, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth 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 (depth 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 below the gage which determine the stage-discharge 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—to which the surface of the river would fall if there were no flow.

## EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1917, and ending September 30, 1918. 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 consist 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 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, II.) 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, and these rating tables, when applied to the gage heights, give the discharge from which the daily, monthly, and yearly mean discharge is determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving results 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 heights and results 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 constancy 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.

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 for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 8, are based.

## ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

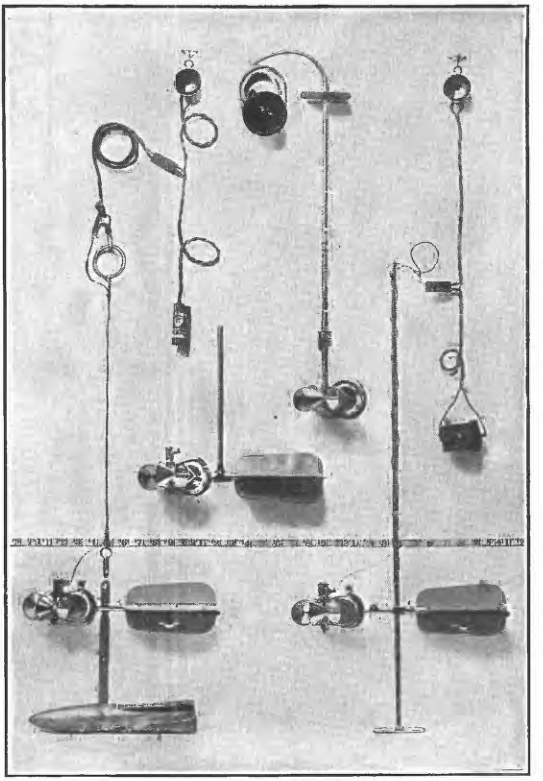
The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

A paragraph in the description of the station or footnotes added to the tables gives information regarding (1) the 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 heights to the rating table to obtain the daily discharge.[1]

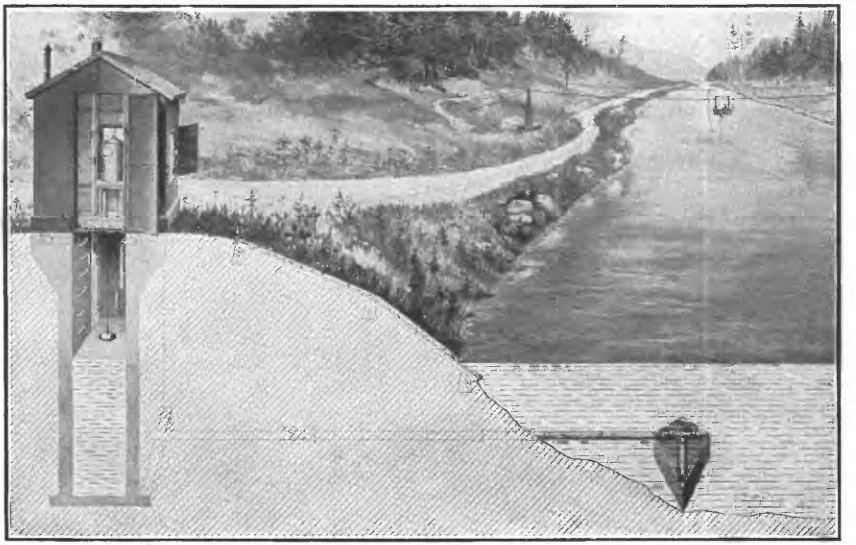
For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference 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 depth of 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 (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for

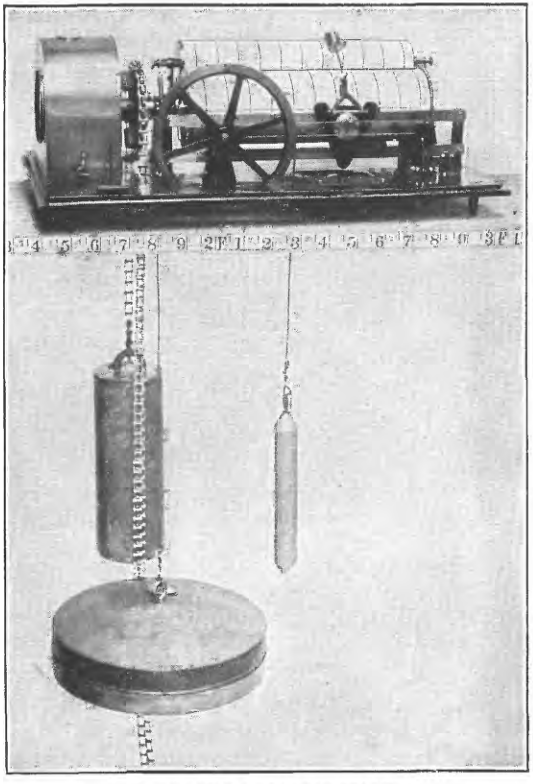
[1] For a more detailed discussion of the accuracy of stream-flow data see Grover, N. C., and Hoyt, J. C., Accuracy of stream-flow data: U. S. Geol. Survey Water-Supply Paper 400, pp. 53-59, 1916.



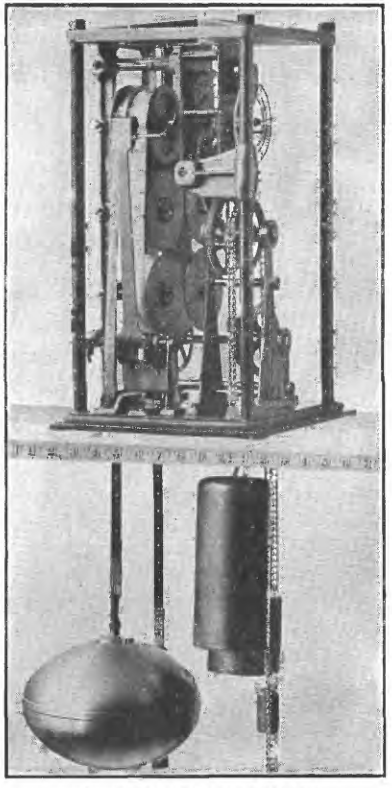
*A*. PRICE CURRENT METERS.



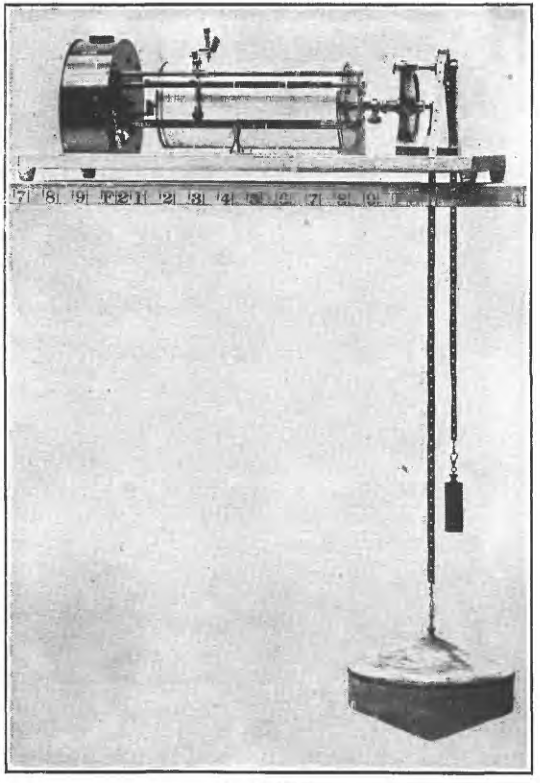
*B*. TYPICAL GAGING STATION.



*A.* STEVENS CONTINUOUS.



*B.* GURLEY PRINTING.



*C.* FRIEZ.

WATER-STAGE RECORDERS.

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 (depth in inches)" previously published by the Survey should be used with caution because of possible inherent but unknown sources of error.

The table of monthly discharge gives 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.

The hydrometric work in Maine was carried on in cooperation with the public utilities commission, Benjamin F. Cleaves, chairman, and Paul L. Bean, chief engineer.

In Vermont the work was carried on in cooperation with the State, Horace F. Graham, governor, and Herbert M. McIntosh, State engineer.

The work in New Hampshire was done in cooperation with the commission on water conservation and water power, George B. Leighton, commissioner.

The work in Massachusetts was carried on in cooperation with the commission on waterways and public lands, John N. Cole, chairman.

Financial assistance has been rendered by the New England Power Co., the Turners Falls Power & Electric Co., the Connecticut Valley Lumber Co., the Holyoke Water Power Co., the International Paper Co., the Connecticut Power Co., the Eastern Connecticut Power Co., Profile Falls Power Co., and the W. H. McElwain Co.

Work in the State of New York has been conducted under cooperative agreements with the State engineer and surveyor and, since July 1, 1911, with the division of waters of the State conservation commission.

The water-stage recorder on Hudson River at Spier Falls, N. Y., was inspected by an employee of the Adirondack Electric Power Corporation, Glens Falls, N. Y.

The station on Rappahannock River near Fredericksburg, Va., was maintained in cooperation with the Spottsylvania Power 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. The work in Maine was under the immediate supervision of A. F. McAlary, assistant engineer of the public utilities commission, who was assisted by H. A. Lancaster. The other assistants in New Eng-

land were O. W. Hartwell, H. W. Fear, M. R. Stackpole, J. W. Moulton, A. N. Weeks, and Hope Hearn.

Data for stations in New York were collected and prepared for publication under the direction of C. C. Covert, district engineer, who was assisted by O. W. Hartwell, E. D. Burchard, A. H. Davison, W. A. James, and Helen Kimmey.

For stations in New Jersey, Maryland, and Virginia, the data were collected and prepared for publication under the direction of G. C. Stevens, district engineer, who was assisted by H. J. Jackson, B. L. Hopkins, M. I. Walters, and J. W. Moulton.

## GAGING-STATION RECORDS.

### ST. JOHN RIVER BASIN.

#### ST. JOHN RIVER AT VAN BUREN, MAINE.

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

DRAINAGE AREA.—8,270 square miles.

RECORDS AVAILABLE.—May 4, 1908, to September 30, 1918.

GAGE.—Gage used since May 6, 1912, painted vertically on second pier from Van Buren end of bridge; zero of gage, 407.69 feet above sea level. From 1908 to 1911 stage was read on a vertical rod attached to pier of sawdust carrier of Hammond's mill, about 700 feet below international bridge, but as published, readings are reduced to datum of bridge gage. Gage read by W. H. Scott.

DISCHARGE MEASUREMENTS.—Made from international bridge.

CHANNEL AND CONTROL.—Control practically permanent. Banks high, rocky, cleared, and not subject to overflow except in very high freshets.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 24.5 feet at 8.10 a. m. May 2 (discharge, 104,000 second-feet); minimum stage recorded, 1.45 feet at 6.30 a. m. October 1 (discharge, 1,820 second-feet). Discharge estimated at 1,520 second-feet several times in February and March (stage-discharge relation affected by ice).

ICE.—Stage-discharge relation seriously affected by ice, usually from December to March; estimates based on gage heights at Grand Falls and rating curve derived from measurements at Van Buren.

REGULATION.—The little storage above 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 twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Winter-gage heights at Grand Falls furnished by H. S. Ferguson, consulting engineer.

No discharge measurements were made at this station during the year ending September 30, 1918.

*Daily discharge, in second-feet, of St. John River at Van Buren, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,820 | 47,000 | 6,320 | 2,700 | 1,880 | 1,640 | 2,580 | 87,500 | 22,900 | 17,200 | 24,400 | 2,880 |
| 2 | 2,700 | 52,500 | 6,570 | 2,700 | 1,880 | 1,640 | 3,580 | 104,000 | 21,800 | 15,700 | 25,500 | 2,880 |
| 3 | 3,060 | 46,000 | 6,840 | 2,580 | 1,690 | 1,640 | 4,080 | 102,000 | 20,800 | 15,700 | 21,200 | 2,880 |
| 4 | 3,640 | 38,200 | 7,110 | 2,580 | 1,690 | 1,640 | 4,990 | 94,000 | 19,500 | 15,100 | 16,900 | 3,060 |
| 5 | 4,700 | 32,300 | 6,700 | 2,460 | 1,690 | 1,640 | 5,840 | 81,000 | 18,200 | 13,600 | 14,200 | 3,250 |
| 6 | 5,140 | 27,800 | 6,190 | 2,460 | 1,690 | 1,640 | 7,400 | 69,000 | 16,900 | 12,200 | 12,500 | 3,440 |
| 7 | 6,760 | 24,700 | 6,070 | 2,240 | 1,640 | 1,520 | 10,100 | 58,600 | 16,000 | 11,100 | 11,600 | 4,920 |
| 8 | 8,980 | 22,600 | 5,400 | 2,240 | 1,640 | 1,520 | 12,900 | 57,500 | 15,700 | 10,300 | 11,100 | 6,050 |
| 9 | 9,760 | 20,800 | 5,090 | 2,360 | 1,640 | 1,520 | 14,100 | 63,000 | 15,700 | 12,200 | 11,400 | 6,760 |
| 10 | 9,500 | 19,500 | 4,990 | 2,360 | 1,640 | 1,520 | 14,500 | 66,000 | 15,400 | 26,200 | 10,800 | 7,240 |
| 11 | 8,470 | 17,900 | 4,800 | 2,360 | 1,560 | 1,520 | 14,900 | 67,800 | 15,400 | 46,500 | 10,000 | 6,050 |
| 12 | 7,970 | 17,200 | 4,600 | 2,360 | 1,560 | 1,520 | 15,300 | 67,800 | 13,900 | 46,500 | 8,470 | 5,360 |
| 13 | 8,220 | 15,700 | 4,330 | 2,360 | 1,600 | 1,520 | 17,400 | 61,900 | 13,600 | 41,000 | 7,480 | 4,480 |
| 14 | 8,470 | 13,900 | 4,240 | 2,240 | 1,560 | 1,520 | 20,500 | 59,200 | 14,500 | 35,400 | 7,240 | 4,480 |
| 15 | 7,970 | 12,800 | 4,240 | 2,300 | 1,690 | 1,560 | 23,700 | 61,900 | 17,900 | 31,100 | 6,760 | 5,360 |
| 16 | 8,720 | 12,200 | 4,160 | 2,240 | 1,640 | 1,520 | 25,000 | 59,200 | 18,800 | 31,900 | 6,050 | 7,480 |
| 17 | 9,500 | 11,900 | 4,240 | 2,140 | 1,640 | 1,520 | 35,200 | 53,500 | 16,600 | 32,300 | 5,590 | 11,100 |
| 18 | 9,240 | 12,200 | 3,990 | 2,140 | 1,640 | 1,520 | 42,500 | 48,000 | 13,900 | 31,500 | 5,820 | 10,300 |
| 19 | 10,000 | 12,200 | 3,900 | 2,140 | 1,520 | 1,520 | 37,700 | 43,500 | 12,500 | 29,800 | 5,820 | 10,000 |
| 20 | 10,000 | 11,600 | 3,900 | 2,140 | 1,520 | 1,640 | 34,500 | 41,000 | 11,100 | 27,000 | 5,820 | 11,400 |
| 21 | 9,500 | 11,000 | 3,990 | 2,140 | 1,520 | 1,780 | 32,300 | 39,600 | 10,000 | 24,000 | 5,360 | 13,600 |
| 22 | 8,470 | 10,200 | 4,080 | 2,140 | 1,520 | 1,780 | 31,900 | 38,600 | 9,240 | 20,800 | 4,920 | 15,100 |
| 23 | 7,970 | 8,790 | 3,900 | 2,080 | 1,520 | 1,640 | 34,500 | 38,600 | 9,760 | 19,500 | 4,700 | 18,800 |
| 24 | 7,970 | 8,960 | 3,740 | 2,030 | 1,520 | 1,520 | 40,600 | 37,200 | 17,200 | 18,200 | 4,050 | 20,800 |
| 25 | 7,720 | 8,150 | 3,500 | 2,030 | 1,640 | 1,520 | 48,000 | 35,000 | 29,400 | 16,900 | 3,840 | 18,500 |
| 26 | 9,500 | 6,320 | 3,580 | 2,030 | 1,640 | 1,520 | 50,000 | 32,300 | 32,300 | 15,700 | 3,840 | 15,700 |
| 27 | 10,800 | 4,800 | 3,580 | 2,030 | 1,690 | 1,560 | 49,500 | 29,000 | 27,000 | 15,100 | 3,440 | 13,600 |
| 28 | 14,500 | 4,510 | 3,280 | 1,930 | 1,640 | 1,690 | 50,000 | 26,600 | 22,200 | 16,000 | 3,440 | 13,600 |
| 29 | 15,400 | 4,990 | 2,840 | 1,930 | ..... | 1,930 | 53,000 | 26,200 | 19,500 | 14,800 | 3,250 | 16,900 |
| 30 | 15,700 | 5,840 | 2,840 | 1,930 | ..... | 2,030 | 63,600 | 27,000 | 17,200 | 13,300 | 3,250 | 21,800 |
| 31 | 24,400 | ..... | 2,700 | 1,930 | ..... | 2,300 | ..... | 25,100 | ..... | 14,800 | 3,060 | ..... |

NOTE.—Stage-discharge relation affected by ice Nov. 23 to Apr. 17; discharge for this period determined from gage heights at Grand Falls and rating curve derived from measurements at Van Buren.

*Monthly discharge of St. John River at Van Buren, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 8,270 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 24,400 | 1,820 | 8,920 | 1.08 | 1.24 |
| November | 52,500 | 4,510 | 18,100 | 2.19 | 2.44 |
| December | 7,110 | 2,700 | 4,570 | .553 | .64 |
| January | 2,700 | 1,930 | 2,240 | .271 | .31 |
| February | 1,880 | 1,520 | 1,630 | .197 | .21 |
| March | 2,300 | 1,520 | 1,630 | .197 | .23 |
| April | 63,600 | 2,580 | 26,700 | 3.23 | 3.60 |
| May | 104,000 | 25,100 | 54,900 | 6.64 | 7.66 |
| June | 32,300 | 9,240 | 17,500 | 2.11 | 2.35 |
| July | 46,500 | 10,300 | 22,300 | 2.70 | 3.11 |
| August | 25,500 | 3,060 | 8,770 | 1.06 | 1.22 |
| September | 21,800 | 2,880 | 9,590 | 1.16 | 1.29 |
| The year | 104,000 | 1,520 | 14,800 | 1.79 | 24.30 |

## MACHIAS RIVER BASIN.

### MACHIAS RIVER AT WHITNEYVILLE, MAINE.

LOCATION.—At a wooden highway bridge in Whitneyville, Washington County, 200 feet below a storage dam and 4 miles above Machias.

DRAINAGE AREA.—465 square miles.

RECORDS AVAILABLE.—October 17, 1903, to September 30, 1918.

GAGE.—Chain installed on the wooden highway bridge October 10, 1911; prior to October 3, 1905, chain gage on the Washington County Railroad bridge, three-fourths of a mile downstream; October 3, 1905, to October 9, 1911, staff gage on highway bridge at datum of present chain gage. Gage read by I. S. Albee.

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

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.0 feet at 3 p. m. April 22 and 3.30 p. m. April 23 (discharge, 5,900 second-feet); minimum stage recorded 3.25 feet on August 3, 4, 5, 6, and 7 (discharge, 160 second-feet).

ICE.—River usually remains open at the gage but ice farther downstream occasionally affects the stage-discharge relation.

REGULATION.—Opening and closing of gates in storage dam immediately above station each day during low stages of the river cause considerable fluctuation; some log driving every year and jams of short duration occasionally occur.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined between 100 and 4,000 second-feet. Gage read to tenths once daily, except from December 15 to March 30, when it was read three times a week. Daily discharge ascertained by applying mean daily gage height to rating table and making corrections for effect of ice during the winter. Records fair.

*Discharge measurements of Machias River at Whitneyville, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 5 | A. F. McAlary | a 4.30 | 308 | Mar. 16 | A. F. McAlary | a 4.80 | 474 |
| Feb. 16 | do | a 5.1 | 538 | Aug. 11 | H. A. Lancaster | 4.23 | 640 |

a Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Machias River at Whitneyville, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 770 | 1,380 | 598 | 360 | 270 | 860 | 920 | 4,150 | 1,380 | 490 | 244 | 178 |
| 2 | 980 | 1,380 | 544 | 360 | 270 | 800 | 1,250 | 4,800 | 1,380 | 387 | 200 | 221 |
| 3 | 860 | 1,240 | 540 | 360 | 270 | 800 | 1,860 | 3,750 | 1,380 | 387 | 160 | 221 |
| 4 | 711 | 1,240 | 520 | 340 | 270 | 800 | 2,200 | 3,150 | 1,240 | 387 | 160 | 314 |
| 5 | 654 | 1,100 | 490 | 310 | 270 | 800 | 2,500 | 2,950 | 1,240 | 387 | 160 | 362 |
| 6 | 711 | 1,100 | 460 | 310 | 270 | 740 | 2,660 | 2,570 | 1,100 | 438 | 160 | 412 |
| 7 | 860 | 1,100 | 460 | 310 | 270 | 680 | 2,750 | 2,030 | 1,100 | 860 | 160 | 412 |
| 8 | 860 | 980 | 440 | 310 | 270 | 660 | 2,950 | 1,860 | 1,240 | 1,700 | 200 | 412 |
| 9 | 980 | 980 | 440 | 340 | 270 | 640 | 2,950 | 1,540 | 1,240 | 1,540 | 200 | 412 |
| 10 | 980 | 980 | 410 | 360 | 270 | 580 | 3,150 | 1,540 | 1,240 | 1,380 | 490 | 412 |
| 11 | 1,240 | 1,240 | 410 | 360 | 270 | 520 | 2,950 | 1,540 | 1,100 | 1,380 | 654 | 412 |
| 12 | 1,700 | 1,100 | 410 | 360 | 270 | 490 | 2,950 | 1,860 | 1,100 | 1,100 | 682 | 412 |
| 13 | 2,200 | 1,100 | 410 | 360 | 270 | 490 | 2,750 | 2,030 | 1,240 | 980 | 740 | 362 |
| 14 | 1,860 | 980 | 410 | 360 | 270 | 460 | 2,750 | 2,390 | 1,240 | 860 | 740 | 362 |
| 15 | 1,540 | 860 | 410 | 360 | 390 | 460 | 2,750 | 2,570 | 1,240 | 770 | 740 | 362 |
| 16 | 1,540 | 770 | 410 | 360 | 540 | 470 | 2,750 | 2,950 | 1,240 | 711 | 740 | 362 |
| 17 | 1,540 | 711 | 410 | 360 | 520 | 490 | 2,950 | 3,150 | 1,240 | 711 | 740 | 362 |
| 18 | 1,540 | 711 | 410 | 360 | 490 | 520 | 2,950 | 3,350 | 1,100 | 711 | 626 | 362 |
| 19 | 1,700 | 711 | 390 | 360 | 490 | 520 | 2,950 | 3,350 | 1,100 | 711 | 571 | 464 |
| 20 | 1,860 | 711 | 360 | 360 | 490 | 540 | 2,950 | 3,150 | 1,100 | 711 | 517 | 682 |
| 21 | 1,860 | 711 | 360 | 360 | 490 | 580 | 2,950 | 2,750 | 1,100 | 654 | 464 | 1,380 |
| 22 | 1,540 | 711 | 360 | 310 | 490 | 580 | 5,900 | 2,570 | 1,100 | 598 | 412 | 1,860 |
| 23 | 1,540 | 860 | 360 | 290 | 490 | 580 | 5,900 | 2,390 | 1,860 | 544 | 412 | 1,940 |
| 24 | 1,540 | 1,100 | 360 | 270 | 526 | 600 | 5,600 | 2,210 | 1,700 | 544 | 412 | 1,940 |
| 25 | 2,030 | 1,100 | 360 | 270 | 580 | 640 | 5,240 | 2,030 | 1,540 | 544 | 362 | 1,460 |
| 26 | 1,860 | 1,240 | 360 | 270 | 640 | 640 | 4,360 | 1,860 | 1,240 | 544 | 314 | 1,240 |
| 27 | 1,540 | 1,380 | 360 | 270 | 740 | 660 | 3,150 | 1,700 | 1,100 | 544 | 267 | 2,120 |
| 28 | 1,540 | 1,380 | 360 | 270 | 860 | 680 | 3,150 | 1,700 | 860 | 490 | 221 | 3,950 |
| 29 | 1,540 | 1,100 | 360 | 270 | ..... | 720 | 3,550 | 1,540 | 711 | 490 | 178 | 3,150 |
| 30 | 1,540 | 770 | 360 | 270 | ..... | 740 | 3,750 | 1,540 | 598 | 438 | 178 | 2,750 |
| 31 | 1,540 | ..... | 360 | 270 | ..... | 800 | ..... | 1,380 | ..... | 338 | 178 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 3 to Apr. 5; 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 Machias River at Whitneyville, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 465 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 2,210 | 654 | 1,390 | 2.99 | 3.45 |
| November | 1,380 | 711 | 1,020 | 2.19 | 2.44 |
| December | 598 | 360 | 416 | .895 | 1.03 |
| January | 360 | 270 | 325 | .699 | .81 |
| February | 860 | 270 | 411 | .884 | .92 |
| March | 860 | 460 | 630 | 1.35 | 1.56 |
| April | 5,900 | 920 | 3,180 | 6.84 | 7.63 |
| May | 4,800 | 1,380 | 2,460 | 5.29 | 6.10 |
| June | 1,860 | 598 | 1,200 | 2.58 | 2.88 |
| July | 1,700 | 338 | 720 | 1.55 | 1.79 |
| August | 740 | 160 | 396 | .854 | .98 |
| September | 3,950 | 178 | 976 | 2.10 | 2.34 |
| The year | 5,900 | 160 | 1,090 | 2.34 | 31.93 |

## UNION RIVER BASIN.

### WEST BRANCH OF UNION RIVER AT AMHERST, MAINE.

LOCATION.—At highway bridge three-fourths of a mile west of Amherst post office, Hancock County, on road to Bangor, 1 mile below highway bridge at old tannery dam.

DRAINAGE AREA.—140 square miles.

RECORDS AVAILABLE.—July 25, 1909, to September 30, 1918.

GAGE.—Chain, installed June 2, 1910, at same datum as old vertical gage nailed to log abutment; read by Mrs. Emma Sumner.

DISCHARGE MEASUREMENTS.—Made from downstream side of the bridge.

CHANNEL AND CONTROL.—Gravel; unlikely to change except in unusual flood.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.9 feet at 9 a. m. and 4 p. m. April 24 (discharge, 1,440 second-feet); minimum stage recorded, 5.2 feet at 8 a. m. and 4 p. m. October 5 (discharge, 16 second-feet); minimum discharge estimated as 12 second-feet February 9 and 10, but stage-discharge relation was affected by ice at the time.

ICE.—Surface ice forms to a considerable thickness and anchor ice is found at the measuring section; stage-discharge relation seriously affected.

REGULATION.—Regimen of stream only slightly affected by operation of the few log-driving dams above the station.

ACCURACY.—Stage-discharge relation practically permanent except as affected by backwater from ice and occasional log jams. Rating curve well defined below 1,100 second-feet. Gage read to half-tenths twice daily, except from December 1 to March 30, when it was read three times a week. Daily discharge ascertained by applying mean daily gage height to rating table and making corrections for effect of ice during the winter. Records fair.

*Discharge measurements of West Branch of Union River at Amherst, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 20 | A. F. McAlary | [a] 9.25 | 201 | June 15 | H. A. Lancaster | 5.74 | 76 |
| 20 | do | [a] 7.80 | 68 | Sept. 5 | do | 5.47 | 36.2 |
| Mar. 22 | H. A. Lancaster | [a] 9.11 | 179 | 5 | do | 5.47 | 35.9 |
| June 15 | do | 5.74 | 68 | | | | |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of West Branch of Union River at Amherst, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 62 | 392 | 240 | 100 | 68 | 160 | 420 | 1,280 | 190 | 217 | 94 | 27 |
| 2 | 39 | 438 | 240 | 94 | 68 | 210 | 480 | 1,200 | 190 | 226 | 87 | 24 |
| 3 | 39 | 461 | 240 | 94 | 50 | 200 | 540 | 1,000 | 114 | 236 | 87 | 29 |
| 4 | 68 | 461 | 240 | 94 | 34 | 190 | 560 | 930 | 107 | 304 | 87 | 29 |
| 5 | 16 | 438 | 240 | 94 | 39 | 200 | 640 | 930 | 107 | 304 | 74 | 37 |
| 6 | 50 | 415 | 240 | 115 | 44 | 210 | 680 | 800 | 62 | 245 | 74 | 62 |
| 7 | 68 | 438 | 240 | 135 | 34 | 200 | 740 | 508 | 80 | 325 | 62 | 107 |
| 8 | 74 | 438 | 230 | 135 | 24 | 190 | 780 | 304 | 80 | 284 | 62 | 144 |
| 9 | 80 | 415 | 230 | 135 | 12 | 180 | 832 | 199 | 80 | 484 | 114 | 94 |
| 10 | 159 | 392 | 230 | 135 | 12 | 175 | 832 | 182 | 62 | 438 | 217 | 39 |
| 11 | 174 | 392 | 230 | 130 | 29 | 175 | 860 | 438 | 62 | 369 | 208 | 29 |
| 12 | 217 | 347 | 200 | 130 | 50 | 175 | 900 | 438 | 62 | 304 | 190 | 39 |
| 13 | 255 | 369 | 200 | 130 | 74 | 190 | 800 | 347 | 62 | 264 | 174 | 50 |
| 14 | 304 | 347 | 200 | 135 | 88 | 210 | 864 | 392 | 68 | 144 | 129 | 87 |
| 15 | 347 | 347 | 210 | 135 | 74 | 210 | 930 | 392 | 68 | 159 | 68 | 56 |
| 16 | 347 | 325 | 210 | 135 | 80 | 210 | 1,040 | 264 | 50 | 264 | 34 | 39 |
| 17 | 325 | 304 | 210 | 135 | 88 | 175 | 1,040 | 284 | 44 | 508 | 50 | 44 |
| 18 | 461 | 284 | 200 | 130 | 100 | 145 | 1,040 | 264 | 62 | 461 | 80 | 44 |
| 19 | 532 | 245 | 200 | 120 | 100 | 145 | 965 | 199 | 74 | 392 | 62 | 122 |
| 20 | 347 | 208 | 200 | 120 | 105 | 145 | 897 | 159 | 68 | 325 | 56 | 347 |
| 21 | 347 | 174 | 190 | 120 | 100 | 135 | 930 | 159 | 50 | 304 | 62 | 532 |
| 22 | 392 | 144 | 180 | 130 | 88 | 175 | 1,320 | 159 | 74 | 255 | 62 | 556 |
| 23 | 392 | 245 | 190 | 135 | 88 | 190 | 1,400 | 174 | 107 | 245 | 56 | 392 |
| 24 | 392 | 284 | 160 | 130 | 74 | 210 | 1,440 | 152 | 208 | 208 | 50 | 325 |
| 25 | 532 | 245 | 135 | 115 | 62 | 230 | 1,400 | 182 | 166 | 190 | 50 | 325 |
| 26 | 410 | 240 | 130 | 105 | 74 | 240 | 1,360 | 129 | 114 | 174 | 44 | 580 |
| 27 | 182 | 230 | 120 | 94 | 88 | 240 | 1,160 | 136 | 56 | 144 | 39 | 930 |
| 28 | 190 | 220 | 115 | 80 | 115 | 260 | 1,120 | 122 | 144 | 129 | 34 | 864 |
| 29 | 208 | 210 | 115 | 74 | ..... | 300 | 1,000 | 94 | 107 | 114 | 34 | 656 |
| 30 | 245 | 200 | 115 | 68 | ..... | 350 | 1,200 | 80 | 50 | 107 | 29 | 580 |
| 31 | 415 | ..... | 105 | 68 | ..... | 350 | ..... | 80 | ..... | 107 | 29 | ..... |

NOTE.—Stage-discharge relation affected by ice Nov. 26 to Apr. 8 and Apr. 11–12. 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.

*Monthly discharge of West Branch of Union River at Amherst, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 140 square miles].

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 532 | 16 | 247 | 1.76 | 2.03 |
| November | 461 | 144 | 322 | 2.30 | 2.57 |
| December | 240 | 105 | 193 | 1.38 | 1.59 |
| January | 135 | 68 | 115 | .821 | .95 |
| February | 115 | 12 | 66.5 | .475 | .49 |
| March | 350 | 135 | 206 | 1.47 | 1.70 |
| April | 1,440 | 420 | 939 | 6.71 | 7.49 |
| May | 1,280 | 80 | 386 | 2.76 | 3.18 |
| June | 208 | 44 | 92.3 | .659 | .74 |
| July | 508 | 107 | 265 | 1.89 | 2.18 |
| August | 217 | 29 | 80.6 | .576 | .66 |
| September | 930 | 24 | 240 | 1.71 | 1.91 |
| The year | 1,440 | 12 | 263 | 1.88 | 25.49 |

## PENOBSCOT RIVER BASIN.

### WEST BRANCH OF PENOBSCOT RIVER AT MILLINOCKET, MAINE.

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

DRAINAGE AREA.—1,880 square miles.

RECORDS AVAILABLE.—January 11, 1901, to September 30, 1918.

GAGES.—Water-stage recorder at Quakish Lake dam and gages in fore bay 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 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 3,000 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 outlets of North Twin and Ripogenus lakes store water on a surface of about 73 square miles, with a capacity of about 41.5 billion cubic feet. Except during the time (usually in August) when excess water has to be supplied for log driving on the river below Millinocket and for a short time during the spring freshet, run-off is regulated by storage. Determination 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, 1918.*

[Drainage area, 1,880 square miles].

| Month. | Discharge in second-feet. | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|
| | Observed. | Corrected for storage. | | |
| | Mean. | Mean. | Per square mile. | |
| October | 2,920 | 3,140 | 1.67 | 1.92 |
| November | 3,450 | 3,610 | 1.92 | 2.14 |
| December | 2,900 | 1,520 | .809 | .93 |
| January | 2,780 | 627 | .334 | .39 |
| February | 3,460 | 300 | .160 | .17 |
| March | 3,940 | 206 | .110 | .13 |
| April | 3,380 | 8,180 | 4.35 | 4.85 |
| May | 2,970 | 8,190 | 4.36 | 5.03 |
| June | 2,940 | 2,510 | 1.34 | 1.50 |
| July | 4,800 | 5,480 | 2.91 | 3.36 |
| August | 3,080 | 2,170 | 1.15 | 1.33 |
| September | 2,820 | 2,400 | 1.28 | 1.43 |
| The year | 3,290 | 3,210 | 1.71 | 23.18 |

### 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 town of Medway, Penobscot County, and 2 miles below East Millinocket.

DRAINAGE AREA.—2,100 square miles.

RECORDS AVAILABLE.—February 20, 1916, to September 30, 1918.

GAGES.—Chain on left bank; read by A. T. Reed; Gurley 7-day water-stage recorder on left bank installed August 4, 1916.

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, 7.11 feet at 1 p. m. July 16 (discharge, 11,500 second-feet); minimum stage during year from water-stage recorder, 2.09 feet at 10 a. m. September 2 (discharge, from extension of rating curve, about 1,140 second-feet).

1916–1918: Maximum stage recorded, 9.88 feet at 1 p. m. June 18, 1917 (discharge, from extension of rating curve, about 20,000 second-feet); minimum stage recorded, 1.45 feet at 9.45 a. m. January 7, 1917 (discharge, 585 second-feet).

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 shifted slightly at time of high water in June, 1917. Rating curve used previous to June, 1917, well defined below 12,000 second-feet; curve used subsequent to that date well defined between 2,000 and 12,000 second-feet. Daily discharge ascertained by discharge integrator. Records fair.

*Discharge measurements of West Branch of Penobscot River near Medway, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| May 25 | Clark and Lancaster.... | 4.38 | 3,970 | May 26 | Clark and Lancaster.... | 4.33 | 3,880 |
| 26 | .....do..... | 3.48 | 2,490 | July 16 | H. A. Lancaster..... | 7.14 | 11,500 |

*Daily discharge, in second-feet, of West Branch of Penobscot River near Medway, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,400 | 4,500 | 3,000 | 4,400 | 4,150 | 5,700 | 5,600 | 4,000 | 4,000 | 3,200 | 3,600 | 4,000 |
| 2 | 2,700 | 4,150 | 2,750 | 4,350 | 4,100 | 5,600 | 5,800 | 4,450 | 3,650 | 3,200 | 3,550 | 2,000 |
| 3 | 2,750 | 4,100 | 3,100 | 4,650 | 3,450 | 4,800 | 5,800 | 4,350 | 3,750 | 3,150 | 3,500 | 2,400 |
| 4 | 2,700 | 3,600 | 3,000 | 4,550 | 3,750 | 4,800 | 5,900 | 4,400 | 4,200 | 2,950 | 3,500 | 2,600 |
| 5 | 2,900 | 4,000 | 3,200 | 4,200 | 3,700 | 5,100 | 5,900 | 3,700 | 4,200 | 3,250 | 3,500 | 2,700 |
| 6 | 3,200 | 3,700 | 3,250 | 2,900 | 3,900 | 5,400 | 6,000 | 3,700 | 3,550 | 2,950 | 3,300 | 2,750 |
| 7 | 2,450 | 3,800 | 3,250 | 3,900 | 4,445 | 5,200 | 4,500 | 4,200 | 3,250 | 2,600 | 3,300 | 2,800 |
| 8 | 2,600 | 5,800 | 3,200 | 3,700 | 4,250 | 5,000 | 5,000 | 4,300 | 3,250 | 4,200 | 3,300 | 2,700 |
| 9 | 3,300 | 9,700 | 3,050 | 3,700 | 5,100 | 5,000 | 4,900 | 4,150 | 2,650 | 4,500 | 3,500 | 3,000 |
| 10 | 2,850 | 8,800 | 3,300 | 3,700 | 4,700 | 4,200 | 4,400 | 4,000 | 3,000 | 4,300 | 3,500 | 3,100 |
| 11 | 2,750 | 7,300 | 3,350 | 3,900 | 5,400 | 5,300 | 4,250 | 4,000 | 3,000 | 4,000 | 2,950 | 2,850 |
| 12 | 3,050 | 4,550 | 3,500 | 3,550 | 5,400 | 5,000 | 4,200 | 3,400 | 3,100 | 3,550 | 3,750 | 2,900 |
| 13 | 2,900 | 4,150 | 3,350 | 3,250 | 5,000 | 4,800 | 4,050 | 3,650 | 3,000 | 3,500 | 3,750 | 2,900 |
| 14 | 2,700 | 3,750 | 3,550 | 3,750 | 4,900 | 4,900 | 3,600 | 4,000 | 3,100 | 5,400 | 4,050 | 3,200 |
| 15 | 2,800 | 3,400 | 3,550 | 3,620 | 4,800 | 4,650 | 3,950 | 3,950 | 3,100 | 10,000 | 4,450 | 2,900 |
| 16 | 3,250 | 3,340 | 3,550 | 3,580 | 4,900 | 4,700 | 4,450 | 3,950 | 2,650 | 11,100 | 4,250 | 3,400 |
| 17 | 3,150 | 3,350 | 3,500 | 3,400 | 4,750 | ..... | 4,500 | 3,700 | 2,900 | 9,400 | 4,250 | 3,400 |
| 18 | 2,950 | 2,750 | 3,300 | 3,450 | 4,750 | ..... | 4,400 | 3,400 | 3,150 | 8,500 | 3,650 | 3,200 |
| 19 | 2,870 | 3,800 | 3,350 | 3,400 | 5,600 | ..... | 4,300 | 3,000 | 3,050 | 8,500 | 4,150 | 3,400 |
| 20 | 3,400 | 4,850 | 3,350 | 2,800 | 5,300 | ..... | 4,200 | 3,500 | 3,100 | 8,400 | 4,050 | 3,500 |
| 21 | 2,950 | 3,900 | 3,350 | 3,050 | 4,600 | ..... | 3,650 | 4,200 | 3,150 | 7,900 | 3,100 | 3,700 |
| 22 | 3,350 | 3,550 | 3,200 | 3,150 | 5,200 | ..... | 3,900 | 4,000 | 3,600 | 8,200 | 3,100 | 3,250 |
| 23 | 3,850 | 3,410 | 3,000 | 3,200 | 5,800 | ..... | 4,150 | 4,150 | 3,550 | 7,300 | 2,950 | 3,400 |
| 24 | 3,750 | 3,500 | 3,000 | 3,350 | 3,880 | 4,600 | 3,600 | 4,250 | 4,350 | 6,700 | 2,950 | 3,300 |
| 25 | 3,500 | 2,750 | 2,600 | 3,450 | 5,600 | 5,200 | 3,650 | 3,800 | 4,200 | 5,500 | 2,550 | 3,250 |
| 26 | 3,900 | 3,500 | 3,300 | 3,350 | 6,100 | 5,300 | 4,100 | 3,800 | 3,950 | 4,100 | 3,300 | 3,100 |
| 27 | 4,150 | 3,600 | 3,100 | 2,850 | 6,000 | 5,200 | 3,900 | 3,900 | 3,800 | 3,550 | 2,800 | 3,300 |
| 28 | 3,500 | 3,450 | 3,400 | 3,200 | 5,800 | 5,400 | 3,400 | 4,200 | 3,700 | 3,300 | 3,050 | 3,500 |
| 29 | 3,900 | 3,300 | 3,400 | 3,350 | ..... | 5,400 | 3,350 | 4,100 | 3,700 | 3,300 | 3,300 | 3,400 |
| 30 | 3,900 | 2,750 | 3,000 | 3,800 | ..... | 6,000 | 3,550 | 4,200 | 3,050 | 3,450 | 3,400 | 3,250 |
| 31 | 4,400 | ..... | 4,150 | 3,900 | ..... | 5,300 | ..... | 4,350 | ..... | 3,450 | 3,400 | ..... |

NOTE.—Average discharge Mar. 17–23 estimated at 5,000 second-feet by comparison with records at West Enfield and observer's once-daily gage readings.

*Monthly discharge of West Branch of Penobscot River near Medway, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 2,100 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 4,400 | 2,400 | 3,190 | 1.52 | 1.75 |
| November | 9,700 | 2,750 | 4,240 | 2.02 | 2.25 |
| December | 4,150 | 2,600 | 3,260 | 1.55 | 1.79 |
| January | 4,650 | 2,800 | 3,590 | 1.71 | 1.97 |
| February | 6,100 | 3,450 | 4,830 | 2.30 | 2.40 |
| March | 6,000 | ..... | 5,080 | 2.42 | 2.79 |
| April | 6,000 | 3,350 | 4,430 | 2.11 | 2.35 |
| May | 4,450 | 3,000 | 3,960 | 1.89 | 2.18 |
| June | 4,350 | 2,650 | 3,420 | 1.63 | 1.82 |
| July | 11,100 | 2,600 | 5,270 | 2.51 | 2.89 |
| August | 4,450 | 2,550 | 3,480 | 1.66 | 1.91 |
| September | 4,000 | 2,000 | 3,110 | 1.48 | 1.65 |
| The year | 11,100 | 2,000 | 3,980 | 1.90 | 25.75 |

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

### 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.—January 1, 1902, to September 30, 1918.

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

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel at gage broken by four bridge piers; straight above and below the gage. Banks high, rocky, and not subject to overflow. Control is at Passadumkeag Rips, about 5 miles below the gage; a wing dam at this point is overflowed at about gage height 5.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 11.2 feet at 8 p. m. May 2 (discharge, 40,700 second-feet); minimum stage during year from water-stage recorder, 2.30 feet at 11 p. m. October 1 (discharge, 3,840 second-feet).

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

REGULATION.—Flow since 1900 largely controlled by storage, principally in the lakes tributary to the West Branch. Results 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 ordinarily ascertained by applying to rating table average gage height taken from recorder sheets and corrections for effect of ice during the winter; at times of serious fluctuation in stage the daily discharge is ascertained by using the average of 12 two-hour periods. Records excellent.

COOPERATION.—Gage-height record and several discharge measurements furnished by Thomas W. Clark, hydraulic engineer, Oldtown, Maine. Discharge measurements also made by students of the University of Maine, under the direction of Prof. H. S. Boardman.

*Discharge measurements of Penobscot River at West Enfield, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 7 | H. A. Lancaster | 3.15 | 5,950 | Feb. 7 | McAlary and Lancaster. | [a] 5.84 | 4,870 |
| 19 | University of Maine students | 4.94 | 9,990 | Aug. 27 | T. W. Clark | [b] 3.22 | 5,440 |

[a] Stage-discharge relation affected by ice. [b] Stage-discharge relation affected by log jam.

*Daily discharge, in second-feet, of Penobscot River at West Enfield, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4,170 | 34,100 | 7,040 | 4,900 | 5,100 | 8,000 | 13,000 | 31,300 | 9,120 | 7,570 | 9,870 | 6,010 |
| 2 | 4,390 | 28,000 | 6,910 | 5,000 | 5,200 | 8,300 | 17,200 | 38,600 | 8,680 | 7,980 | 8,970 | 5,650 |
| 3 | 4,960 | 24,200 | 6,800 | 5,200 | 5,300 | 8,300 | 21,100 | 37,100 | 8,970 | 7,570 | 8,680 | 4,730 |
| 4 | 5,070 | 21,500 | 7,400 | 5,200 | 4,800 | 7,200 | 25,300 | 32,400 | 8,970 | 7,170 | 8,680 | 5,070 |
| 5 | 5,190 | 19,500 | 7,600 | 5,300 | 4,700 | 7,400 | 24,700 | 28,800 | 8,540 | 6,780 | 8,120 | 4,960 |
| 6 | 5,420 | 18,000 | 7,300 | 5,300 | 4,600 | 7,900 | 26,000 | 25,000 | 7,980 | 6,650 | 7,980 | 4,960 |
| 7 | 5,650 | 17,000 | 6,400 | 5,100 | 4,900 | 8,000 | 26,000 | 23,000 | 7,710 | 6,650 | 7,980 | 4,840 |
| 8 | 5,190 | 16,600 | 6,200 | 5,300 | 5,000 | 7,700 | 28,300 | 23,000 | 8,680 | 11,700 | 7,710 | 4,730 |
| 9 | 5,420 | 18,600 | 5,800 | 5,400 | 5,100 | 7,400 | 29,900 | 20,800 | 9,120 | 30,000 | 7,570 | 4,840 |
| 10 | 5,770 | 19,700 | 5,800 | 5,500 | 5,400 | 7,400 | 29,400 | 18,800 | 7,980 | 33,500 | 7,710 | 5,070 |
| 11 | 5,770 | 17,600 | 6,200 | 5,300 | 5,200 | 6,700 | 29,400 | 17,800 | 7,570 | 27,000 | 7,300 | 5,190 |
| 12 | 6,770 | 15,200 | 6,300 | 5,300 | 5,200 | 7,300 | 27,000 | 17,400 | 7,570 | 22,500 | 6,600 | 4,960 |
| 13 | 8,540 | 12,300 | 6,100 | 5,300 | 5,600 | 7,400 | 25,000 | 16,800 | 7,840 | 21,100 | 6,800 | 4,960 |
| 14 | 10,200 | 10,800 | 6,000 | 4,900 | 5,600 | 7,300 | 24,000 | 16,800 | 8,120 | 20,800 | 7,000 | 6,010 |
| 15 | 10,500 | 10,200 | 6,000 | 5,000 | 5,800 | 7,300 | 24,700 | 19,100 | 8,400 | 25,500 | 7,600 | 6,910 |
| 16 | 11,500 | 9,720 | 6,100 | 5,200 | 6,000 | 7,200 | 28,800 | 19,100 | 8,120 | 31,600 | 8,500 | 7,170 |
| 17 | 12,100 | 9,420 | 5,900 | 5,200 | 6,200 | 6,900 | 31,800 | 17,000 | 7,710 | 31,000 | 8,100 | 7,170 |
| 18 | 11,600 | 8,970 | 5,800 | 5,200 | 5,900 | 6,400 | 31,800 | 14,600 | 7,440 | 28,000 | 8,100 | 6,780 |
| 19 | 10,800 | 8,260 | 5,900 | 5,200 | 5,900 | 7,200 | 30,200 | 14,100 | 7,040 | 25,700 | 7,200 | 7,440 |
| 20 | 11,300 | 9,720 | 6,000 | 5,200 | 6,700 | 7,300 | 28,300 | 12,600 | 6,910 | 22,500 | 6,300 | 9,800 |
| 21 | 13,700 | 9,720 | 6,300 | 4,800 | 6,700 | 7,400 | 26,500 | 12,100 | 7,710 | 20,400 | 5,700 | 14,800 |
| 22 | 13,700 | 8,680 | 6,200 | 4,600 | 5,900 | 8,000 | 27,800 | 11,500 | 8,260 | 19,700 | 5,600 | 17,800 |
| 23 | 13,700 | 8,260 | 6,000 | 4,700 | 6,400 | 8,300 | 34,400 | 11,500 | 11,300 | 18,800 | 5,200 | 15,800 |
| 24 | 12,700 | 8,540 | 5,500 | 5,100 | 6,900 | 8,400 | 36,800 | 10,700 | 17,400 | 17,400 | 4,900 | 14,600 |
| 25 | 13,500 | 9,120 | 5,200 | 5,000 | 5,500 | 8,400 | 37,100 | 10,800 | 14,400 | 15,800 | 5,300 | 13,400 |
| 26 | 19,000 | 8,100 | 5,800 | 5,200 | 6,800 | 9,100 | 34,700 | 10,700 | 12,000 | 13,700 | 5,300 | 12,500 |
| 27 | 18,800 | 8,400 | 5,200 | 5,200 | 7,700 | 9,100 | 31,600 | 10,000 | 10,500 | 12,000 | 5,400 | 14,300 |
| 28 | 17,200 | 6,800 | 5,300 | 4,700 | 7,800 | 9,400 | 28,600 | 9,270 | 9,720 | 10,700 | 5,400 | 22,200 |
| 29 | 16,200 | 6,900 | 5,300 | 4,500 | ..... | 9,700 | 26,500 | 9,570 | 9,270 | 9,720 | 5,500 | 20,400 |
| 30 | 16,600 | 7,440 | 5,100 | 4,600 | ..... | 10,500 | 26,800 | 9,720 | 8,680 | 9,870 | 5,650 | 18,000 |
| 31 | 24,700 | ..... | 5,000 | 4,900 | ..... | 11,500 | ..... | 9,120 | ..... | 10,300 | 5,530 | ..... |

NOTE.—Stage-discharge relation affected by ice Nov. 26–29 and Dec. 3 to Apr. 8; discharge for this period computed from gage heights corrected for effect of ice by means of one discharge measurement at West Enfield and numerous discharge measurements and other data at Sunk Haze. Stage-discharge relation affected by log jams Aug. 12–29; determinations of discharge for this period based on observed gage heights corrected for effect of logs by means of one discharge measurement at West Enfield and data at Sunk Haze.

*Monthly discharge of Penobscot River at West Enfield, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 6,600 square miles.]

| Month | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 24,700 | 4,170 | 10,600 | 1.60 | 1.85 |
| November | 34,100 | 6,800 | 13,700 | 2.07 | 2.31 |
| December | 7,600 | 5,000 | 6,080 | .922 | 1.06 |
| January | 5,500 | 4,500 | 5,070 | .769 | .89 |
| February | 7,800 | 4,600 | 5,780 | .874 | .91 |
| March | 11,500 | 6,400 | 8,010 | 1.21 | 1.40 |
| April | 37,100 | 13,000 | 27,800 | 4.22 | 4.71 |
| May | 38,600 | 9,120 | 18,000 | 2.72 | 3.14 |
| June | 17,400 | 6,910 | 9,060 | 1.37 | 1.53 |
| July | 33,500 | 6,650 | 17,400 | 2.63 | 3.03 |
| August | 9,870 | 4,900 | 6,980 | 1.06 | 1.22 |
| September | 22,200 | 4,730 | 9,370 | 1.42 | 1.58 |
| The year | 38,600 | 4,170 | 11,500 | 1.74 | 23.63 |

### 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 8 miles above confluence with West Branch at Medway.

DRAINAGE AREA.—1,100 square miles; includes 270 square miles of Chamberlain Lake drainage.

RECORDS AVAILABLE.—October 23, 1902, to September 30, 1918.

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

DISCHARGE MEASUREMENTS.—Made from railroad bridge.

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, 10.7 feet at 4 p. m. July 9 (discharge, 12,900 second-feet); minimum stage recorded, 4.4 feet at 7 a. m. October 1 (discharge, 290 second-feet). Minimum discharge estimated as 210 second-feet from February 10–17, 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.—Several 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 270 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. Results 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 between 300 and 9,000 second-feet. Gage read to half-tenths once daily (except Sundays), except from November 27 to March 30, when it was read three times a week. Daily discharge ascertained by applying mean daily gage height to rating table and making corrections for effect of ice during the winter. Record fair for moderate and high stages but uncertain for low stages.

*Discharge measurements of East Branch of Penobscot River at Grindstone, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 17 | A. F. McAlary | [a] 5.15 | 406 | May 1 | H. A. Lancaster | 8.04 | 5,170 |
| Jan. 28 | do | [a] 5.21 | 289 | 18 | do | 6.88 | 3,080 |
| Mar. 1 | do | [a] 5.80 | 583 | Aug. 1 | do | 6.61 | 2,460 |
| 27 | H. A. Lancaster | [a] 5.65 | 554 | Sept. 3 | do | 5.44 | 996 |

[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, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 290 | 7,800 | 560 | 250 | 250 | 580 | 1,150 | 5,340 | 1,530 | 2,250 | 2,550 | 1,000 |
| 2 | 415 | 6,380 | 560 | 250 | 250 | 600 | 2,100 | 8,100 | 1,650 | 2,250 | 2,550 | 1,050 |
| 3 | 390 | 5,590 | 560 | 250 | 250 | 540 | 2,700 | 6,110 | 1,810 | 2,250 | 2,550 | 950 |
| 4 | 365 | 4,800 | 560 | 250 | 250 | 470 | 4,240 | 5,100 | 1,670 | 2,250 | 2,200 | 770 |
| 5 | 365 | 3,860 | 560 | 250 | 250 | 470 | 4,440 | 4,600 | 1,160 | 2,100 | 1,950 | 620 |
| 6 | 390 | 3,490 | 520 | 250 | 250 | 470 | 4,240 | 4,240 | 1,530 | 1,950 | 2,100 | 560 |
| 7 | 450 | 3,490 | 520 | 270 | 250 | 470 | 4,600 | 5,340 | 1,280 | 2,200 | 1,950 | 560 |
| 8 | 470 | 3,160 | 500 | 290 | 250 | 470 | 5,100 | 4,870 | 1,400 | 3,320 | 1,810 | 600 |
| 9 | 470 | 2,850 | 500 | 290 | 250 | 470 | 5,100 | 4,650 | 1,450 | 12,600 | 1,950 | 620 |
| 10 | 500 | 2,550 | 500 | 320 | 210 | 440 | 4,650 | 3,860 | 1,530 | 9,000 | 1,810 | 590 |
| 11 | 470 | 2,400 | 470 | 320 | 210 | 420 | 4,240 | 3,760 | 1,280 | 7,500 | 1,600 | 560 |
| 12 | 500 | 2,320 | 420 | 240 | 210 | 420 | 4,240 | 3,400 | 1,400 | 7,800 | 1,400 | 500 |
| 13 | 730 | 2,020 | 420 | 340 | 210 | 420 | 4,440 | 3,160 | 2,020 | 9,000 | 1,280 | 560 |
| 14 | 1,000 | 1,740 | 420 | 320 | 210 | 420 | 4,600 | 4,050 | 1,950 | 8,000 | 1,280 | 815 |
| 15 | 1,340 | 1,600 | 420 | 340 | 210 | 420 | 4,870 | 5,340 | 1,810 | 6,930 | 1,400 | 750 |
| 16 | 1,600 | 1,600 | 420 | 340 | 210 | 420 | 5,850 | 5,100 | 1,810 | 9,300 | 1,400 | 620 |
| 17 | 1,600 | 1,460 | 420 | 360 | 210 | 420 | 5,850 | 3,160 | 1,810 | 6,380 | 1,280 | 620 |
| 18 | 1,340 | 1,460 | 420 | 390 | 230 | 420 | 5,590 | 3,000 | 1,160 | 5,100 | 1,150 | 620 |
| 19 | 1,340 | 1,460 | 420 | 420 | 230 | 440 | 5,340 | 2,800 | 1,160 | 4,650 | 1,050 | 815 |
| 20 | 1,340 | 1,340 | 420 | 390 | 230 | 440 | 4,870 | 2,550 | 2,250 | 3,670 | 950 | 815 |
| 21 | 1,500 | 1,220 | 420 | 360 | 230 | 470 | 4,600 | 1,950 | 2,400 | 4,000 | 950 | 1,460 |
| 22 | 1,400 | 1,220 | 420 | 360 | 250 | 470 | 4,440 | 1,950 | 2,700 | 4,240 | 860 | 1,450 |
| 23 | 1,280 | 1,100 | 390 | 390 | 270 | 500 | 5,100 | 2,250 | 5,000 | 4,050 | 860 | 1,340 |
| 24 | 1,160 | 1,000 | 360 | 360 | 290 | 500 | 7,210 | 1,950 | 5,850 | 3,860 | 860 | 1,280 |
| 25 | 2,850 | 950 | 360 | 340 | 320 | 540 | 6,380 | 1,950 | 2,700 | 3,490 | 950 | 1,160 |
| 26 | 4,240 | 815 | 360 | 320 | 390 | 560 | 6,110 | 1,950 | 2,850 | 3,160 | 1,050 | 1,050 |
| 27 | 3,160 | 820 | 340 | 290 | 470 | 560 | 5,340 | 1,950 | 2,400 | 3,000 | 1,050 | 1,100 |
| 28 | 3,000 | 700 | 320 | 290 | 530 | 560 | 4,600 | 1,950 | 2,400 | 2,900 | 950 | 1,670 |
| 29 | 2,850 | 620 | 290 | 270 | ..... | 600 | 3,860 | 1,950 | 2,250 | 2,850 | 860 | 1,500 |
| 30 | 3,160 | 560 | 270 | 270 | ..... | 780 | 4,240 | 1,950 | 2,250 | 2,550 | 950 | 1,400 |
| 31 | 8,400 | ..... | 250 | 270 | ..... | 940 | ..... | 1,810 | ..... | 3,000 | 950 | ..... |

NOTE.—Stage-discharge relation affected by ice from Dec. 27 to Apr. 3; 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. Discharge estimated for Sundays (gage not read).

*Monthly discharge of East Branch of Penobscot River at Grindstone, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 1,100 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 8,400 | 290 | 1,560 | 1.42 | 1.64 |
| November | 7,800 | 560 | 2,350 | 2.14 | 2.39 |
| December | 560 | 250 | 431 | .392 | .45 |
| January | 420 | 250 | 315 | .286 | .33 |
| February | 530 | 210 | 263 | .239 | .25 |
| March | 940 | 420 | 507 | .461 | .53 |
| April | 7,210 | 1,150 | 4,670 | 4.25 | 4.74 |
| May | 8,100 | 1,810 | 3,550 | 3.23 | 3.72 |
| June | 5,850 | 1,160 | 2,080 | 1.89 | 2.11 |
| July | 12,600 | 1,950 | 4,700 | 4.27 | 4.92 |
| August | 2,550 | 860 | 1,440 | 1.31 | 1.51 |
| September | 1,670 | 500 | 914 | .831 | .93 |
| The year | 12,600 | 210 | 1,900 | 1.73 | 23.52 |

### MATTAWAMKEAG RIVER AT MATTAWAMKEAG, MAINE.

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

DRAINAGE AREA.—1,500 square miles.

RECORDS AVAILABLE.—August 26, 1902, to September 30, 1918.

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

DISCHARGE MEASUREMENTS.—Made from the bridge; low-water measurements made by wading at a point about a mile above station.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.9 feet at 5 p. m. April 26 (discharge, 12,400 second-feet); minimum stage recorded, 3.90 feet at 7 a. m. October 1 (discharge, 560 second-feet). Minimum discharge estimated as 340 second-feet on February 7 when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation usually affected by ice for several months 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 tenths twice daily, except from December 16 to March 28, when it was read twice a week. Daily discharge ascertained by applying mean daily gage height to rating table and making corrections for effect of ice during the winter. Records good.

*Discharge measurements of Mattawamkeag River at Mattawamkeag, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 7 | A. F. McAlary | [a] 6.30 | 657 | May 16 | H. A. Lancaster | 6.63 | 4,270 |
| Feb. 8 | do | [a] 5.76 | 466 | June 22 | do | 4.87 | 1,420 |
| Mar. 5 | do | [a] 6.6 | 1,010 | July 30 | do | 5.07 | 1,690 |
| 30 | H. A. Lancaster | [a] 6.7 | 1,250 | Sept. 7 | do | 3.94 | 575 |
| Apr. 10 | do | [b] 8.44 | 7,300 | | | | |

[a] Stage-discharge relation affected by ice.
[b] Stage-discharge relation possibly affected by high stage of Penobscot River.

*Daily discharge, in second-feet, of Mattawamkeag River at Mattawamkeag, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 590 | 6,140 | 1,000 | 500 | 560 | 940 | 1,500 | 9,690 | 1,230 | 1,400 | 1,510 | 590 |
| 2 | 730 | 6,850 | 1,000 | 540 | 560 | 1,000 | 1,950 | 10,200 | 1,340 | 1,230 | 1,450 | 590 |
| 3 | 850 | 7,100 | 1,000 | 540 | 560 | 1,050 | 2,500 | 10,500 | 1,570 | 1,280 | 1,340 | 590 |
| 4 | 940 | 6,610 | 940 | 540 | 540 | 1,050 | 3,000 | 10,200 | 1,570 | 1,180 | 1,180 | 590 |
| 5 | 895 | 6,140 | 900 | 540 | 470 | 1,000 | 3,600 | 9,690 | 1,510 | 985 | 1,080 | 590 |
| 6 | 895 | 5,240 | 900 | 600 | 390 | 1,050 | 4,400 | 8,900 | 1,450 | 940 | 1,080 | 590 |
| 7 | 1,080 | 4,810 | 900 | 660 | 340 | 1,050 | 4,600 | 8,120 | 1,570 | 1,130 | 1,180 | 620 |
| 8 | 1,230 | 4,600 | 900 | 620 | 470 | 1,080 | 4,800 | 7,600 | 1,820 | 2,090 | 1,130 | 590 |
| 9 | 1,180 | 4,400 | 1,150 | 620 | 500 | 1,080 | 6,100 | 7,100 | 1,820 | 4,200 | 1,080 | 620 |
| 10 | 1,230 | 4,000 | 940 | 620 | 470 | 1,150 | 7,400 | 6,370 | 1,820 | 5,460 | 1,080 | 730 |
| 11 | 1,400 | 3,610 | 900 | 620 | 440 | 1,100 | 8,100 | 6,370 | 1,820 | 5,910 | 1,030 | 730 |
| 12 | 1,690 | 3,230 | 840 | 620 | 420 | 1,100 | 8,640 | 6,140 | 1,690 | 5,460 | 985 | 655 |
| 13 | 2,380 | 2,870 | 800 | 620 | 360 | 1,050 | 8,640 | 5,460 | 1,950 | 5,680 | 1,030 | 690 |
| 14 | 3,230 | 2,530 | 840 | 620 | 420 | 1,050 | 8,380 | 4,600 | 2,230 | 5,910 | 1,080 | 850 |
| 15 | 4,000 | 2,380 | 800 | 620 | 540 | 1,000 | 8,380 | 4,400 | 2,380 | 6,370 | 1,080 | 940 |
| 16 | 4,400 | 2,230 | 700 | 620 | 620 | 1,000 | 8,900 | 4,000 | 2,380 | 6,850 | 1,080 | 1,280 |
| 17 | 4,600 | 2,090 | 640 | 600 | 740 | 1,000 | 9,690 | 4,000 | 1,570 | 6,370 | 985 | 1,280 |
| 18 | 4,400 | 2,090 | 620 | 600 | 740 | 940 | 9,960 | 4,000 | 1,570 | 6,140 | 895 | 1,280 |
| 19 | 4,000 | 1,950 | 620 | 600 | 740 | 940 | 9,690 | 3,610 | 1,570 | 5,910 | 850 | 1,820 |
| 20 | 4,000 | 1,950 | 620 | 600 | 740 | 1,000 | 9,420 | 3,040 | 1,510 | 5,460 | 730 | 2,380 |
| 21 | 4,810 | 1,820 | 620 | 600 | 780 | 1,000 | 8,640 | 2,700 | 1,510 | 4,810 | 655 | 4,200 |
| 22 | 5,020 | 1,820 | 620 | 600 | 810 | 1,000 | 8,640 | 2,530 | 1,510 | 4,600 | 590 | 5,460 |
| 23 | 4,810 | 1,690 | 620 | 600 | 810 | 940 | 9,690 | 2,380 | 1,570 | 4,200 | 620 | 5,910 |
| 24 | 4,600 | 1,510 | 620 | 600 | 810 | 940 | 10,800 | 2,230 | 2,090 | 3,800 | 655 | 5,910 |
| 25 | 4,400 | 1,280 | 620 | 600 | 810 | 1,000 | 11,900 | 1,950 | 2,230 | 3,040 | 655 | 5,460 |
| 26 | 4,600 | 1,080 | 620 | 560 | 840 | 1,000 | 12,400 | 1,570 | 2,090 | 2,700 | 655 | 5,020 |
| 27 | 4,810 | 995 | 600 | 560 | 840 | 1,050 | 11,900 | 1,510 | 1,820 | 2,380 | 620 | 4,810 |
| 28 | 4,810 | 940 | 560 | 560 | 900 | 1,150 | 11,300 | 1,340 | 1,820 | 2,090 | 590 | 6,370 |
| 29 | 4,600 | 900 | 560 | 560 | ..... | 1,250 | 10,500 | 1,400 | 1,690 | 1,820 | 590 | 7,350 |
| 30 | 4,400 | 940 | 540 | 560 | ..... | 1,250 | 9,960 | 1,400 | 1,690 | 1,690 | 590 | 7,600 |
| 31 | 5,240 | ..... | 500 | 560 | ..... | 1,250 | ..... | 1,280 | ..... | 1,690 | 590 | ..... |

NOTE.—Stage-discharge relation affected by ice Nov. 28 to Apr. 11; discharge for this period computed from gage heights corrected for effect of ice by means of five discharge measurements, observer's notes, and weather records.

*Monthly discharge of Mattawamkeag River at Mattawamkeag, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 1,500 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 5,240 | 590 | 3,090 | 2.06 | 2.38 |
| November | 7,100 | 900 | 3,130 | 2.09 | 2.33 |
| December | 1,150 | 500 | 758 | .505 | .58 |
| January | 620 | 540 | 589 | .393 | .45 |
| February | 900 | 340 | 615 | .410 | .43 |
| March | 1,250 | 940 | 1,050 | .700 | .81 |
| April | 12,400 | 1,500 | 7,840 | 5.23 | 5.84 |
| May | 10,500 | 1,280 | 4,980 | 3.32 | 3.83 |
| June | 2,380 | 1,230 | 1,750 | 1.17 | 1.30 |
| July | 6,850 | 940 | 3,640 | 2.43 | 2.80 |
| August | 1,510 | 590 | 925 | .617 | .71 |
| September | 7,600 | 590 | 2,540 | 1.69 | 1.89 |
| The year | 12,400 | 340 | 2,580 | 1.72 | 23.35 |

### PISCATAQUIS RIVER NEAR FOXCROFT, MAINE.

LOCATION.—At highway bridge known as Lows Bridge, halfway between Guilford and Foxcroft, Piscataquis County, three-fourths 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, 1918.

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

DISCHARGE MEASUREMENTS.—At medium and high stages made from bridge; at low stages made by wading either above or below the bridge.

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

EXTREMES OF DISCHARGE.—Maximum open-water stage recorded during year, 7.8 feet at 7.30 a. m. October 31 (discharge, 5,310 second feet; a stage of 8.6 feet was recorded at 5 p. m. April 3, but the water was probably held back by an ice jam); minimum stage recorded, 1.9 feet several times during August and September (discharge, 51 second-feet). Minimum discharge estimated as 17 second-feet several times during January, when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation affected by ice during some winters.

REGULATION.—The stream is used to develop power at several manufacturing plants above the station; 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 between 20 and 4,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table and making corrections for effect of ice during the winter. Some uncertainty exists in regard to accuracy of gage heights and the effect of diurnal fluctuation. Records fair.

*Discharge measurements of Piscataquis River near Foxcroft, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 14 | A. F. McAlary | [a] 4.27 | 180 | July 31 | H. A. Lancaster | 2.94 | 341 |
| Feb. 18 | do | [a] 4.38 | 202 | Sept. 22 | do | 3.64 | 792 |
| Mar. 26 | H. A. Lancaster | [a] 4.56 | 251 | 23 | do | 3.02 | 404 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Piscataquis River near Foxcroft, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 175 | 2,430 | 380 | 80 | 58 | 560 | 640 | 3,200 | 355 | 305 | 355 | 51 |
| 2 | 175 | 1,700 | 380 | 80 | 46 | 560 | 1,150 | 4,110 | 305 | 260 | 355 | 72 |
| 3 | 175 | 1,240 | 380 | 90 | 24 | 380 | 2,400 | 3,200 | 440 | 222 | 240 | 110 |
| 4 | 175 | 1,020 | 380 | 110 | 19 | 380 | 2,300 | 2,100 | 380 | 222 | 260 | 145 |
| 5 | 175 | 925 | 380 | 100 | 24 | 280 | 2,200 | 1,240 | 330 | 222 | 260 | 145 |
| 6 | 260 | 800 | 380 | 90 | 24 | 175 | 2,300 | 1,240 | 260 | 190 | 240 | 120 |
| 7 | 470 | 800 | 380 | 36 | 24 | 200 | 2,400 | 1,020 | 90 | 305 | 355 | 160 |
| 8 | 470 | 680 | 380 | 28 | 24 | 100 | 2,200 | 720 | 222 | 840 | 280 | 100 |
| 9 | 470 | 680 | 380 | 80 | 24 | 58 | 2,210 | 500 | 380 | 2,540 | 240 | 110 |
| 10 | 410 | 640 | 300 | 100 | 24 | 120 | 2,000 | 500 | 440 | 2,000 | 240 | 110 |
| 11 | 280 | 570 | 240 | 100 | 51 | 100 | 1,800 | 500 | 440 | 1,420 | 222 | 90 |
| 12 | 280 | 640 | 240 | 64 | 19 | 72 | 1,700 | 440 | 440 | 1,420 | 222 | 120 |
| 13 | 470 | 680 | 200 | 17 | 46 | 72 | 1,420 | 440 | 330 | 1,330 | 222 | 110 |
| 14 | 500 | 640 | 200 | 31 | 58 | 90 | 1,420 | 380 | 330 | 1,240 | 190 | 160 |
| 15 | 640 | 605 | 200 | 22 | 31 | 100 | 1,700 | 355 | 330 | 1,420 | 190 | 160 |
| 16 | 570 | 605 | 200 | 24 | 28 | 100 | 1,700 | 470 | 380 | 1,330 | 190 | 175 |
| 17 | 535 | 605 | 200 | 24 | 19 | 64 | 2,210 | 720 | 355 | 2,100 | 132 | 175 |
| 18 | 410 | 380 | 200 | 19 | 160 | 90 | 2,210 | 680 | 260 | 1,510 | 64 | 190 |
| 19 | 410 | 380 | 200 | 22 | 46 | 110 | 1,800 | 410 | 260 | 1,330 | 110 | 205 |
| 20 | 410 | 380 | 200 | 90 | 51 | 110 | 1,800 | 680 | 190 | 1,020 | 190 | 440 |
| 21 | 640 | 440 | 145 | 72 | 200 | 145 | 1,700 | 680 | 145 | 840 | 160 | 880 |
| 22 | 470 | 440 | 160 | 72 | 72 | 145 | 2,540 | 640 | 145 | 500 | 132 | 640 |
| 23 | 440 | 440 | 64 | 110 | 110 | 145 | 2,980 | 640 | 2,760 | 500 | 132 | 470 |
| 24 | 305 | 500 | 46 | 145 | 31 | 260 | 2,980 | 535 | 760 | 500 | 90 | 355 |
| 25 | 760 | 570 | 80 | 72 | 120 | 360 | 2,540 | 470 | 680 | 500 | 64 | 355 |
| 26 | 1,150 | 570 | 80 | 58 | 330 | 260 | 2,000 | 440 | 680 | 440 | 80 | 500 |
| 27 | 925 | 640 | 58 | 17 | 145 | 260 | 1,800 | 440 | 605 | 305 | 80 | 2,320 |
| 28 | 1,060 | 640 | 64 | 28 | 145 | 260 | 1,420 | 440 | 570 | 355 | 72 | 1,600 |
| 29 | 970 | 640 | 72 | 28 | ..... | 300 | 1,510 | 380 | 260 | 380 | 120 | 720 |
| 30 | 1,060 | 500 | 72 | 40 | ..... | 330 | 2,100 | 260 | 305 | 500 | 100 | 535 |
| 31 | 4,830 | ..... | 90 | 58 | ..... | 500 | ..... | 500 | ..... | 355 | 51 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 10 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, and weather records.

*Monthly discharge of Piscataquis River near Foxcroft, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 286 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 4,830 | 175 | 647 | 2.26 | 2.61 |
| November | 2,430 | 380 | 726 | 2.54 | 2.83 |
| December | 380 | 46 | 217 | .759 | .88 |
| January | 145 | 17 | 61.6 | .214 | .25 |
| February | 330 | 19 | 69.8 | .244 | .25 |
| March | 560 | 64 | 216 | .755 | .87 |
| April | 2,980 | 640 | 1,970 | 6.89 | 7.69 |
| May | 4,110 | 260 | 914 | 3.19 | 3.68 |
| June | 2,760 | 90 | 448 | 1.57 | 1.75 |
| July | 2,540 | 190 | 852 | 2.98 | 3.44 |
| August | 355 | 51 | 182 | .636 | .73 |
| September | 2,320 | 51 | 377 | 1.32 | 1.47 |
| The year | 4,830 | 17 | 557 | 1.95 | 26.45 |

### PASSADUMKEAG RIVER AT LOWELL, MAINE.

LOCATION.—About 400 feet 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, 1918.

GAGES.—Chain and staff gages on left bank; from October 1, 1915, to October 1, 1917, chain and staff gages on right bank half a mile below the highway bridge; read by F. A. Lord. Staff above dam for supplementary use during winter.

DISCHARGE MEASUREMENTS.—Made from cable near gage.

CHANNEL AND CONTROL.—Channel rough and somewhat irregular; control about 100 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.30 feet several times during April and May (discharge, 1,490 second-feet); minimum stage recorded, 1.40 feet at 8 a. m. August 30 (discharge, 127 second-feet).

1916–1918: Maximum stage recorded, 5.8 feet at 9.30 a. m. April 26, 1917 (discharge, 2,460 second-feet); minimum stage recorded, 1.40 feet at 8 a. m. August 30, 1918 (discharge, 127 second-feet).

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 400 feet above the gage cause fluctuations in stage for a short time each day when mill is in operation.

ACCURACY.—Stage-discharge relation practically permanent, except when affected by backwater due to logs on control or to ice. Gage read to half-tenths once daily. Rating curve well defined between 90 and 2,000 second-feet. Daily discharge ascertained by applying gage height to rating table and making corrections for effect of ice during the winter. Records fair.

COOPERATION.—Discharge measurements made by engineers employed by T. W. Clark, hydraulic engineer, Oldtown, Maine.

*Discharge measurements of Passadumkeag River at Lowell, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 6 | Pressey and Lancaster. | 1.67 | 191 | Mar. 12 | H. A. Lancaster..... | [a] 1.84 | 226 |
| 24 | H. A. Lancaster..... | 2.18 | 481 | Apr. 3 | .....do..... | 2.56 | 758 |
| Nov. 2 | Clark and Lancaster... | 2.52 | 749 | 4 | .....do..... | 2.70 | 843 |
| 28 | H. A. Lancaster..... | 2.15 | 436 | Sept. 18 | .....do..... | 1.14 | 94 |
| Jan. 30 | .....do..... | [a] 1.77 | 182 | 18 | .....do..... | 1.17 | 110 |
| 30 | .....do..... | [a] 1.77 | 180 | | | | |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Passadumkeag River at Lowell, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 178 | 712 | 382 | 190 | 180 | 300 | 382 | 1,490 | 712 | 478 | 275 | 138 |
| 2 | 163 | 712 | 382 | 180 | 180 | 300 | 669 | 1,490 | 712 | 444 | 275 | 138 |
| 3 | 178 | 712 | 382 | 180 | 180 | 270 | 588 | 1,440 | 669 | 478 | 252 | 138 |
| 4 | 178 | 628 | 382 | 180 | 180 | 270 | 845 | 1,380 | 628 | 382 | 252 | 138 |
| 5 | 178 | 628 | 353 | 180 | 180 | 250 | 845 | 1,330 | 669 | 382 | 252 | 138 |
| 6 | 194 | 628 | 353 | 180 | 180 | 230 | 845 | 1,220 | 628 | 353 | 231 | 138 |
| 7 | 212 | 550 | 353 | 180 | 180 | 230 | 845 | 1,220 | 669 | 353 | 252 | 150 |
| 8 | 275 | 550 | 380 | 180 | 180 | 230 | 890 | 1,220 | 800 | 480 | 231 | 150 |
| 9 | 275 | 550 | 353 | 180 | 180 | 230 | 935 | 1,070 | 760 | 550 | 275 | 178 |
| 10 | 300 | 588 | 350 | 180 | 180 | 230 | 980 | 1,020 | 760 | 710 | 252 | 212 |
| 11 | 326 | 478 | 350 | 180 | 180 | 230 | 1,120 | 980 | 710 | 890 | 300 | 212 |
| 12 | 382 | 478 | 350 | 180 | 180 | 230 | 1,070 | 1,020 | 670 | 840 | 326 | 212 |
| 13 | 478 | 478 | 350 | 180 | 180 | 230 | 1,070 | 1,020 | 630 | 800 | 275 | 212 |
| 14 | 669 | 444 | 330 | 180 | 180 | 230 | 935 | 980 | 630 | 756 | 252 | 231 |
| 15 | 669 | 444 | 326 | 180 | 180 | 230 | 935 | 980 | 630 | 756 | 252 | 275 |
| 16 | 669 | 444 | 330 | 180 | 180 | 230 | 980 | 980 | 590 | 756 | 252 | 275 |
| 17 | 712 | 412 | 326 | 180 | 180 | 210 | 1,070 | 1,020 | 550 | 800 | 231 | 275 |
| 18 | 669 | 353 | 300 | 180 | 190 | 212 | 1,070 | 935 | 510 | 756 | 252 | 275 |
| 19 | 588 | 300 | 300 | 180 | 210 | 212 | 513 | 935 | 480 | 756 | 231 | 252 |
| 20 | 628 | 353 | 300 | 180 | 210 | 212 | 513 | 890 | 440 | 712 | 231 | 353 |
| 21 | 669 | 353 | 275 | 180 | 230 | 231 | 1,070 | 756 | 410 | 669 | 231 | 382 |
| 22 | 513 | 353 | 275 | 180 | 230 | 231 | 1,170 | 800 | 380 | 669 | 212 | 628 |
| 23 | 513 | 353 | 275 | 180 | 230 | 231 | 1,330 | 712 | 440 | 588 | 252 | 712 |
| 24 | 478 | 382 | 275 | 180 | 250 | 252 | 1,440 | 800 | 510 | 513 | 252 | 760 |
| 25 | 513 | 444 | 252 | 180 | 252 | 252 | 1,490 | 800 | 510 | 478 | 178 | 760 |
| 26 | 588 | 478 | 230 | 180 | 270 | 252 | 1,440 | 756 | 510 | 382 | 194 | 800 |
| 27 | 628 | 513 | 230 | 180 | 270 | 252 | 1,380 | 756 | 510 | 326 | 194 | 940 |
| 28 | 669 | 444 | 210 | 180 | 300 | 252 | 1,330 | 756 | 513 | 330 | 194 | 980 |
| 29 | 628 | 478 | 210 | 180 | ..... | 275 | 1,070 | 756 | 478 | 326 | 178 | 980 |
| 30 | 628 | 444 | 210 | 180 | ..... | 300 | 1,380 | 712 | 478 | 300 | 127 | 980 |
| 31 | 669 | ..... | 210 | 180 | ..... | 326 | ..... | 712 | ..... | 300 | 138 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 8, 10–14, 16; Dec. 26 to Feb. 24; and Feb. 26 to Mar. 17. Discharge for these periods computed from gage heights corrected for effect of ice by means of three discharge measurements and gage heights at dam. Corrections made for operation of gates July 8, 28; and for log jams June 8–27, July 8–13, and Sept. 24–30.

*Monthly discharge of Passadumkeag River at Lowell, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 301 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 712 | 163 | 465 | 1.54 | 1.78 |
| November | 712 | 300 | 489 | 1.62 | 1.81 |
| December | 382 | 210 | 309 | 1.03 | 1.19 |
| January | 190 | 180 | 180 | .598 | .69 |
| February | 300 | 180 | 204 | .678 | .71 |
| March | 326 | 210 | 246 | .817 | .94 |
| April | 1,490 | 382 | 1,010 | 3.36 | 3.75 |
| May | 1,490 | 712 | 998 | 3.32 | 3.83 |
| June | 800 | 380 | 586 | 1.95 | 2.18 |
| July | 890 | 300 | 558 | 1.85 | 2.13 |
| August | 326 | 127 | 235 | .781 | .90 |
| September | 980 | 138 | 400 | 1.33 | 1.48 |
| The year | 1,490 | 127 | 474 | 1.57 | 21.39 |

### KENDUSKEAG STREAM NEAR BANGOR, MAINE.

LOCATION.—At highway bridge at Sixmile Falls, 6 miles northwest of Bangor, Penobscot County, and 7 miles below mouth of Black Stream.

DRAINAGE AREA.—191 square miles. See "Diversions."

RECORDS AVAILABLE.—September 15, 1908, to September 30, 1918.

GAGE.—Chain attached to bridge; read by Fred Cort.

DISCHARGE MEASUREMENTS.—Made from the bridge.

CHANNEL AND CONTROL.—Practically permanent; channel broken by one pier at the bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.7 feet at 7.35 a. m. April 4 (discharge, 4,370 second-feet); minimum stage recorded, 1.7 feet several times in June and September (discharge, 29 second-feet).

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

DIVERSIONS.—An artificial cut was made for log driving through a low divide between Souadabscook Stream and Black Stream, which enters the Kenduskeag about 7 miles above the gaging station. During high stages of the Souadabscook part of its waters finds its way through the artificial cut into the Kenduskeag; at low stages of the Souadabscook all the flow continues down its own channel; Black Stream probably sends its waters only to the Kenduskeag.

ACCURACY.—Stage-discharge relation probably permanent except when affected by ice. Rating curve well defined below 3,600 second-feet. Gage read to tenths twice daily during open-water period; three times a week from December 25 to March 26. Daily discharge ascertained by applying mean daily gage height to rating table and making corrections for effect of ice during the winter. Records good for ordinary stages.

*Discharge measurements of Kenduskeag Stream near Bangor, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 24 | A. F. McAlary | [a] 2.80 | 69 | Apr. 1 | A. F. McAlary | [a] 7.35 | 1,760 |
| Jan. 26 | do | [a] 2.98 | 59 | July 5 | H. A. Lancaster | 1.75 | 32.7 |
| Feb. 25 | do | [a] 4.47 | 210 | | | | |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Kenduskeag Stream near Bangor, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 76 | 1,750 | 311 | 60 | 60 | 860 | 1,800 | 790 | 48 | 42 | 123 | 29 |
| 2 | 84 | 1,480 | 265 | 60 | 60 | 760 | 3,000 | 1,240 | 48 | 37 | 99 | 33 |
| 3 | 76 | 1,360 | 206 | 60 | 60 | 680 | 4,000 | 1,060 | 37 | 37 | 84 | 37 |
| 4 | 84 | 890 | 206 | 60 | 54 | 620 | 4,370 | 790 | 37 | 37 | 68 | 29 |
| 5 | 68 | 790 | 181 | 60 | 48 | 540 | 3,930 | 538 | 37 | 37 | 61 | 29 |
| 6 | 84 | 615 | 170 | 60 | 48 | 380 | 2,950 | 538 | 29 | 48 | 76 | 33 |
| 7 | 91 | 538 | 170 | 60 | 48 | 430 | 2,460 | 463 | 29 | 76 | 61 | 29 |
| 8 | 91 | 500 | 150 | 60 | 54 | 380 | 2,370 | 343 | 29 | 181 | 76 | 29 |
| 9 | 107 | 576 | 140 | 60 | 60 | 360 | 2,050 | 375 | 29 | 392 | 68 | 33 |
| 10 | 115 | 392 | 125 | 60 | 60 | 360 | 1,120 | 327 | 29 | 740 | 123 | 37 |
| 11 | 150 | 296 | 115 | 54 | 60 | 340 | 1,540 | 280 | 29 | 1,180 | 159 | 42 |
| 12 | 194 | 234 | 100 | 54 | 60 | 330 | 1,540 | 343 | 33 | 1,480 | 170 | 37 |
| 13 | 265 | 206 | 100 | 48 | 60 | 310 | 1,500 | 265 | 37 | 1,610 | 170 | 76 |
| 14 | 392 | 206 | 100 | 60 | 68 | 330 | 1,200 | 250 | 29 | 1,970 | 181 | 140 |
| 15 | 359 | 194 | 100 | 68 | 68 | 330 | 1,060 | 234 | 37 | 2,950 | 206 | 206 |
| 16 | 250 | 206 | 90 | 68 | 76 | 340 | 1,000 | 181 | 29 | 2,550 | 181 | 296 |
| 17 | 206 | 181 | 90 | 68 | 90 | 330 | 1,000 | 206 | 33 | 2,050 | 159 | 427 |
| 18 | 170 | 181 | 90 | 76 | 100 | 330 | 945 | 170 | 33 | 1,000 | 150 | 500 |
| 19 | 159 | 234 | 90 | 84 | 100 | 340 | 740 | 132 | 29 | 790 | 115 | 538 |
| 20 | 463 | 296 | 90 | 90 | 115 | 360 | 655 | 115 | 33 | 615 | 84 | 840 |
| 21 | 655 | 392 | 84 | 90 | 130 | 360 | 538 | 107 | 37 | 538 | 54 | 1,480 |
| 22 | 538 | 375 | 100 | 90 | 140 | 360 | 890 | 107 | 42 | 538 | 61 | 1,610 |
| 23 | 463 | 427 | 76 | 84 | 160 | 360 | 1,480 | 91 | 68 | 615 | 76 | 1,610 |
| 24 | 392 | 463 | 68 | 76 | 180 | 330 | 1,420 | 91 | 280 | 538 | 91 | 1,610 |
| 25 | 1,060 | 538 | 68 | 68 | 210 | 330 | 1,180 | 76 | 234 | 392 | 91 | 1,480 |
| 26 | 1,750 | 463 | 68 | 60 | 440 | 380 | 840 | 68 | 150 | 206 | 76 | 1,480 |
| 27 | 1,360 | 538 | 68 | 60 | 760 | 410 | 655 | 61 | 99 | 194 | 61 | 1,480 |
| 28 | 1,000 | 463 | 68 | 60 | 820 | 460 | 538 | 61 | 68 | 206 | 54 | 1,610 |
| 29 | 1,120 | 410 | 68 | 60 | ..... | 800 | 500 | 76 | 61 | 181 | 42 | 1,180 |
| 30 | 1,120 | 343 | 60 | 60 | ..... | 1,200 | 538 | 61 | 48 | 159 | 37 | 840 |
| 31 | 1,680 | ..... | 60 | 60 | ..... | 1,400 | ..... | 61 | ..... | 140 | 37 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 6 to Apr. 3; 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.

*Monthly discharge of Kenduskeag Stream near Bangor, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 191 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 1,750 | 68 | 472 | 2.47 | 2.85 |
| November | 1,750 | 181 | 518 | 2.71 | 3.02 |
| December | 311 | 60 | 119 | .623 | .72 |
| January | 90 | 48 | 65.7 | .344 | .40 |
| February | 820 | 48 | 150 | .780 | .81 |
| March | 1,400 | 310 | 487 | 2.55 | 2.94 |
| April | 4,370 | 500 | 1,590 | 8.34 | 9.31 |
| May | 1,240 | 61 | 306 | 1.60 | 1.84 |
| June | 280 | 29 | 58.7 | .307 | .34 |
| July | 2,950 | 37 | 694 | 3.63 | 4.18 |
| August | 206 | 37 | 99.8 | .523 | .60 |
| September | 1,610 | 29 | 593 | 3.10 | 3.46 |
| The year | 4,370 | 29 | 429 | 2.25 | 30.47 |

## KENNEBEC RIVER BASIN.

### 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, 1918.

GAGE.—Staff at end of boat landing; two datums have been used at east outlet; the first (or original datum) is 1,011.30 feet above mean sea level and about 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 elevations varying from 8.0 feet to 11.4 feet. At extreme low stages the flow from the lake is controlled not by the gates but by a bar above the dam at a gage height of about 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 the Kennebec at The Forks.

COOPERATION.—Record furnished by Hollingsworth & Whitney Co.

*Daily gage height, in feet, of Moosehead Lake at east outlet, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 15.6 | 15.55 | ..... | ..... | 13.05 | ..... | 11.4 | 15.5 | ..... | 16.75 | ..... | ..... |
| 2 | ..... | ..... | ..... | 14.6 | ..... | 11.95 | ..... | ..... | ..... | ..... | 16.7 | 15.0 |
| 3 | 15.5 | ..... | 16.0 | ..... | ..... | ..... | 11.5 | ..... | 17.2 | 16.65 | ..... | ..... |
| 4 | ..... | ..... | ..... | 14.5 | 12.95 | 11.9 | ..... | ..... | ..... | ..... | ..... | 14.9 |
| 5 | 15.4 | 16.0 | 15.95 | ..... | ..... | ..... | ..... | ..... | 17.2 | 16.6 | 16.55 | ..... |
| 6 | ..... | ..... | ..... | ..... | 12.8 | 11.85 | 11.8 | 16.4 | ..... | ..... | ..... | ..... |
| 7 | ..... | 16.1 | 15.7 | 14.3 | ..... | ..... | ..... | ..... | ..... | ..... | 16.5 | 14.8 |
| 8 | 15.2 | ..... | ..... | ..... | 12.75 | 11.75 | 12.05 | 16.6 | 17.2 | 16.6 | 16.4 | ..... |
| 9 | ..... | 16.1 | ..... | 14.2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 14.9 |
| 10 | 15.15 | ..... | 15.8 | ..... | ..... | ..... | 12.45 | 16.65 | 17.05 | 16.8 | ..... | ..... |
| 11 | ..... | ..... | ..... | ..... | 12.65 | 11.7 | ..... | ..... | ..... | ..... | ..... | 14.5 |
| 12 | 15.15 | 16.1 | 15.75 | 14.0 | 12.5 | ..... | 12.6 | ..... | 17.05 | 17.0 | 16.4 | ..... |
| 13 | ..... | ..... | ..... | ..... | ..... | 11.65 | ..... | 16.9 | ..... | ..... | ..... | 14.4 |
| 14 | ..... | 16.2 | 15.7 | 13.9 | ..... | ..... | ..... | ..... | 17.0 | ..... | 16.25 | ..... |
| 15 | 15.0 | ..... | ..... | ..... | 12.45 | 11.6 | 13.0 | 17.1 | ..... | 17.0 | ..... | ..... |
| 16 | 15.0 | 16.25 | ..... | 13.75 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 17 | ..... | ..... | 15.5 | ..... | ..... | ..... | ..... | 17.2 | 16.9 | 17.1 | 16.0 | 14.2 |
| 18 | ..... | ..... | ..... | 13.8 | 12.3 | 11.6 | ..... | ..... | ..... | ..... | ..... | 14.1 |
| 19 | 14.9 | 16.25 | 15.4 | ..... | ..... | ..... | 13.7 | ..... | 16.8 | 17.1 | 15.95 | ..... |
| 20 | ..... | ..... | ..... | ..... | 12.2 | 11.6 | ..... | 17.3 | ..... | ..... | ..... | ..... |
| 21 | ..... | ..... | ..... | 13.6 | ..... | ..... | ..... | ..... | ..... | ..... | 15.8 | ..... |
| 22 | 14.9 | ..... | 15.25 | ..... | ..... | 11.55 | 14.1 | 17.3 | 16.7 | 17.0 | ..... | ..... |
| 23 | ..... | 16.2 | ..... | 13.55 | 12.0 | ..... | ..... | ..... | ..... | ..... | 15.75 | 14.3 |
| 24 | 14.9 | ..... | 15.1 | ..... | ..... | ..... | 14.4 | ..... | 16.8 | 17.0 | ..... | ..... |
| 25 | ..... | ..... | ..... | 13.45 | 12.0 | 11.5 | ..... | 17.3 | ..... | ..... | ..... | ..... |
| 26 | 14.9 | 16.2 | 15.0 | ..... | ..... | ..... | 14.7 | ..... | 16.9 | 16.9 | 15.5 | 14.5 |
| 27 | ..... | ..... | ..... | ..... | 12.0 | 11.5 | ..... | 17.3 | ..... | ..... | ..... | ..... |
| 28 | ..... | 16.15 | 14.9 | 13.25 | ..... | ..... | ..... | ..... | 16.9 | ..... | 15.4 | ..... |
| 29 | 15.0 | ..... | ..... | ..... | ..... | ..... | 15.1 | ..... | ..... | 16.8 | ..... | ..... |
| 30 | ..... | 16.1 | ..... | 13.2 | ..... | 11.4 | ..... | ..... | ..... | ..... | 15.3 | 14.6 |
| 31 | 15.3 | ..... | 14.7 | ..... | ..... | ..... | ..... | 17.3 | ..... | 16.7 | ..... | ..... |

### KENNEBEC RIVER AT THE FORKS, MAINE.

LOCATION.—At wooden highway bridge, 2,000 feet above mouth of Dead River, at The Forks, Somerset County.

DRAINAGE AREA.—1,570 square miles.

RECORDS AVAILABLE.—September 28, 1901, to September 30, 1918.

GAGES.—Chain on bridge, a vertical staff on timber retaining wall on left bank, 75 feet above bridge, and a Gurley 7-day water-stage recorder on left abutment, recorder set to read the same as chain gage at low water, but gives lower readings than chain gage at high water; used during summer months only. Chain gage read by S. C. Durgin.

DISCHARGE MEASUREMENTS.—Made from the bridge.

CHANNEL AND CONTROL.—Channel at bridge is subject to slight changes in section; control is occasionally affected by backwater from Dead River.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, from water-stage recorder, 6.19 feet at 10 a. m. May 2 (discharge, 9,670 second-feet); minimum stage recorded, 1.10 feet on August 15, 16, and 17 (discharge, 580 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 reduced to natural flow by adding or subtracting the amount of water stored in or released from Moosehead Lake.

ACCURACY.—Stage-discharge relation occasionally affected by backwater from Dead River and by ice during the winter. Rating curve fairly well defined, a table of relation being used to convert discharge rating for chain gage to a corresponding rating for water-stage recorder. Water-stage recorder in operation October 1–12 and April 25 to September 30; chain gage read to half-tenths once daily. Daily discharge when water-stage recorder was in operation determined by use of discharge integrator. When water-stage recorder was not in operation, discharge ascertained by applying daily gage height to rating table and making corrections for effect of ice during the winter. Records fair for period when water-stage recorder was in operation and poor during remainder of year.

*Discharge measurements of Kennebec River at The Forks, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan 23 | A. F. McAlary | [a] 3.80 | 2,390 | Apr. 25 | A. F. McAlary | [b] 3.20 | 2,100 |
| Feb. 12 | do | [a] 4.30 | 2,440 | Sept. 27 | H. A. Lancaster | 1.48 | 842 |
| Mar. 19 | do | 2.33 | 1,580 | | | | |

[a] Stage-discharge relation affected by ice.
[b] Gage height affected by backwater from Dead River.

*Daily discharge, in second-feet, of Kennebec River at The Forks, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3,000 | 3,170 | 3,320 | 2,900 | 2,300 | 1,500 | 1,100 | 3,300 | 3,650 | 3,100 | 2,900 | 2,900 |
| 2 | 2,900 | 2,330 | 3,320 | 2,600 | 2,300 | 1,500 | 3,300 | 4,350 | 3,700 | 3,200 | 2,800 | 2,800 |
| 3 | 3,000 | 2,330 | 3,320 | 2,600 | 2,300 | 1,250 | 2,900 | 3,850 | 3,400 | 3,200 | 2,500 | 2,650 |
| 4 | 3,100 | 1,510 | 3,320 | 2,600 | 2,300 | 1,250 | 2,400 | 3,500 | 2,700 | 3,250 | 3,300 | 2,650 |
| 5 | 3,000 | 1,300 | 3,320 | 2,600 | 2,300 | 1,250 | 2,100 | 1,700 | 3,350 | 3,300 | 3,500 | 2,650 |
| 6 | 3,000 | 1,100 | 3,170 | 2,600 | 2,300 | 1,250 | 1,960 | 1,800 | 3,250 | 2,550 | 3,200 | 2,650 |
| 7 | 3,000 | 1,010 | 3,100 | 2,600 | 2,600 | 1,250 | 1,960 | 1,850 | 2,950 | 2,900 | 3,100 | 2,650 |
| 8 | 3,300 | 1,300 | 3,100 | 2,600 | 2,600 | 1,300 | 1,960 | 3,700 | 2,700 | 3,200 | 3,250 | 2,600 |
| 9 | 2,600 | 1,960 | 3,000 | 2,500 | 2,600 | 1,300 | 1,960 | 3,400 | 2,850 | 3,650 | 3,050 | 2,500 |
| 10 | 2,500 | 1,960 | 3,000 | 2,500 | 2,500 | 1,300 | 1,960 | 3,100 | 3,400 | 3,250 | 3,000 | 2,450 |
| 11 | 2,500 | 1,960 | 2,900 | 2,500 | 2,500 | 1,400 | 1,960 | 3,400 | 3,400 | 2,600 | 2,700 | 2,400 |
| 12 | 2,100 | 1,960 | 2,900 | 2,500 | 2,500 | 1,400 | 1,740 | 1,550 | 2,950 | 3,400 | 2,900 | 3,000 |
| 13 | 2,600 | 1,960 | 2,900 | 2,500 | 1,950 | 1,450 | 1,740 | 1,400 | 3,000 | 2,700 | 2,750 | 2,850 |
| 14 | 2,600 | 1,960 | 2,900 | 2,500 | 1,900 | 1,500 | 1,510 | 3,700 | 3,000 | 3,500 | 2,650 | 2,800 |
| 15 | 2,460 | 1,850 | 2,900 | 2,600 | 1,850 | 1,500 | 1,960 | 3,400 | 3,000 | 4,200 | 2,500 | 2,800 |
| 16 | 2,460 | 1,850 | 2,900 | 2,600 | 1,850 | 1,550 | 2,740 | 3,300 | 2,850 | 4,350 | 2,700 | 2,800 |
| 17 | 2,200 | 1,850 | 2,900 | 2,500 | 1,800 | 1,550 | 3,320 | 3,400 | 2,950 | 3,800 | 3,750 | 2,800 |
| 18 | 1,960 | 1,850 | 3,000 | 2,500 | 1,700 | 1,550 | 3,320 | 4,600 | 2,800 | 3,400 | 2,950 | 2,750 |
| 19 | 1,510 | 1,850 | 3,300 | 2,500 | 1,700 | 1,550 | 2,740 | 3,550 | 3,000 | 3,550 | 2,700 | 2,600 |
| 20 | 1,510 | 1,850 | 3,200 | 2,500 | 1,600 | 1,550 | 2,460 | 4,800 | 2,850 | 3,650 | 2,650 | 2,600 |
| 21 | 1,510 | 1,850 | 3,200 | 2,300 | 1,500 | 1,550 | 2,200 | 3,050 | 3,000 | 3,800 | 2,550 | 2,500 |
| 22 | 1,620 | 2,200 | 3,000 | 2,300 | 1,400 | 1,550 | 2,200 | 5,000 | 2,900 | 3,200 | 2,500 | 1,380 |
| 23 | 1,510 | 2,330 | 2,900 | 2,400 | 1,400 | 1,500 | 2,460 | 3,800 | 1,500 | 3,200 | 2,550 | 1,080 |
| 24 | 1,740 | 2,460 | 2,900 | 2,400 | 1,450 | 1,500 | 3,320 | 4,050 | 1,000 | 3,300 | 2,900 | 900 |
| 25 | 2,080 | 2,330 | 2,900 | 2,400 | 1,500 | 1,500 | 3,300 | 3,300 | 850 | 3,200 | 3,050 | 800 |
| 26 | 1,960 | 2,460 | 2,900 | 2,600 | 1,550 | 1,500 | 2,100 | 3,300 | 750 | 3,000 | 3,000 | 750 |
| 27 | 1,960 | 2,460 | 2,700 | 2,600 | 1,550 | 1,500 | 2,000 | 3,100 | 3,000 | 3,000 | 2,950 | 2,100 |
| 28 | 1,960 | 2,330 | 2,700 | 2,600 | 1,550 | 1,500 | 2,000 | 2,800 | 3,000 | 2,300 | 2,900 | 2,350 |
| 29 | 1,850 | 3,170 | 3,000 | 2,500 | ..... | 1,500 | 1,800 | 3,200 | 3,000 | 3,650 | 2,800 | 2,200 |
| 30 | 1,740 | 3,640 | 3,000 | 2,500 | ..... | 1,250 | 2,400 | 1,000 | 3,050 | 3,050 | 2,850 | 1,700 |
| 31 | 3,320 | ..... | 3,000 | 2,300 | ..... | 1,250 | ..... | 3,000 | ..... | 3,200 | 2,900 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 7 to Mar. 2, Mar. 7–13, and Apr. 2–5; discharge for these periods computed from gage heights corrected for effect of ice by means of two discharge measurements, records of discharge from Moosehead Lake, and weather records.

*Monthly discharge of Kennebec River at The Forks, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 1,570 square miles.]

| Month. | Discharge in second-feet. | | | Corrected run-off (depth in inches on drainage area). |
|---|---|---|---|---|
| | Observed. | Corrected for storage. | | |
| | Mean. | Mean. | Per square mile. | |
| October | 2,340 | 1,920 | 1.22 | 1.41 |
| November | 2,070 | 3,060 | 1.95 | 2.18 |
| December | 3,030 | 1,360 | .866 | 1.00 |
| January | 2,520 | 630 | .401 | .46 |
| February | 1,980 | 550 | .350 | .36 |
| March | 1,430 | 730 | .465 | .54 |
| April | 2,300 | 6,930 | 4.42 | 4.93 |
| May | 3,200 | 5,720 | 3.64 | 4.20 |
| June | 2,790 | 2,170 | 1.38 | 1.54 |
| July | 3,280 | 3,160 | 2.01 | 2.32 |
| August | 2,900 | 1,100 | .701 | .81 |
| September | 2,320 | 1,580 | 1.01 | 1.13 |
| The year | 2,520 | 2,410 | 1.54 | 20.88 |

### 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 Sept. 30, 1918.

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

DETERMINATION OF DISCHARGE.—Daily discharge values are the sums of the discharge through several wheels, through the logway, and over the spillway, as computed from one set of observations per day on several gages. When flow is less than about 3,500 second-feet all the water is used through the wheels.

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

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

ACCURACY.—Daily discharge as given is the sum of the discharge through several wheels and over the spillway, as determined from one set of observations per day on several gages. Owing to the possibility of changes in stage and uncertainties of ratings of the wheels, and the spillway, the determinations may differ appreciably from the true mean daily discharge. Therefore the records as published can be considered only fair. Errors in determinations for individual days are probably compensatory, and may be largely eliminated in the computed mean discharge for a month or a year.

COOPERATION.—Records furnished by Hollingsworth & Whitney Co.

*Daily discharge, in second-feet, of Kennebec River at Waterville, Maine, for the year ending Sept. 30, 1917.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,790 | 3,820 | 23,500 | 4,320 | 4,020 | 3,840 | 14,600 | 17,800 | 17,400 | 14,500 | 34,000 | 8,160 |
| 2 | 5,000 | 3,820 | 17,200 | 4,180 | 4,230 | 3,850 | 14,400 | 20,300 | 15,500 | 14,300 | 19,100 | 7,470 |
| 3 | 3,920 | 3,970 | 7,740 | 4,150 | 4,930 | 4,110 | 11,700 | 22,200 | 13,200 | 13,300 | 12,200 | 7,690 |
| 4 | 3,830 | 3,820 | 6,680 | 3,940 | 2,390 | 1,360 | 10,600 | 23,600 | 15,200 | 9,790 | 11,600 | 6,970 |
| 5 | 2,860 | 3,640 | 9,610 | 3,970 | 4,320 | 4,800 | 11,800 | 20,200 | 15,200 | 11,700 | 10,300 | 6,540 |
| 6 | 2,970 | 4,690 | 9,190 | 4,730 | 4,000 | 3,850 | 12,900 | 18,800 | 11,000 | 13,300 | 9,230 | 5,800 |
| 7 | 2,740 | 3,330 | 9,630 | 4,400 | 4,130 | 3,870 | 40,900 | 16,600 | 10,500 | 12,900 | 5,440 | 5,810 |
| 8 | 2,700 | 3,280 | 9,150 | 4,360 | 3,820 | 3,850 | 40,000 | 16,700 | 10,600 | 11,500 | 3,890 | 6,320 |
| 9 | 4,440 | 3,230 | 7,720 | 4,610 | 3,870 | 3,880 | 37,500 | 15,000 | 14,000 | 12,000 | 5,640 | 4,960 |
| 10 | 4,700 | 3,550 | 6,350 | 4,510 | 3,930 | 4,060 | 28,900 | 11,400 | 11,100 | 12,000 | 6,430 | 6,890 |
| 11 | 4,760 | 3,930 | 7,920 | 4,450 | 2,420 | 1,190 | 19,100 | 11,400 | 14,800 | 10,800 | 10,700 | 6,620 |
| 12 | 3,950 | 2,340 | 7,240 | 4,250 | 4,340 | 4,790 | 17,900 | 14,500 | 61,000 | 11,800 | 12,500 | 4,640 |
| 13 | 3,940 | 4,030 | 4,700 | 3,920 | 3,840 | 4,290 | 11,500 | 16,100 | 76,500 | 12,000 | 10,700 | 5,230 |
| 14 | 3,460 | 3,770 | 4,870 | 1,320 | 3,900 | 3,900 | 12,800 | 12,400 | 53,800 | 12,000 | 9,340 | 5,000 |
| 15 | 3,190 | 3,540 | 3,540 | 5,000 | 4,920 | 4,050 | 14,500 | 16,600 | 45,700 | 9,440 | 7,360 | 4,810 |
| 16 | 4,670 | 3,300 | 3,540 | 6,510 | 4,120 | 3,850 | 14,400 | 12,900 | 42,000 | 12,400 | 7,410 | 3,510 |
| 17 | 3,760 | 2,940 | 100 | 5,430 | 4,400 | 3,950 | 15,100 | 13,000 | 41,000 | 11,900 | 7,660 | 5,080 |
| 18 | 3,380 | 3,620 | 4,390 | 5,090 | 2,040 | 1,580 | 13,500 | 11,100 | 38,500 | 11,900 | 8,160 | 4,580 |
| 19 | 3,670 | 2,280 | 5,140 | 6,060 | 4,880 | 4,950 | 14,900 | 18,200 | 78,800 | 10,600 | 5,980 | 4,790 |
| 20 | 5,320 | 3,580 | 4,480 | 5,290 | 3,700 | 4,220 | 18,300 | 9,780 | 49,600 | 10,500 | 8,090 | 5,470 |
| 21 | 11,100 | 3,670 | 4,670 | 3,660 | 4,390 | 3,960 | 20,200 | 12,900 | 44,600 | 10,700 | 8,130 | 5,480 |
| 22 | 6,650 | 3,010 | 4,660 | 5,370 | 4,340 | 3,950 | 23,500 | 12,900 | 41,000 | 9,230 | 9,850 | 5,270 |
| 23 | 6,810 | 3,260 | 5,720 | 4,140 | 4,000 | 4,400 | 27,500 | 16,400 | 37,400 | 10,700 | 9,350 | 4,380 |
| 24 | 5,080 | 3,910 | 6,710 | 4,020 | 4,050 | 4,420 | 30,000 | 14,600 | 29,300 | 10,300 | 8,570 | 5,460 |
| 25 | 4,010 | 7,500 | 6,300 | 3,640 | 916 | 1,870 | 27,200 | 19,400 | 27,400 | 10,000 | 15,000 | 4,800 |
| 26 | 4,330 | 4,240 | 7,130 | 4,500 | 4,840 | 4,700 | 20,500 | 18,700 | 23,700 | 4,520 | 13,000 | 4,800 |
| 27 | 3,710 | 4,820 | 5,720 | 4,820 | 4,800 | 5,620 | 20,500 | 16,300 | 17,000 | 4,030 | 3,950 | 4,860 |
| 28 | 3,260 | 4,290 | 4,950 | 4,060 | 3,890 | 12,200 | 19,000 | 15,800 | 13,500 | 3,980 | 19,700 | 4,740 |
| 29 | 3,000 | 4,680 | 5,710 | 4,580 | ..... | 25,900 | 18,200 | 13,700 | 11,900 | 3,900 | 8,460 | 4,590 |
| 30 | 3,930 | 4,010 | 4,610 | 4,180 | ..... | 23,600 | 12,500 | 14,100 | 11,700 | 4,020 | 8,100 | 3,250 |
| 31 | 3,910 | ..... | 2,990 | 5,080 | ..... | 18,400 | ..... | 17,800 | ..... | 12,100 | 8,470 | ..... |

*Monthly discharge of Kennebec River at Waterville, Maine, for the year ending Sept. 30, 1917.*

[Drainage area, 4,270 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 11,100 | 2,700 | 4,250 | 0.996 | 1.15 |
| November | 7,500 | 2,280 | 3,800 | .890 | .99 |
| December | 23,500 | 100 | 6,830 | 1.60 | 1.84 |
| January | 6,510 | 1,320 | 4,440 | 1.04 | 1.20 |
| February | 4,930 | 916 | 3,910 | .916 | .95 |
| March | 25,900 | 1,190 | 5,910 | 1.38 | 1.59 |
| April | 40,900 | 10,600 | 19,800 | 4.64 | 5.18 |
| May | 23,600 | 9,780 | 15,800 | 3.70 | 4.27 |
| June | 88,500 | 10,500 | 31,400 | 7.35 | 8.20 |
| July | 14,500 | 3,900 | 10,400 | 2.44 | 2.81 |
| August | 34,000 | 3,890 | 10,300 | 2.41 | 2.78 |
| September | 8,160 | 3,250 | 5,470 | 1.28 | 1.43 |
| The year | 88,500 | 100 | 10,200 | 2.39 | 32.39 |

NOTE.—The monthly discharge in second-feet per square mile and the run-off in depth 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 probably little stored water is held over from year to year.

*Daily discharge, in second-feet, of Kennebec River at Waterville, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4,760 | 20,200 | 3,980 | 3,930 | 3,400 | 3,920 | 12,100 | 24,400 | 7,250 | 5,930 | 4,450 | 2,380 |
| 2 | 4,410 | 14,200 | 3,390 | 3,890 | 3,300 | 3,950 | 12,700 | 33,900 | 6,730 | 4,490 | 4,570 | 4,330 |
| 3 | 4,370 | 11,500 | 5,300 | 3,830 | 2,340 | 3,330 | 52,900 | 26,600 | 7,340 | 4,440 | 4,560 | 4,190 |
| 4 | 4,260 | 9,480 | 4,830 | 3,780 | 2,950 | 4,380 | 32,100 | 21,100 | 5,660 | 3,910 | 4,460 | 4,310 |
| 5 | 4,240 | 7,060 | 4,590 | 3,820 | 3,220 | 3,900 | 28,200 | 19,100 | 5,050 | 5,150 | 5,130 | 3,820 |
| 6 | 3,970 | 5,690 | 4,710 | 3,770 | 2,880 | 3,930 | 23,100 | 17,400 | 4,130 | 4,430 | 4,640 | 3,900 |
| 7 | 3,570 | 5,230 | 4,710 | 3,870 | 2,940 | 3,860 | 18,900 | 9,820 | 4,780 | 3,320 | 4,680 | 3,900 |
| 8 | 5,030 | 4,980 | 4,150 | 3,980 | 2,900 | 3,860 | 21,600 | 16,400 | 4,740 | 5,220 | 4,690 | 2,850 |
| 9 | 4,580 | 4,260 | 3,160 | 3,880 | 3,020 | 3,890 | 20,900 | 16,400 | 4,600 | 4,740 | 4,680 | 3,890 |
| 10 | 4,190 | 5,020 | 4,750 | 3,880 | 443 | 2,590 | 20,900 | 12,700 | 6,040 | 7,660 | 4,930 | 3,500 |
| 11 | 4,050 | 3,440 | 4,130 | 3,980 | 2,970 | 3,900 | 18,200 | 12,800 | 4,750 | 10,900 | 5,200 | 3,130 |
| 12 | 3,980 | 5,680 | 3,880 | 3,880 | 3,360 | 3,610 | 16,100 | 11,600 | 4,730 | 7,320 | 5,220 | 3,870 |
| 13 | 4,040 | 4,260 | 3,880 | 2,760 | 3,490 | 3,590 | 17,600 | 11,800 | 4,620 | 7,660 | 4,590 | 3,910 |
| 14 | 2,820 | 4,840 | 3,860 | 3,930 | 3,670 | 3,160 | 11,500 | 10,200 | 4,690 | 10,100 | 4,500 | 3,910 |
| 15 | 5,340 | 4,340 | 3,860 | 3,860 | 3,670 | 3,860 | 13,300 | 20,500 | 4,800 | 13,100 | 4,600 | 3,240 |
| 16 | 5,090 | 4,340 | 2,130 | 3,880 | 3,780 | 3,910 | 14,700 | 16,900 | 4,060 | 3,830 | 4,470 | 4,130 |
| 17 | 5,100 | 4,340 | 3,960 | 3,860 | 2,200 | 1,840 | 17,900 | 12,800 | 5,180 | 12,100 | 4,510 | 3,870 |
| 18 | 4,830 | 3,040 | 3,830 | 3,860 | 3,620 | 3,830 | 18,600 | 12,200 | 4,660 | 11,100 | 3,600 | 3,880 |
| 19 | 4,590 | 4,610 | 3,830 | 2,180 | 3,870 | 3,810 | 20,400 | 13,600 | 4,040 | 8,410 | 5,140 | 3,830 |
| 20 | 4,600 | 4,030 | 3,930 | 1,760 | 3,150 | 3,810 | 15,200 | 7,280 | 4,330 | 8,410 | 4,410 | 4,080 |
| 21 | 3,820 | 3,860 | 3,930 | 3,100 | 3,830 | 3,830 | 11,800 | 9,900 | 4,430 | 7,320 | 4,290 | 6,630 |
| 22 | 4,190 | 3,860 | 4,000 | 3,100 | 3,670 | 3,900 | 14,300 | 8,770 | 4,240 | 8,350 | 3,430 | 7,250 |
| 23 | 3,910 | 3,880 | 2,580 | 4,520 | 3,660 | 4,230 | 17,400 | 10,100 | 5,670 | 6,970 | 3,640 | 6,150 |
| 24 | 3,860 | 4,210 | 3,840 | 3,780 | 2,630 | 5,280 | 21,100 | 8,820 | 11,100 | 6,050 | 3,360 | 5,540 |
| 25 | 3,940 | 3,480 | 2,970 | 3,650 | 3,930 | 5,550 | 22,000 | 8,820 | 9,070 | 6,280 | 2,430 | 5,000 |
| 26 | 10,100 | 4,540 | 4,110 | 3,680 | 3,770 | 5,380 | 19,200 | 7,970 | 6,700 | 5,090 | 4,660 | 4,630 |
| 27 | 8,770 | 3,860 | 3,890 | 2,060 | 3,860 | 6,030 | 15,700 | 8,990 | 4,400 | 4,410 | 4,560 | 8,210 |
| 28 | 6,130 | 3,860 | 3,890 | 3,100 | 3,880 | 6,450 | 13,000 | 4,460 | 4,000 | 3,020 | 4,240 | 21,900 |
| 29 | 8,720 | 2,000 | 3,520 | 3,640 | ..... | 6,110 | 16,200 | 4,590 | 5,060 | 4,620 | 4,060 | 12,300 |
| 30 | 8,020 | 4,430 | 2,410 | 3,350 | ..... | 7,880 | 14,800 | 4,920 | 4,410 | 4,540 | 4,550 | 9,730 |
| 31 | 17,100 | ..... | 3,920 | 3,340 | ..... | 5,760 | ..... | 8,990 | ..... | 4,530 | 4,300 | ..... |

*Monthly discharge of Kennebec River at Waterville, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 4,270 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 17,100 | 2,820 | 5,370 | 1.26 | 1.45 |
| November | 20,200 | 2,000 | 5,620 | 1.32 | 1.47 |
| December | 5,300 | 2,130 | 3,870 | .906 | 1.04 |
| January | 4,520 | 1,760 | 3,550 | .831 | .96 |
| February | 3,930 | 443 | 3,230 | .756 | .79 |
| March | 7,880 | 1,840 | 4,300 | 1.01 | 1.16 |
| April | 52,900 | 11,500 | 19,100 | 4.47 | 4.99 |
| May | 33,900 | 4,460 | 13,300 | 3.11 | 3.58 |
| June | 11,100 | 4,000 | 5,370 | 1.26 | 1.41 |
| July | 13,100 | 3,020 | 6,560 | 1.54 | 1.78 |
| August | 5,220 | 2,430 | 4,400 | 1.03 | 1.19 |
| September | 21,900 | 2,380 | 5,410 | 1.27 | 1.42 |
| The year | 52,900 | 443 | 6,680 | 1.56 | 21.24 |

NOTE.—The monthly discharge in second-feet per square mile and the run-off in depth 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; and March 16, 1910, to September 30, 1918.

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

DISCHARGE MEASUREMENTS.—Made from cable 700 feet above gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.4 feet at 8.30 a. m. May 30 (discharge, 11,300 second-feet); minimum stage recorded, 0.2 foot on September 12, 13, and 17 (water held back by logging dams, exact 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 practically permanent except when ice is present. Rating curve well defined above 400 second-feet. Gage read to half-tenths twice daily except from December 30 to April 1, when it was read three times a week. Some uncertainty in regard to accuracy of gage heights. Daily discharge ascertained by applying mean daily gage height to rating table, and making corrections for effect of ice during the winter. Records fair.

*Discharge measurements of Dead River at The Forks, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 3 | A. F. McAlary | [a]2.30 | 308 | Sept. 27 | H. A. Lancaster | 2.42 | 2,620 |
| Feb. 12 | do | [a]1.70 | 278 | 28 | do | 2.92 | 3,560 |
| Mar. 19 | do | [a]2.48 | 431 | | | | |

[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, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 965 | 6,140 | 510 | 320 | 280 | 1,300 | 6,800 | 6,140 | 965 | 1,030 | 50 | 462 |
| 2 | 665 | 5,530 | 610 | 320 | 280 | 1,250 | 7,130 | 6,140 | 840 | 780 | 50 | 462 |
| 3 | 370 | 6,790 | 610 | 320 | 280 | 1,250 | 6,460 | 5,830 | 720 | 560 | 50 | 462 |
| 4 | 370 | 2,750 | 610 | 320 | 280 | 1,150 | 5,530 | 6,140 | 560 | 325 | 75 | 462 |
| 5 | 415 | 2,290 | 510 | 320 | 280 | 1,100 | 4,970 | 6,140 | 462 | 240 | 50 | 415 |
| 6 | 510 | 1,780 | 510 | 320 | 280 | 960 | 4,220 | 5,530 | 370 | 160 | 50 | 370 |
| 7 | 840 | 1,700 | 510 | 370 | 280 | 900 | 3,990 | 5,240 | 257 | 200 | 50 | 415 |
| 8 | 720 | 1,540 | 500 | 400 | 280 | 840 | 3,990 | 5,530 | 200 | 370 | 50 | 415 |
| 9 | 720 | 1,390 | 500 | 400 | 280 | 720 | 3,990 | 5,830 | 160 | 720 | 75 | 415 |
| 10 | 665 | 1,240 | 500 | 400 | 280 | 600 | 4,220 | 5,240 | 160 | 1,030 | 100 | 370 |
| 11 | 610 | 1,240 | 500 | 400 | 280 | 560 | 3,550 | 6,140 | 160 | 1,240 | 50 | ..... |
| 12 | 462 | 1,170 | 320 | 400 | 280 | 460 | 2,750 | 5,530 | 160 | 1,390 | 50 | ..... |
| 13 | 720 | 1,170 | 320 | 400 | 280 | 420 | 2,120 | 5,240 | 224 | 1,540 | 50 | ..... |
| 14 | 965 | 1,390 | 320 | 400 | 280 | 370 | 1,780 | 4,460 | 308 | 1,320 | 130 | ..... |
| 15 | 840 | 1,240 | 240 | 400 | 280 | 320 | 2,030 | 3,990 | 397 | 1,100 | 240 | ..... |
| 16 | 965 | 1,100 | 240 | 400 | 280 | 320 | 2,750 | 3,770 | 510 | 965 | 224 | ..... |
| 17 | 1,100 | 1,100 | 240 | 400 | 320 | 320 | 4,220 | 3,550 | 415 | 902 | 160 | ..... |
| 18 | 840 | 965 | 240 | 400 | 370 | 370 | 4,970 | 3,140 | 415 | 840 | 160 | ..... |
| 19 | 840 | 965 | 240 | 400 | 460 | 430 | 4,970 | 2,290 | 343 | 720 | 100 | ..... |
| 20 | 720 | 965 | 240 | 400 | 560 | 720 | 4,710 | 2,200 | 325 | 720 | 100 | 240 |
| 21 | 720 | 902 | 320 | 400 | 600 | 840 | 3,770 | 1,940 | 325 | 610 | 100 | 840 |
| 22 | 665 | 840 | 320 | 400 | 720 | 960 | 3,990 | 1,700 | 462 | 610 | 100 | 1,700 |
| 23 | 610 | 720 | 320 | 400 | 840 | 1,050 | 5,530 | 1,390 | 780 | 510 | 100 | 1,620 |
| 24 | 560 | 720 | 320 | 400 | 900 | 1,050 | 6,140 | 1,390 | 2,030 | 370 | 90 | 902 |
| 25 | 1,100 | 610 | 320 | 400 | 1,050 | 1,100 | 6,460 | 1,170 | 1,700 | 240 | 50 | 665 |
| 26 | 2,750 | 610 | 320 | 400 | 1,150 | 1,300 | 6,790 | 1,100 | 1,540 | 160 | 462 | 560 |
| 27 | 2,380 | 610 | 320 | 280 | 1,300 | 1,550 | 5,830 | 1,100 | 1,540 | 160 | 415 | 1,780 |
| 28 | 2,200 | 560 | 320 | 280 | 1,300 | 1,950 | 6,140 | 1,240 | 1,540 | 160 | 462 | 3,340 |
| 29 | 2,200 | 560 | 320 | 280 | ..... | 2,300 | 3,990 | 1,100 | 1,540 | 100 | 370 | 3,140 |
| 30 | 3,990 | 415 | 320 | 280 | ..... | 2,800 | 6,790 | 4,710 | 1,460 | 100 | 415 | 2,560 |
| 31 | 6,790 | ..... | 320 | 280 | ..... | 4,500 | ..... | 965 | ..... | 75 | 370 | ..... |

NOTE.—Stage-discharge relation affected by ice from Dec. 8 to Apr. 1; discharge for this period computed from gage heights corrected for effect of ice by means of three discharge measurements, observer's reports, and weather records. Discharge estimated as averaging 75 second-feet Sept. 11–19; water held back by logging dams. (Some uncertainty in regard to accuracy of gage heights during this period.)

*Monthly discharge of Dead River at The Forks, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 878 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 6,790 | 370 | 1,230 | 1.41 | 1.63 |
| November | 6,790 | 415 | 1,630 | 1.86 | 2.08 |
| December | 610 | 240 | 380 | .433 | .50 |
| January | 400 | 280 | 364 | .415 | .48 |
| February | 1,300 | 280 | 502 | .572 | .60 |
| March | 4,500 | 320 | 1,090 | 1.24 | 1.43 |
| April | 7,130 | 1,780 | 4,690 | 5.34 | 5.96 |
| May | 6,140 | 965 | 3,740 | 4.26 | 4.91 |
| June | 2,030 | 160 | 696 | .793 | .88 |
| July | 1,540 | 75 | 621 | .707 | .82 |
| August | 462 | 50 | 155 | .177 | .20 |
| September | 3,340 | ..... | 742 | .845 | .94 |
| The year | 7,130 | ..... | 1,320 | 1.50 | 20.43 |

## SEBASTICOOK RIVER AT PITTSFIELD, MAINE.

LOCATION.—At steel highway bridge just above Maine Central Railroad bridge in Pittsfield, Somerset County.

DRAINAGE AREA.—320 square miles.

RECORDS AVAILABLE.—July 27, 1908, to September 30, 1918.

GAGE.—Chain attached to highway bridge; read by C. D. Morrill.

DISCHARGE MEASUREMENTS.—Made from the highway bridge.

CHANNEL AND CONTROL.—Practically permanent; banks high and rocky and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.72 feet at 2.35 p. m. April 8 (discharge, 2,840 second-feet); minimum stage recorded, 2.38 feet at 3.10 p. m. February 23 (discharge, 69 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice, as the rapid fall and the proximity of the power plant immediately above station tend to keep river open.

REGULATION.—About 800 feet upstream from the station is the dam of the American Woolen Co. (Pioneer mills) and the Smith Textile Co.; and about half a mile farther upstream is the dam of the American Woolen Co.'s Waverly mill; the storage of water at these dams causes diurnal fluctuation at the gage.

ACCURACY.—Stage-discharge relation has apparently changed slightly at times. Rating curve well defined between 70 and 4,000 second-feet. Gage read to half-tenths twice daily from October 1 to February 1, and to hundredths from February 2 to September 30. Owing to lack of exact information in regard to the stage at night when the mills are shut down, determinations of mean daily discharge are not published.

The following discharge measurement was made by A. F. McAlary:
November 30, 1917: Gage height, 3.64 feet; discharge, 551 second-feet.

*Twice-daily discharge, in second-feet, of Sebasticook River at Pittsfield, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | | Nov. | | Dec. | | Jan. | | Feb. | | Mar. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A. M. | P. M. | A. M. | P. M. | A. M. | P. M. | A. M. | P. M. | A. M. | P. M. | A. M | P. M. |
| 1 | 331 | 376 | 1,320 | 1,320 | 376 | 424 | 376 | 331 | ..... | ..... | 376 | 376 |
| 2 | 331 | 376 | 1,320 | 1,380 | 450 | 450 | 376 | 376 | 331 | 158 | 310 | 154 |
| 3 | 331 | 354 | 1,320 | 1,320 | 560 | 560 | 424 | 331 | 400 | 218 | 154 | 145 |
| 4 | 331 | 331 | 1,320 | 1,320 | 475 | 502 | 376 | 331 | 475 | 376 | 340 | 372 |
| 5 | 331 | 289 | 1,210 | 1,210 | 424 | 400 | 400 | 376 | 475 | 376 | 331 | 331 |
| 6 | 250 | 250 | 1,160 | 1,210 | 424 | 376 | 250 | 250 | 657 | 331 | 372 | 354 |
| 7 | 180 | 197 | 1,050 | 1,380 | 376 | 400 | 376 | 354 | 376 | 542 | 376 | 386 |
| 8 | 250 | 331 | 1,320 | 1,210 | 376 | 376 | 376 | 376 | 340 | 336 | 414 | 400 |
| 9 | 331 | 354 | 1,160 | 1,210 | 331 | 354 | 376 | 376 | 475 | 197 | 386 | 164 |
| 10 | 331 | 376 | 815 | 475 | 400 | 400 | 376 | 376 | 200 | 145 | 174 | 180 |
| 11 | 331 | 354 | 657 | 590 | 400 | 450 | 400 | 376 | 542 | 376 | 434 | 400 |
| 12 | 270 | 376 | 475 | 590 | 450 | 400 | 376 | 180 | 297 | 400 | 424 | 376 |
| 13 | 310 | 232 | 502 | 530 | 424 | 450 | 148 | ..... | 297 | 372 | 386 | 400 |
| 14 | 232 | 214 | 475 | 530 | 502 | 475 | ..... | ..... | 289 | 376 | 376 | 340 |
| 15 | 250 | 310 | 475 | 502 | 214 | 214 | ..... | ..... | 331 | 336 | 376 | 344 |
| 16 | 289 | 354 | 475 | 475 | 214 | 214 | ..... | ..... | 434 | 154 | 400 | 142 |
| 17 | 331 | 354 | 475 | 354 | 400 | 400 | ..... | ..... | 170 | 145 | 142 | 142 |
| 18 | 289 | 354 | 331 | 331 | 400 | 400 | ..... | ..... | 367 | 354 | 340 | 331 |
| 19 | 310 | 376 | 424 | 475 | 376 | 354 | ..... | ..... | 376 | 344 | 367 | 340 |
| 20 | 331 | 310 | 424 | 424 | 354 | 354 | ..... | ..... | 354 | 331 | 354 | 331 |
| 21 | 180 | 180 | 331 | 400 | 354 | 331 | ..... | ..... | 386 | 354 | 340 | 331 |
| 22 | 197 | 331 | 331 | 376 | 354 | 376 | ..... | ..... | 424 | 354 | 354 | 331 |
| 32 | 289 | 376 | 331 | 331 | 214 | 214 | ..... | ..... | 354 | 69 | 354 | 104 |
| 24 | 310 | 376 | 376 | 400 | 331 | 354 | ..... | ..... | 197 | 148 | 133 | 133 |
| 25 | 310 | 331 | 424 | 475 | 180 | 180 | ..... | ..... | 400 | 331 | 340 | 331 |
| 26 | 289 | 354 | 530 | 590 | 331 | 354 | ..... | ..... | 367 | 354 | 367 | 340 |
| 27 | 310 | 331 | 475 | 502 | 354 | 376 | ..... | ..... | 331 | 331 | 405 | 390 |
| 28 | 331 | 400 | 424 | 475 | 400 | 376 | ..... | ..... | 367 | 331 | 400 | 386 |
| 29 | 475 | 475 | ..... | 354 | 400 | 376 | ..... | ..... | ..... | ..... | 390 | 386 |
| 30 | 475 | 475 | ..... | 502 | 214 | 250 | ..... | ..... | ..... | ..... | 424 | 310 |
| 31 | 815 | 1,160 | ..... | ..... | 657 | 530 | ..... | ..... | ..... | ..... | 465 | 578 |

*Twice-daily discharge, in second-feet, of Sebasticook River at Pittsfield, Maine, for the year ending Sept. 30, 1918*—Continued.

| Day. | Apr. | | May. | | June. | | July. | | Aug. | | Sept. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A. M. | P. M. | A. M. | P. M. | A. M. | P. M. | A. M. | P. M. | A. M. | P. M. | A. M. | P. M. |
| 1 | 1,000 | 1,050 | 1,490 | 1,550 | 475 | 250 | 414 | 400 | 465 | 424 | 118 | 118 |
| 2 | 1,470 | 1,550 | 1,910 | 1,910 | 243 | 243 | 424 | 414 | 450 | 414 | 118 | 164 |
| 3 | 2,160 | 2,680 | 2,010 | 1,910 | 486 | 465 | 450 | 424 | 424 | 197 | 354 | 354 |
| 4 | 2,810 | 2,780 | 1,850 | 1,610 | 475 | 450 | 289 | 281 | 214 | 214 | 400 | 367 |
| 5 | 2,810 | 2,810 | 1,670 | 1,550 | 450 | 400 | 424 | 414 | 450 | 424 | 400 | 376 |
| 6 | 2,740 | 2,550 | 1,610 | 1,490 | 414 | 354 | 424 | 258 | 450 | 414 | 386 | 376 |
| 7 | 2,680 | 2,680 | 1,160 | 1,050 | 450 | 390 | 281 | 289 | 434 | 414 | 354 | 133 |
| 8 | 2,810 | 2,840 | 717 | 774 | 344 | 232 | 465 | 480 | 450 | 400 | 104 | 104 |
| 9 | 2,740 | 2,740 | 952 | 952 | 281 | 289 | 530 | 492 | 450 | 414 | 354 | 331 |
| 10 | 2,680 | 2,740 | 887 | 815 | 439 | 400 | 542 | 530 | 424 | 148 | 400 | 376 |
| 11 | 2,620 | 2,550 | 833 | 624 | 439 | 376 | 590 | 560 | 197 | 190 | 414 | 376 |
| 12 | 2,420 | 2,480 | 644 | 644 | 434 | 400 | 624 | 624 | 386 | 400 | 400 | 354 |
| 13 | 2,220 | 2,100 | 765 | 732 | 414 | 400 | 657 | 530 | 450 | 424 | 414 | 367 |
| 14 | 2,030 | 2,030 | 774 | 757 | 424 | 376 | 560 | 590 | 424 | 400 | 400 | 145 |
| 15 | 2,060 | 2,060 | 694 | 694 | 376 | 250 | 1,250 | 1,210 | 414 | 386 | 96 | 96 |
| 16 | 2,100 | 2,030 | 644 | 603 | 164 | 174 | 1,260 | 1,210 | 424 | 414 | 354 | 331 |
| 17 | 1,970 | 1,970 | 590 | 578 | 424 | 424 | 1,160 | 1,130 | 424 | 187 | 381 | 376 |
| 18 | 2,030 | 1,970 | 560 | 376 | 400 | 376 | 1,100 | 1,160 | 180 | 190 | 376 | 367 |
| 19 | 1,910 | 1,850 | 354 | 354 | 376 | 367 | 1,100 | 1,120 | 424 | 414 | 386 | 354 |
| 20 | 1,670 | 1,550 | 542 | 530 | 400 | 376 | 1,050 | 924 | 424 | 400 | 400 | 386 |
| 21 | 1,490 | 1,490 | 530 | 502 | 376 | 367 | 860 | 815 | 400 | 376 | 439 | 530 |
| 22 | 1,670 | 1,670 | 530 | 486 | 376 | 154 | 952 | 815 | 414 | 386 | 492 | 450 |
| 23 | 1,910 | 1,890 | 519 | 480 | 250 | 232 | 765 | 694 | 400 | 376 | 475 | 530 |
| 24 | 2,010 | 2,030 | 502 | 475 | 450 | 450 | 732 | 694 | 395 | 148 | 530 | 486 |
| 25 | 2,100 | 1,970 | 486 | 289 | 424 | 434 | 657 | 624 | 180 | 180 | 519 | 475 |
| 26 | 1,890 | 1,730 | 270 | 270 | 465 | 450 | 644 | 578 | 180 | 180 | 502 | 475 |
| 27 | 1,670 | 1,470 | 486 | 480 | 475 | 465 | 590 | 376 | 232 | 124 | 694 | 774 |
| 28 | 1,320 | 1,380 | 475 | 475 | 444 | 424 | 400 | 400 | 118 | 164 | 732 | 560 |
| 29 | 1,430 | 1,380 | 492 | 475 | 439 | 262 | 560 | 530 | 164 | 124 | 548 | 502 |
| 30 | 1,320 | 1,300 | 270 | 270 | 258 | 250 | 502 | 450 | 118 | 118 | 603 | 590 |
| 31 | ..... | ..... | 519 | 465 | ..... | ..... | 475 | 434 | 112 | 104 | ..... | ..... |

NOTE.—Times of gage height readings varied from 6 to 10 a. m. and from noon to 6 p. m. One or more of the mills above the gage were in operation 24 hours a day, except Sundays, during greater part of the time from October, 1916, to September, 1918.

## ANDROSCOGGIN RIVER BASIN.

### ANDROSCOGGIN RIVER AT ERROL DAM, N. H.

LOCATION.—At Errol dam, 1 mile above Errol, Coos County.

DRAINAGE AREA.—1,095 square miles.

RECORDS AVAILABLE.—January 1, 1905, to September 30, 1918.

GAGE.—Movable rod gage; readings taken daily from sill of deep gate No. 6; elevation of zero of gage or sill of gate, 1,231.3 feet above mean sea level.

DISCHARGE.—Computed from discharge through 14 gates in the dam by means of coefficients determined from a few discharge measurements.[1]

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

REGULATION.—Errol dam regulates the storage of Umbagog Lake, the lower of the Rangeley series of lakes, comprising the principal storage of Androsocoggin River and amounting to nearly 20 billion cubic feet, and also a recently developed storage site on Magalloway River created by the Aziscohos dam, which amounts to about 9.6 billion cubic feet, thus making the total storage about 29.6 billion cubic feet. Errol dam is about 5 miles below outlet of Umbagog Lake and about 3. 5 miles below mouth of Magalloway River, thus making this stream one of the feeders of Umbagog Lake. Results not corrected for storage.

COOPERATION.—Records obtained and computations of daily discharge made under direction of Walter H. Sawyer, agent for Union Water Power Co., Lewiston, Maine.

[1] See U. S. Geol. Survey Water-Supply Paper 321, p. 61.

*Daily discharge, in second-feet, of Androscoggin River at Errol dam, N. H., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,930 | 803 | 2,270 | 2,050 | 2,000 | 1,970 | 1,950 | 2,500 | 1,120 | 1,540 | 2,140 | 1,760 |
| 2 | 1,900 | 1,490 | 2,360 | 2,100 | 2,030 | 2,140 | 2,070 | 2,470 | 1,180 | 1,630 | 2,190 | 1,820 |
| 3 | 1,940 | 1,660 | 2,410 | 2,100 | 1,980 | 2,240 | 2,160 | 2,350 | 1,520 | 1,650 | 2,190 | 1,930 |
| 4 | 1,920 | 1,610 | 2,990 | 2,050 | 1,910 | 2,160 | 2,200 | 2,120 | 1,530 | 1,820 | 2,180 | 1,930 |
| 5 | 1,720 | 1,560 | 2,310 | 2,000 | 1,910 | 2,110 | 2,230 | 1,960 | 1,520 | 1,940 | 2,180 | 1,920 |
| 6 | 1,690 | 1,560 | 2,200 | 1,830 | 1,850 | 2,130 | 2,030 | 1,940 | 1,480 | 1,870 | 2,190 | 1,950 |
| 7 | 1,870 | 1,630 | 2,110 | 1,920 | 1,880 | 2,150 | 1,940 | 1,940 | 1,340 | 1,650 | 2,160 | 2,010 |
| 8 | 1,890 | 1,620 | 2,100 | 1,970 | 1,910 | 2,180 | 1,940 | 1,870 | 1,290 | 1,600 | 1,980 | 1,950 |
| 9 | 1,900 | 1,560 | 2,300 | 1,970 | 1,980 | 2,200 | 1,980 | 1,770 | 1,460 | 1,630 | 1,460 | 1,950 |
| 10 | 1,890 | 1,540 | 2,220 | 1,980 | 2,000 | 2,290 | 1,980 | 1,170 | 1,560 | 1,810 | 1,030 | 1,780 |
| 11 | 1,920 | 1,520 | 2,310 | 1,970 | 1,990 | 2,480 | 1,940 | 830 | 1,680 | 1,920 | 1,390 | 1,870 |
| 12 | 2,010 | 1,580 | 2,270 | 1,900 | 1,990 | 2,340 | 1,940 | 1,530 | 1,760 | 1,830 | 1,760 | 1,870 |
| 13 | 1,900 | 1,940 | 2,120 | 1,880 | 1,940 | 2,240 | 1,740 | 1,690 | 1,590 | 1,680 | 1,910 | 1,950 |
| 14 | 1,980 | 2,160 | 2,020 | 1,900 | 1,960 | 2,200 | 1,450 | 894 | 1,400 | 1,230 | 2,090 | 1,540 |
| 15 | 1,710 | 2,150 | 2,060 | 1,810 | 1,960 | 2,070 | 1,340 | 896 | 1,590 | 1,180 | 2,160 | 1,900 |
| 16 | 1,930 | 2,150 | 2,100 | 1,950 | 2,000 | 2,070 | 1,410 | 900 | 1,680 | 1,370 | 2,140 | 2,020 |
| 17 | 1,990 | 2,070 | 2,130 | 2,030 | 2,050 | 2,070 | 1,690 | 896 | 1,660 | 1,580 | 2,140 | 1,980 |
| 18 | 1,860 | 2,130 | 2,070 | 1,840 | 2,160 | 2,010 | 1,900 | 818 | 1,770 | 1,630 | 2,140 | 1,540 |
| 19 | 1,790 | 2,360 | 2,030 | 2,080 | 2,240 | 1,940 | 2,010 | 1,230 | 1,810 | 1,720 | 2,140 | 1,420 |
| 20 | 1,750 | 2,280 | 1,980 | 1,940 | 2,400 | 2,010 | 2,050 | 1,560 | 1,790 | 1,840 | 2,050 | 1,400 |
| 21 | 1,800 | 2,200 | 1,810 | 2,160 | 2,430 | 2,010 | 1,990 | 1,530 | 1,790 | 1,820 | 2,080 | (a) |
| 22 | 1,800 | 2,120 | 1,730 | 2,140 | 2,430 | 1,970 | 2,070 | 1,500 | 1,320 | 1,770 | 2,130 | 835 |
| 23 | 1,770 | 2,030 | 2,210 | 2,120 | 2,190 | 1,950 | 2,080 | 1,500 | 1,100 | 1,800 | 2,130 | 1,350 |
| 24 | 1,800 | 2,130 | 1,980 | 2,140 | 2,020 | 2,010 | 2,130 | 990 | 1,120 | 1,950 | 2,130 | 485 |
| 25 | 1,600 | 2,290 | 2,020 | 2,160 | 1,900 | 2,060 | 2,170 | 909 | 1,140 | 2,140 | 2,120 | 622 |
| 26 | 1,790 | 2,260 | 2,000 | 2,180 | 1,800 | 2,060 | 2,170 | 1,630 | 1,130 | 2,170 | 2,000 | 329 |
| 27 | 1,890 | 2,210 | 2,040 | 2,180 | 1,790 | 2,060 | 2,180 | 1,600 | 1,260 | 2,180 | 1,790 | 55 |
| 28 | 2,010 | 2,560 | 2,050 | 2,090 | 1,910 | 2,090 | 2,180 | 1,500 | 1,540 | 2,180 | 1,760 | 197 |
| 29 | 1,990 | 2,370 | 2,000 | 2,020 | ..... | 2,090 | 2,280 | 1,480 | 1,540 | 2,130 | 1,760 | 374 |
| 30 | 972 | 2,370 | 2,060 | 1,980 | ..... | 2,090 | 2,370 | 1,080 | 1,720 | 2,060 | 1,770 | 915 |
| 31 | (a) | ..... | 2,040 | 1,960 | ..... | 1,980 | ..... | 1,080 | ..... | 2,050 | 1,770 | ..... |

a Mills shut down; water held back by dams.

*Monthly discharge of Androscoggin River at Errol dam, N. H., for the year ending Sept. 30, 1918.*

[Drainage area, 1,095 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 2,010 | (a) | 1,770 | 1.62 | 1.87 |
| November | 2,560 | 803 | 1,930 | 1.76 | 1.96 |
| December | 2,990 | 1,730 | 2,140 | 1.95 | 2.25 |
| January | 2,180 | 1,810 | 2,010 | 1.83 | 2.11 |
| February | 2,430 | 1,790 | 2,020 | 1.84 | 1.92 |
| March | 2,480 | 1,950 | 2,110 | 1.93 | 2.22 |
| April | 2,370 | 1,340 | 1,990 | 1.82 | 2.03 |
| May | 2,500 | 818 | 1,490 | 1.36 | 1.57 |
| June | 1,810 | 1,100 | 1,480 | 1.35 | 1.51 |
| July | 2,180 | 1,180 | 1,790 | 1.63 | 1.88 |
| August | 2,190 | 1,030 | 1,970 | 1.80 | 2.08 |
| September | 2,020 | (a) | 1,390 | 1.27 | 1.42 |
| The year | 2,990 | (a) | 1,840 | 1.68 | 22.82 |

a Mills shut down; water held back by dams.

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

### ANDROSCOGGIN RIVER AT BERLIN, N. H.

LOCATION.—At the upper or sawmill dam of the Berlin Mills Co. at Berlin, Coos County.

DRAINAGE AREA.—1,350 square miles.

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1918.

GAGES.—Fixed gages are maintained in the river above the forebay racks and in the tailrace immediately below the outlet of the wheels; these gages are referred to the same datum, and the differences in the readings give the head on the wheels; a gage is also attached to each wheel gate, from which the wheel-gate opening can be ascertained.

DETERMINATION OF DISCHARGE.—Discharge computed from curves prepared from Holyoke tests of the wheel runners, using the head and gate openings as ascertained from the gages. Quantity of water wasted over the dam is computed by the Francis formula for discharge over weirs.

ICE. Stage-discharge relation not affected by ice.

REGULATION.—Under the agreement between the power users on Androscoggin River, the flow at Berlin, N. H., is maintained at a minimum of 1,550 second-feet and at such a point above 1,550 second-feet as is consistent with the constant maintenance of that quantity. Final regulation of the river is made at Pontocook dam, N. H., above which is a pond containing about a day's supply; the primary regulation is made at Errol, N. H., about 30 miles above Berlin.

COOPERATION.—Gages are under the direction of George P. Abbott, of the Berlin Mills Co., and discharge record is furnished for publication by Walter H. Sawyer, agent for Union Water Power Co., Lewiston, Maine.

*Daily discharge, in second-feet, of Androscoggin River at Berlin, N. H., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,000 | 4,000 | 2,300 | 2,300 | 2,000 | 2,000 | 2,400 | 3,700 | 1,950 | 1,900 | 1,950 | 1,650 |
| 2 | 1,800 | 3,000 | 2,300 | 2,200 | 2,000 | 2,100 | 3,200 | 3,900 | 2,000 | 1,900 | 1,900 | 1,650 |
| 3 | 1,700 | 3,000 | 2,300 | 2,300 | 2,000 | 2,100 | 3,800 | 3,500 | 2,000 | 1,900 | 1,900 | 1,640 |
| 4 | 1,800 | 3,000 | 2,400 | 2,300 | 2,000 | 2,100 | 3,500 | 3,500 | 1,950 | 1,900 | 1,950 | 1,650 |
| 5 | 1,900 | 3,200 | 2,700 | 2,300 | 2,100 | 2,100 | 3,300 | 3,200 | 2,000 | 1,950 | 1,900 | 1,620 |
| 6 | 1,800 | 2,700 | 2,600 | 2,200 | 1,800 | 1,900 | 2,600 | 3,000 | 1,900 | 1,950 | 1,950 | 1,620 |
| 7 | 2,000 | 2,400 | 2,500 | 2,200 | 1,800 | 2,000 | 2,400 | 2,900 | 1,950 | 1,900 | 1,900 | 1,620 |
| 8 | 2,000 | 2,400 | 2,400 | 2,200 | 1,800 | 2,100 | 3,000 | 2,900 | 2,000 | 1,900 | 1,950 | 1,650 |
| 9 | 2,100 | 2,400 | 2,300 | 2,200 | 1,900 | 2,000 | 2,900 | 2,900 | 2,200 | 1,900 | 2,400 | 1,650 |
| 10 | 2,100 | 2,300 | 2,300 | 2,100 | 1,900 | 2,000 | 2,900 | 2,200 | 1,950 | 1,900 | 2,200 | 1,640 |
| 11 | 2,100 | 2,300 | 2,400 | 2,300 | 2,000 | 2,100 | 2,900 | 2,200 | 1,950 | 1,900 | 2,000 | 1,630 |
| 12 | 2,100 | 2,000 | 2,400 | 2,300 | 2,100 | 2,100 | 2,600 | 2,300 | 1,950 | 1,900 | 1,950 | 1,650 |
| 13 | 1,800 | 1,900 | 2,500 | 2,300 | 1,900 | 2,100 | 2,600 | 2,300 | 1,850 | 1,950 | 1,900 | 1,650 |
| 14 | 1,800 | 2,100 | 2,300 | 2,100 | 1,900 | 2,200 | 2,800 | 2,700 | 1,850 | 2,100 | 1,900 | 1,650 |
| 15 | 1,900 | 2,100 | 2,200 | 2,000 | 2,000 | 2,100 | 2,600 | 2,700 | 1,850 | 2,000 | 1,900 | 1,620 |
| 16 | 2,100 | 2,200 | 2,200 | 2,100 | 1,800 | 2,000 | 2,600 | 2,000 | 1,950 | 2,000 | 1,950 | 1,600 |
| 17 | 2,100 | 2,300 | 2,200 | 2,200 | 1,800 | 2,000 | 2,800 | 2,000 | 1,950 | 1,990 | 1,950 | 1,650 |
| 18 | 2,100 | 2,300 | 2,400 | 2,100 | 1,900 | 2,100 | 2,900 | 1,900 | 2,000 | 1,990 | 1,950 | 1,650 |
| 19 | 2,100 | 2,300 | 2,400 | 2,100 | 2,100 | 2,000 | 2,600 | 1,900 | 1,950 | 1,990 | 1,950 | 1,570 |
| 20 | 2,100 | 2,400 | 2,400 | 2,100 | 2,300 | 2,000 | 2,600 | 2,000 | 1,950 | 1,950 | 1,900 | 1,750 |
| 21 | 2,100 | 2,600 | 2,300 | 2,100 | 2,400 | 2,100 | 2,800 | 1,900 | 1,950 | 2,000 | 1,850 | 2,000 |
| 22 | 1,800 | 2,500 | 2,300 | 2,100 | 2,400 | 2,200 | 2,900 | 2,000 | 1,950 | 1,800 | 1,860 | 1,900 |
| 23 | 1,800 | 2,400 | 2,200 | 2,300 | 2,100 | 2,100 | 3,100 | 2,000 | 1,950 | 1,900 | 1,900 | 1,650 |
| 24 | 1,900 | 2,300 | 2,200 | 2,300 | 2,100 | 2,000 | 3,300 | 1,900 | 1,950 | 1,900 | 1,920 | 1,600 |
| 25 | 2,200 | 2,200 | (a) | 2,200 | 2,300 | 2,100 | 3,200 | 1,900 | 1,950 | 1,950 | 1,900 | 1,650 |
| 26 | 2,100 | 2,200 | 2,200 | 2,300 | 2,100 | 2,200 | 3,000 | 2,000 | 1,950 | 1,900 | 1,700 | 1,680 |
| 27 | 2,100 | 2,200 | 2,100 | 2,300 | 2,100 | 2,200 | 2,900 | 2,000 | 1,950 | 1,900 | 1,620 | 1,850 |
| 28 | 2,100 | 2,300 | 2,300 | 2,300 | 2,000 | 2,200 | 3,000 | 1,950 | 1,950 | 1,900 | 1,620 | 1,650 |
| 29 | 2,400 | 2,300 | 2,200 | 2,400 | ..... | 2,300 | 3,300 | 1,950 | 1,950 | 1,950 | 1,650 | 1,600 |
| 30 | 3,600 | 2,300 | 2,200 | 2,200 | ..... | 2,300 | 3,200 | 1,900 | 2,000 | 1,900 | 1,650 | 1,600 |
| 31 | 6,300 | ..... | 2,200 | 2,000 | ..... | 2,300 | ..... | 1,950 | ..... | 1,900 | 1,650 | ..... |

[a] Mills shut down; water held back by dams.

*Monthly discharge of Androscoggin River at Berlin, N. H., for the year ending Sept. 30, 1918.*

[Drainage area, 1,350 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 6,300 | 1,700 | 2,190 | 1.62 | 1.87 |
| November | 4,000 | 1,900 | 2,450 | 1.81 | 2.02 |
| December | 2,700 | (a) | 2,220 | 1.67 | 1.92 |
| January | 2,400 | 2,000 | 2,210 | 1.64 | 1.89 |
| February | 2,400 | 1,800 | 2,020 | 1.50 | 1.56 |
| March | 2,300 | 1,900 | 2,100 | 1.56 | 1.80 |
| April | 3,800 | 2,400 | 2,920 | 2.16 | 2.41 |
| May | 3,900 | 1,900 | 2,420 | 1.79 | 2.06 |
| June | 2,200 | 1,850 | 1,960 | 1.45 | 1.62 |
| July | 2,100 | 1,800 | 1,930 | 1.43 | 1.65 |
| August | 2,400 | 1,620 | 1,890 | 1.40 | 1.61 |
| September | 2,000 | 1,570 | 1,670 | 1.24 | 1.38 |
| The year | 6,300 | (a) | 2,170 | 1.61 | 21.79 |

a Mills shut down; water held back by dams.

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

### ANDROSCOGGIN RIVER AT RUMFORD, MAINE.

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

DRAINAGE AREA.—2,090 square miles.

RECORDS AVAILABLE.—May 18, 1892, to September 30, 1918.

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

DISCHARGE.—Computed from discharge over the dam by use of the 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. Results not corrected for storage.

COOPERATION.—Records obtained and computations made by Mr. 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, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,440 | 7,650 | 2,690 | 2,330 | 2,360 | 2,950 | 7,290 | 11,180 | 2,560 | 2,600 | 2,470 | 1,490 |
| 2 | 2,360 | 4,660 | 2,450 | 2,370 | 2,280 | 2,840 | 10,570 | 9,730 | 2,200 | 2,560 | 2,510 | 1,600 |
| 3 | 2,360 | 4,010 | 2,710 | 2,430 | 2,390 | 2,640 | 12,430 | 7,410 | 2,550 | 2,530 | 2,440 | 2,040 |
| 4 | 2,480 | 3,030 | 2,740 | 2,440 | 2,290 | 2,830 | 9,910 | 6,600 | 2,480 | 1,910 | 1,920 | 2,230 |
| 5 | 2,530 | 3,320 | 2,900 | 2,430 | 2,210 | 2,830 | 7,360 | 5,130 | 2,540 | 2,430 | 2,450 | 2,100 |
| 6 | 2,640 | 3,260 | 2,860 | 2,160 | 1,990 | 2,850 | 6,330 | 4,890 | 2,460 | 2,560 | 2,540 | 2,060 |
| 7 | 1,920 | 3,050 | 2,670 | 2,370 | 1,880 | 2,740 | 5,640 | 5,350 | 2,560 | 1,990 | 2,580 | 2,060 |
| 8 | 2,610 | 2,780 | 2,500 | 2,360 | 1,870 | 2,750 | 6,510 | 5,290 | 2,920 | 2,770 | 2,600 | 1,810 |
| 9 | 2,600 | 2,580 | 1,930 | 2,330 | 1,880 | 2,770 | 6,300 | 4,800 | 2,320 | 2,740 | 3,730 | 2,070 |
| 10 | 2,550 | 2,650 | 2,550 | 2,390 | 1,970 | 2,500 | 6,110 | 4,210 | 2,530 | 2,800 | 4,350 | 2,110 |
| 11 | 2,540 | 2,000 | 2,520 | 2,330 | 2,060 | 2,710 | 5,580 | 5,310 | 2,670 | 2,770 | 2,960 | 2,050 |
| 12 | 2,510 | 2,670 | 2,500 | 2,380 | 2,290 | 2,750 | 5,180 | 4,050 | 2,500 | 2,790 | 2,730 | 2,020 |
| 13 | 2,640 | 2,620 | 2,640 | 2,430 | 2,400 | 2,770 | 4,720 | 3,960 | 2,560 | 2,810 | 2,550 | 2,200 |
| 14 | 2,640 | 2,630 | 2,530 | 2,310 | 2,400 | 2,760 | 4,160 | 6,020 | 2,510 | 3,320 | 2,550 | 2,590 |
| 15 | 2,490 | 2,730 | 2,480 | 2,320 | 2,350 | 2,770 | 4,990 | 5,670 | 2,560 | 3,360 | 2,570 | 1,720 |
| 16 | 2,640 | 2,920 | 2,710 | 2,320 | 2,480 | 2,730 | 6,540 | 4,570 | 1,950 | 2,850 | 2,580 | 2,100 |
| 17 | 2,560 | 2,970 | 2,530 | 2,310 | 2,670 | 2,300 | 6,730 | 3,820 | 2,390 | 2,750 | 2,550 | 2,130 |
| 18 | 2,540 | 2,470 | 2,620 | 2,630 | 2,590 | 2,700 | 7,060 | 3,640 | 2,520 | 2,850 | 2,110 | 2,240 |
| 19 | 2,560 | 3,030 | 2,650 | 2,570 | 2,510 | 2,720 | 5,600 | 2,830 | 2,490 | 2,690 | 2,500 | 2,480 |
| 20 | 2,560 | 2,850 | 2,690 | 2,320 | 2,660 | 2,740 | 4,600 | 3,140 | 2,420 | 2,650 | 2,520 | 2,530 |
| 21 | 1,970 | 2,960 | 2,760 | 2,250 | 2,990 | 2,830 | 4,360 | 3,100 | 2,460 | 1,790 | 2,500 | 4,180 |
| 22 | 2,490 | 3,000 | 2,610 | 2,240 | 3,030 | 3,500 | 5,880 | 3,970 | 3,500 | 2,480 | 2,330 | 3,700 |
| 23 | 2,490 | 2,960 | 2,540 | 2,460 | 3,140 | 3,970 | 6,650 | 2,910 | 5,920 | 2,330 | 2,340 | 2,700 |
| 24 | 2,350 | 2,870 | 2,180 | 2,530 | 3,250 | 3,430 | 7,290 | 2,630 | 3,440 | 2,000 | 2,410 | 2,560 |
| 25 | 4,730 | 2,110 | 2,000 | 2,520 | 2,830 | 3,790 | 6,410 | 2,440 | 2,990 | 2,170 | 1,830 | 2,650 |
| 26 | 3,860 | 2,100 | 2,450 | 2,540 | 2,860 | 3,920 | 5,380 | 1,950 | 2,720 | 2,120 | 2,290 | 3,280 |
| 27 | 3,080 | 2,020 | 2,420 | 2,460 | 3,220 | 3,690 | 5,370 | 2,500 | 2,650 | 2,190 | 2,260 | 11,240 |
| 28 | 3,040 | 2,350 | 2,390 | 2,290 | 3,210 | 3,620 | 5,300 | 2,680 | 2,610 | 2,100 | 2,050 | 6,750 |
| 29 | 3,780 | 2,640 | 2,370 | 2,460 | ..... | 3,820 | 6,210 | 2,630 | 2,930 | 2,360 | 2,120 | 3,830 |
| 30 | 8,320 | 2,780 | 2,540 | 2,520 | ..... | 4,390 | 9,280 | 2,580 | 1,990 | 2,530 | 2,090 | 3,130 |
| 31 | 15,210 | ..... | 2,280 | 2,400 | ..... | 5,280 | ..... | 2,470 | ..... | 2,540 | 2,070 | ..... |

*Monthly discharge of Androscoggin River at Rumford, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 2,090 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 15,210 | 1,920 | 3,270 | 1.56 | 1.80 |
| November | 7,650 | 2,000 | 2,990 | 1.43 | 1.60 |
| December | 2,900 | 1,930 | 2,530 | 1.21 | 1.40 |
| January | 2,630 | 2,160 | 2,390 | 1.14 | 1.31 |
| February | 3,250 | 1,870 | 2,500 | 1.20 | 1.25 |
| March | 5,280 | 2,300 | 3,130 | 1.50 | 1.73 |
| April | 12,430 | 4,160 | 6,520 | 3.12 | 3.48 |
| May | 11,180 | 1,950 | 4,430 | 2.12 | 2.44 |
| June | 5,920 | 1,950 | 2,700 | 1.29 | 1.44 |
| July | 3,360 | 1,790 | 2,530 | 1.21 | 1.40 |
| August | 4,350 | 1,830 | 2,500 | 1.20 | 1.38 |
| September | 11,240 | 1,490 | 2,860 | 1.37 | 1.53 |
| The year | 15,210 | 1,490 | 3,200 | 1.53 | 20.76 |

NOTE.—The monthly discharge in second-feet per square mile and the run-off depth in inches do not represent the natural run-off from the basin because of storage. (See "Regulation.") The indicated minimum discharge usually occurs on Sundays 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.—215 square miles.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1918.

GAGE.—Vertical staff in two sections, the lower attached to one of the concrete buttresses of the dam and the upper on 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 a mile below the 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, 1918.*

[Drainage area, 215 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 1,720 | 90 | 596 | 2.77 | 3.19 |
| November | 560 | 92 | 349 | 1.62 | 1.81 |
| December | 2,200 | 1,490 | 1,790 | 8.33 | 9.60 |
| January | 2,050 | 1,440 | 1,680 | 7.81 | 9.00 |
| February | 1,680 | 46 | 757 | 3.52 | 3.66 |
| March | 619 | 49 | 124 | .577 | .67 |
| April | 77 | 58 | 69 | .321 | .36 |
| May | 1,030 | 79 | 180 | .837 | .96 |
| June | 1,240 | 88 | 535 | 2.49 | 2.78 |
| July | 167 | 147 | 153 | .712 | .82 |
| August | 1,100 | 161 | 272 | 1.27 | 1.46 |
| September | 259 | 154 | 177 | .823 | .92 |
| The year | 2,200 | 46 | 558 | 2.60 | 35.23 |

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

### LITTLE ANDROSCOGGIN RIVER NEAR SOUTH PARIS, MAINE.

LOCATION.—At left end of 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, 1918.

GAGE.—Chain on left bank installed April 16, 1914; original gage, a vertical staff, was destroyed by ice March 2, 1914; from March 18 to April 9, 1914, a chain gage on a footbridge was used; all gages referred to same datum and at practically the same place. Gage 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; water flows over dam at gage height 5.30 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.3 feet at 5 p. m. September 26 (discharge, 1,970 second-feet); minimum stage recorded, 1.16 feet at 8 p. m. August 4 (discharge, 8 second-feet).

1914–1918: Maximum stage recorded, 9.3 feet at 7 a. m. July 9, 1915 (discharge, 2,970 second-feet); minimum stage recorded, 0.7 foot at 6 p. m. August 16 (discharge, 1 second-foot).

ICE.—Control remains open throughout the winter; stage-discharge relation not affected by ice.

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

ACCURACY.—Stage-discharge relation changed at the time of high water April 9, 1914; otherwise practically permanent. Rating curve well defined below 700 second-

feet and fairly well defined between 700 and 1,800 second-feet. Gage read to tenths once daily. Daily discharges ascertained by applying daily gage height to rating table. Records good except for times of sudden changes in stage, when the number of gage readings is insufficient to determine accurately the mean daily flow.

No discharge measurements were made during the year.

*Daily discharge, in second-feet, of Little Androscoggin River near South Paris, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 37 | 219 | 54 | 24 | 26 | 132 | 558 | 650 | 100 | 54 | 14 | 11 |
| 2 | 30 | 140 | 50 | 24 | 24 | 132 | 1,080 | 458 | 100 | 47 | 13 | 13 |
| 3 | 26 | 124 | 50 | 24 | 24 | 108 | 1,080 | 325 | 92 | 47 | 11 | 13 |
| 4 | 26 | 112 | 47 | 30 | 24 | 112 | 760 | 303 | 92 | 40 | 8 | 29 |
| 5 | 29 | 92 | 54 | 30 | 24 | 108 | 442 | 259 | 76 | 34 | 47 | 24 |
| 6 | 76 | 84 | 50 | 34 | 24 | 100 | 458 | 249 | 68 | 34 | 47 | 24 |
| 7 | 54 | 68 | 40 | 29 | 24 | 92 | 442 | 259 | 100 | 116 | 47 | 29 |
| 8 | 68 | 64 | 34 | 24 | 24 | 92 | 442 | 219 | 92 | 124 | 54 | 24 |
| 9 | 100 | 64 | 47 | 32 | 24 | 96 | 411 | 219 | 92 | 140 | 372 | 24 |
| 10 | 47 | 54 | 54 | 26 | 24 | 76 | 372 | 199 | 100 | 124 | 325 | 18 |
| 11 | 54 | 47 | 50 | 26 | 30 | 76 | 325 | 239 | 100 | 116 | 189 | 20 |
| 12 | 47 | 58 | 40 | 29 | 30 | 76 | 303 | 219 | 92 | 124 | 124 | 20 |
| 13 | 61 | 54 | 40 | 34 | 30 | 72 | 325 | 169 | 92 | 140 | 124 | 34 |
| 14 | 92 | 47 | 47 | 32 | 30 | 68 | 348 | 270 | 76 | 149 | 314 | 34 |
| 15 | 80 | 54 | 47 | 34 | 30 | 68 | 348 | 249 | 68 | 140 | 458 | 29 |
| 16 | 61 | 47 | 34 | 40 | 30 | 72 | 325 | 219 | 34 | 124 | 281 | 24 |
| 17 | 54 | 54 | 34 | 37 | 30 | 61 | 336 | 219 | 34 | 76 | 124 | 24 |
| 18 | 47 | 40 | 37 | 34 | 30 | 68 | 325 | 199 | 40 | 76 | 100 | 18 |
| 19 | 54 | 54 | 37 | 32 | 30 | 72 | 360 | 199 | 34 | 47 | 84 | 384 |
| 20 | 47 | 47 | 34 | 29 | 34 | 100 | 360 | 189 | 24 | 47 | 68 | 270 |
| 21 | 34 | 47 | 34 | 29 | 24 | 104 | 384 | 124 | 24 | 40 | 68 | 270 |
| 22 | 50 | 47 | 29 | 32 | 26 | 159 | 426 | 100 | 535 | 47 | 54 | 219 |
| 23 | 50 | 54 | 34 | 34 | 24 | 169 | 372 | 100 | 585 | 40 | 47 | 199 |
| 24 | 47 | 54 | 37 | 32 | 29 | 179 | 325 | 76 | 303 | 29 | 34 | 219 |
| 25 | 179 | 54 | 32 | 24 | 26 | 189 | 259 | 76 | 219 | 24 | 24 | 270 |
| 26 | 108 | 47 | 34 | 26 | 92 | 219 | 249 | 84 | 140 | 29 | 29 | 1,970 |
| 27 | 76 | 54 | 34 | 26 | 159 | 259 | 239 | 92 | 108 | 24 | 24 | 760 |
| 28 | 124 | 50 | 24 | 24 | 149 | 259 | 219 | 92 | 76 | 29 | 18 | 512 |
| 29 | 124 | 47 | 24 | 24 | ..... | 303 | 303 | 92 | 68 | 24 | 14 | 336 |
| 30 | 140 | 47 | 24 | 24 | ..... | 325 | 426 | 100 | 47 | 24 | 13 | 303 |
| 31 | 426 | ..... | 24 | 26 | ..... | 411 | ..... | 100 | ..... | 20 | 11 | ..... |

NOTE.—Discharge estimated Oct. 2, Dec. 30 to Jan. 5, and Feb. 3–19; consideration being given to temperature and rainfall data.

*Monthly discharge of Little Androscoggin River near South Paris, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 75 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 426 | 26 | 79.0 | 1.05 | 1.21 |
| November | 219 | 40 | 67.5 | .900 | 1.00 |
| December | 54 | 24 | 39.0 | .520 | .60 |
| January | 40 | 24 | 29.2 | .389 | .45 |
| February | 159 | 24 | 38.4 | .512 | .53 |
| March | 411 | 61 | 141 | 1.88 | 2.17 |
| April | 1,080 | 219 | 420 | 5.60 | 6.25 |
| May | 650 | 76 | 205 | 2.73 | 3.15 |
| June | 585 | 24 | 120 | 1.60 | 1.78 |
| July | 149 | 20 | 68.7 | .916 | 1.06 |
| August | 458 | 8 | 101 | 1.35 | 1.56 |
| September | 1,970 | 11 | 204 | 2.72 | 3.04 |
| The year | 1,970 | 8 | 126 | 1.68 | 22.80 |

## 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, 1918. All data from 1887 to 1911 recomputed and published in the second annual report of Maine State Water Storage Commission.

GAGES.—On bulkhead of gatehouse at outlet dam, and in fore bay 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.

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

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.; record in second-feet computed by engineers of United States Geological Survey.

*Daily discharge, in second-feet, of Presumpscot River at outlet of Sebago Lake, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 765 | 705 | 813 | 807 | 807 | 654 | 542 | 445 | 539 | 502 | 764 | 230 |
| 2 | 788 | 773 | 273 | 818 | 804 | 633 | 528 | 438 | 170 | 584 | 704 | 262 |
| 3 | 803 | 803 | 820 | 803 | 235 | 135 | 524 | 470 | 366 | 590 | 679 | 689 |
| 4 | 803 | 212 | 745 | 797 | 472 | 676 | 490 | 445 | 558 | 186 | 252 | 672 |
| 5 | 878 | 743 | 742 | 817 | 816 | 668 | 533 | 237 | 575 | 526 | 678 | 619 |
| 6 | 798 | 780 | 783 | 299 | 820 | 707 | 569 | 503 | 601 | 652 | 746 | 622 |
| 7 | 278 | 817 | 787 | 788 | 919 | 699 | 187 | 537 | 628 | 187 | 741 | 650 |
| 8 | 790 | 783 | 723 | 780 | 901 | 707 | 558 | 435 | 547 | 675 | 715 | 262 |
| 9 | 798 | 747 | 337 | 801 | 918 | 703 | 563 | 444 | 212 | 619 | 574 | 629 |
| 10 | 800 | 770 | 773 | 805 | 311 | 236 | 572 | 594 | 587 | 644 | 534 | 627 |
| 11 | 790 | 235 | 742 | 783 | 494 | 722 | 547 | 507 | 570 | 693 | 128 | 647 |
| 12 | 805 | 787 | 818 | 769 | 490 | 718 | 585 | 205 | 600 | 699 | 593 | 689 |
| 13 | 778 | 740 | 830 | 323 | 830 | 715 | 504 | 528 | 498 | 594 | 589 | 641 |
| 14 | 203 | 760 | 808 | 760 | 818 | 735 | 172 | 514 | 651 | 199 | 692 | 622 |
| 15 | 792 | 752 | 825 | 799 | 806 | 728 | 497 | 563 | 575 | 565 | 661 | 277 |
| 16 | 803 | 778 | 372 | 796 | 792 | 709 | 474 | 548 | 199 | 611 | 716 | 592 |
| 17 | 777 | 782 | 825 | 804 | 258 | 249 | 502 | 591 | 504 | 664 | 634 | 613 |
| 18 | 773 | 238 | 813 | 511 | 505 | 771 | 542 | 545 | 559 | 505 | 172 | 617 |
| 19 | 795 | 797 | 825 | 412 | 789 | 760 | 501 | 192 | 600 | 683 | 692 | 577 |
| 20 | 733 | 730 | 818 | 373 | 794 | 757 | 598 | 477 | 679 | 569 | 707 | 548 |
| 21 | 198 | 748 | 822 | 402 | 803 | 693 | 248 | 546 | 626 | 133 | 707 | 421 |
| 22 | 805 | 798 | 822 | 541 | 785 | 639 | 422 | 555 | 488 | 643 | 801 | 148 |
| 23 | 820 | 705 | 327 | 730 | 777 | 597 | 458 | 571 | 65 | 677 | 753 | 598 |
| 24 | 787 | 668 | 752 | 801 | 216 | 190 | 496 | 564 | 412 | 689 | 703 | 607 |
| 25 | 710 | 282 | 240 | 805 | 741 | 637 | 533 | 484 | 518 | 661 | 257 | 570 |
| 26 | 803 | 788 | 733 | 803 | 722 | 595 | 591 | 221 | 582 | 682 | 747 | 566 |
| 27 | 777 | 825 | 822 | 239 | 676 | 638 | 533 | 504 | 535 | 583 | 730 | 409 |
| 28 | 192 | 785 | 835 | 522 | 633 | 613 | 149 | 560 | 588 | 258 | 737 | 335 |
| 29 | 770 | 648 | 822 | 803 | ..... | 551 | 628 | 588 | 555 | 624 | 748 | 169 |
| 30 | 770 | 762 | 288 | 811 | ..... | 536 | 536 | 473 | 242 | 642 | 774 | 604 |
| 31 | 720 | ..... | 805 | 816 | ..... | 138 | ..... | 528 | ..... | 651 | 600 | ..... |

*Monthly discharge of Presumpscot River at outlet of Sebago Lake, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 436 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 878 | 192 | 713 | 1.64 | 1.89 |
| November | 825 | 212 | 691 | 1.58 | 1.76 |
| December | 835 | 240 | 701 | 1.61 | 1.86 |
| January | 818 | 239 | 681 | 1.56 | 1.80 |
| February | 919 | 216 | 676 | 1.55 | 1.61 |
| March | 771 | 135 | 597 | 1.37 | 1.58 |
| April | 628 | 149 | 486 | 1.11 | 1.24 |
| May | 594 | 192 | 478 | 1.10 | 1.27 |
| June | 679 | 65 | 494 | 1.13 | 1.26 |
| July | 699 | 133 | 555 | 1.27 | 1.46 |
| August | 774 | 128 | 630 | 1.44 | 1.66 |
| September | 689 | 148 | 517 | 1.19 | 1.33 |
| The year | 919 | 65 | 602 | 1.38 | 18.72 |

NOTE.—The monthly discharge does not represent the natural flow from the basin because of artificial storage. The yearly discharge and run-off probably represent more nearly the natural flow, because 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, 1918.

GAGE.—Chain attached to bridge; read by S. J. Elliott and 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 recorded during year, 5.6 feet at 3 p. m. April 7 (discharge, 7,560 second-feet); minimum stage recorded, 0.74 foot at 9.30 a. m. September 15 (discharge, 644 second-feet). Minimum discharge estimated as 350 second-feet several times in January and February; stage-discharge relation affected by ice at the time.

1916–1918: Maximum stage recorded, 9.4 feet at 6.30 a. m. June 18, 1917 (approximate discharge, from extension of rating curve, 17,400 second-feet); minimum open-water stage recorded, 0.8 foot several times in August and September, 1917 (discharge, 635 second-feet).

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

REGULATION.—Distribution of flow probably not seriously affected by power developments above the gage.

ACCURACY.—Stage-discharge relation has apparently shifted since station was first established; present rating curve fairly well defined between 1,000 and 7,000 second-feet. Gage read to half-tenths twice daily, except from December 14 to March 27, when it was read three times a week. Daily discharge ascertained by applying daily gage height to rating table and making corrections for effect of ice during the winter. Records fair.

*Discharge measurements of Saco River at Cornish, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 11 | A. F. McAlary | [a] 2.40 | 851 | Apr. 12 | H. A. Lancaster | 5.11 | 6,440 |
| Feb. 15 | do | [a] 2.65 | 691 | May 9 | do | 4.26 | 4,850 |
| Mar. 14 | do | [a] 3.43 | 1,360 | | | | |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Saco River at Cornish, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 845 | 1,830 | 960 | 700 | 440 | 960 | 3,690 | 5,280 | 1,530 | 1,730 | 1,180 | 1,020 |
| 2 | 810 | 1,630 | 1,000 | 700 | 440 | 960 | 5,460 | 5,640 | 1,730 | 1,830 | 1,140 | 915 |
| 3 | 845 | 2,040 | 920 | 700 | 440 | 960 | 6,420 | 5,640 | 1,530 | 1,630 | 1,100 | 880 |
| 4 | 915 | 3,210 | 920 | 700 | 500 | 1,000 | 6,860 | 5,830 | 1,530 | 1,530 | 880 | 915 |
| 5 | 880 | 3,690 | 880 | 680 | 540 | 1,100 | 7,090 | 5,600 | 1,260 | 1,440 | 1,100 | 1,060 |
| 6 | 880 | 3,370 | 880 | 440 | 560 | 1,200 | 7,320 | 5,400 | 1,180 | 1,530 | 985 | 1,060 |
| 7 | 845 | 3,530 | 880 | 500 | 600 | 1,200 | 7,560 | 5,200 | 1,350 | 1,350 | 985 | 950 |
| 8 | 1,020 | 3,210 | 840 | 600 | 620 | 1,200 | 7,320 | 5,000 | 1,180 | 1,440 | 985 | 810 |
| 9 | 1,020 | 2,770 | 840 | 740 | 640 | 1,250 | 7,090 | 4,800 | 1,180 | 1,630 | 1,530 | 985 |
| 10 | 1,020 | 2,380 | 800 | 800 | 640 | 1,200 | 6,860 | 4,560 | 1,260 | 1,530 | 1,630 | 985 |
| 11 | 1,020 | 2,040 | 800 | 860 | 660 | 1,200 | 6,640 | 4,560 | 1,440 | 1,530 | 1,830 | 1,020 |
| 12 | 1,100 | 2,040 | 800 | 620 | 660 | 1,200 | 6,640 | 4,380 | 1,350 | 1,630 | 1,730 | 1,020 |
| 13 | 1,140 | 1,730 | 800 | 380 | 540 | 1,250 | 6,220 | 3,860 | 1,440 | 1,730 | 1,630 | 1,020 |
| 14 | 1,060 | 1,730 | 740 | 560 | 680 | 1,350 | 5,830 | 3,690 | 1,440 | 1,930 | 1,530 | 845 |
| 15 | 1,180 | 1,630 | 700 | 680 | 700 | 1,350 | 5,830 | 3,530 | 1,530 | 2,040 | 1,530 | 680 |
| 16 | 1,140 | 1,530 | 700 | 840 | 600 | 1,350 | 5,460 | 3,690 | 1,400 | 2,040 | 1,530 | 1,060 |
| 17 | 1,100 | 1,440 | 680 | 800 | 350 | 1,350 | 5,460 | 3,530 | 1,300 | 2,260 | 1,350 | 1,060 |
| 18 | 1,180 | 1,440 | 680 | 800 | 500 | 1,450 | 5,460 | 3,210 | 1,250 | 2,380 | 1,350 | 1,060 |
| 19 | 1,140 | 1,440 | 680 | 640 | 560 | 1,550 | 5,460 | 3,370 | 1,250 | 2,040 | 1,260 | 1,180 |
| 20 | 1,140 | 1,530 | 680 | 380 | 540 | 1,650 | 5,460 | 2,910 | 1,250 | 2,040 | 1,180 | 1,260 |
| 21 | 1,260 | 1,630 | 700 | 560 | 660 | 1,750 | 5,460 | 2,630 | 1,350 | 2,150 | 1,100 | 1,830 |
| 22 | 1,180 | 1,630 | 740 | 680 | 660 | 1,850 | 5,460 | 2,500 | 1,500 | 1,930 | 1,140 | 1,930 |
| 23 | 1,260 | 1,440 | 780 | 800 | 600 | 2,000 | 5,640 | 2,380 | 2,150 | 1,530 | 1,020 | 2,040 |
| 24 | 1,100 | 1,440 | 780 | 740 | 600 | 2,100 | 5,830 | 2,260 | 2,630 | 1,440 | 985 | 2,040 |
| 25 | 1,260 | 1,140 | 700 | 620 | 740 | 2,200 | 5,830 | 1,930 | 2,630 | 1,350 | 1,020 | 2,040 |
| 26 | 1,440 | 1,100 | 700 | 350 | 840 | 2,300 | 5,830 | 1,730 | 2,630 | 1,180 | 1,020 | 2,380 |
| 27 | 1,440 | 1,000 | 700 | 350 | 960 | 2,500 | 5,460 | 1,730 | 2,500 | 1,180 | 1,020 | 4,920 |
| 28 | 1,350 | 960 | 700 | 520 | 960 | 2,600 | 5,460 | 1,730 | 2,260 | 1,100 | 1,020 | 4,740 |
| 29 | 1,830 | 960 | 700 | 740 | ..... | 2,700 | 5,100 | 1,730 | 2,150 | 1,260 | 985 | 4,920 |
| 30 | 1,530 | 920 | 700 | 920 | ..... | 2,900 | 5,100 | 1,530 | 1,930 | 1,260 | 915 | 5,100 |
| 31 | 2,040 | ..... | 700 | 800 | ..... | 3,100 | ..... | 1,730 | ..... | 1,180 | 1,060 | ..... |

NOTE.—Stage-discharge relation affected by ice Nov. 27 to Mar. 30; 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 comparative records of power plant at Hiram, plus records of Ossipee. Discharge estimated May 5–9 and June 16–22 by comparative hydrograph.

*Monthly discharge of Saco River at Cornish, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 1,390 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 2,040 | 810 | 1,160 | 0.892 | 1.03 |
| November | 3,690 | 920 | 1,880 | 1.45 | 1.62 |
| December | 1,000 | 680 | 777 | .598 | .69 |
| January | 920 | 350 | 652 | .502 | .58 |
| February | 960 | 350 | 615 | .473 | .49 |
| March | 3,100 | 960 | 1,640 | 1.26 | 1.45 |
| April | 7,560 | 3,690 | 5,980 | 4.60 | 5.13 |
| May | 5,830 | 1,530 | 3,600 | 2.77 | 3.19 |
| June | 2,630 | 1,180 | 1,640 | 1.26 | 1.41 |
| July | 2,380 | 1,100 | 1,640 | 1.26 | 1.45 |
| August | 1,830 | 880 | 1,220 | .938 | 1.08 |
| September | 5,100 | 680 | 1,720 | 1.32 | 1.47 |
| The year | 7,560 | 350 | 1,880 | 1.45 | 19.59 |

### OSSIPEE RIVER AT CORNISH, MAINE.

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

DRAINAGE AREA.—448 square miles.

RECORDS AVAILABLE.—July 5, 1916, to September 30, 1918.

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

DISCHARGE MEASUREMENTS.—Made from bridge.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.15 feet at 4 p. m. April 4 (discharge, 2,610 second-feet); minimum stage recorded, 0.90 foot at 6 p. m. September 14 (discharge, 320 second-feet). Minimum discharge estimated as 240 second-feet several times during January and February; stage-discharge relation affected by ice at the time.

1916–1918: Maximum stage recorded, 7.25 feet at 6 a. m. June 18, 1917 (approximate discharge, from extension of rating curve, 6,480 second-feet); minimum open-water stage recorded, 0.90 foot at 6 p. m. September 14, 1918 (discharge, 320 second-feet).

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

REGULATION.—Flow regulated by dams at Kezar Falls and at outlet of Great Ossipee Lake.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined between 350 and 2,400 second-feet. Gage read to half-tenths once a day except from January 1 to February 25, when it was read three or four times a week. Daily discharge, ascertained by applying gage height to rating table and making corrections for effect of ice during the winter. Records fair.

*Discharge measurements of Ossipee River at Cornish, Maine, during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 10 | A. F. McAlary | [a] 1.61 | 220 | Apr. 11 | H. A. Lancaster | 3.65 | 2,150 |
| Feb. 15 | do | [a] 2.23 | 232 | 12 | do | 3.49 | 1,990 |
| Mar. 13 | do | [a] 2.97 | 406 | May 9 | do | 2.50 | 1,160 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Ossipee River at Cornish, Maine, for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 390 | 520 | 300 | 290 | 260 | 360 | 1,320 | 1,820 | 500 | 500 | 360 | 375 |
| 2 | 360 | 550 | 310 | 290 | 270 | 360 | 1,820 | 1,910 | 480 | 500 | 350 | 375 |
| 3 | 375 | 575 | 320 | 290 | 250 | 360 | 2,460 | 1,730 | 480 | 480 | 340 | 375 |
| 4 | 360 | 600 | 320 | 290 | 250 | 390 | 2,560 | 1,560 | 460 | 440 | 360 | 390 |
| 5 | 350 | 600 | 300 | 300 | 250 | 420 | 2,560 | 1,500 | 440 | 420 | 360 | 375 |
| 6 | 390 | 600 | 310 | 290 | 250 | 420 | 2,270 | 1,400 | 390 | 420 | 350 | 360 |
| 7 | 375 | 575 | 300 | 290 | 250 | 420 | 2,270 | 1,400 | 375 | 420 | 340 | 330 |
| 8 | 375 | 500 | 310 | 290 | 250 | 420 | 2,180 | 1,320 | 390 | 440 | 350 | 330 |
| 9 | 375 | 480 | 320 | 270 | 250 | 420 | 2,180 | 1,160 | 390 | 440 | 960 | 350 |
| 10 | 360 | 480 | 320 | 250 | 250 | 420 | 2,180 | 1,000 | 420 | 460 | 850 | 350 |
| 11 | 360 | 480 | 320 | 250 | 250 | 420 | 2,090 | 1,000 | 460 | 460 | 815 | 360 |
| 12 | 375 | 460 | 320 | 250 | 240 | 400 | 2,000 | 1,000 | 440 | 480 | 660 | 350 |
| 13 | 390 | 440 | 310 | 250 | 240 | 400 | 2,000 | 1,000 | 460 | 500 | 600 | 340 |
| 14 | 405 | 420 | 310 | 250 | 240 | 390 | 1,910 | 1,080 | 460 | 480 | 550 | 320 |
| 15 | 405 | 405 | 310 | 240 | 240 | 340 | 1,820 | 1,000 | 460 | 460 | 550 | 330 |
| 16 | 405 | 405 | 320 | 270 | 240 | 340 | 1,640 | 1,000 | 420 | 460 | 500 | 340 |
| 17 | 405 | 390 | 310 | 260 | 240 | 360 | 1,640 | 1,000 | 420 | 460 | 420 | 340 |
| 18 | 390 | 375 | 310 | 260 | 240 | 390 | 1,730 | 920 | 375 | 500 | 390 | 340 |
| 19 | 390 | 350 | 300 | 250 | 260 | 390 | 1,730 | 850 | 390 | 500 | 390 | 500 |
| 20 | 405 | 350 | 290 | 250 | 270 | 400 | 1,640 | 750 | 390 | 460 | 375 | 525 |
| 21 | 405 | 350 | 290 | 250 | 250 | 560 | 1,640 | 720 | 390 | 600 | 360 | 815 |
| 22 | 405 | 360 | 290 | 260 | 250 | 660 | 2,000 | 690 | 460 | 405 | 360 | 780 |
| 23 | 405 | 375 | 290 | 250 | 240 | 720 | 2,000 | 630 | 720 | 390 | 340 | 600 |
| 24 | 420 | 390 | 300 | 250 | 250 | 840 | 2,000 | 550 | 720 | 375 | 330 | 525 |
| 25 | 500 | 390 | 300 | 250 | 270 | 1,000 | 1,910 | 500 | 750 | 360 | 350 | 550 |
| 26 | 420 | 405 | 300 | 250 | 290 | 1,150 | 1,730 | 480 | 690 | 360 | 360 | 815 |
| 27 | 405 | 400 | 300 | 250 | 310 | 1,250 | 1,640 | 550 | 690 | 340 | 360 | 1,240 |
| 28 | 410 | 380 | 290 | 250 | 310 | 1,300 | 1,480 | 550 | 630 | 350 | 360 | 1,730 |
| 29 | 440 | 340 | 290 | 250 | ..... | 1,400 | 1,400 | 550 | 600 | 375 | 360 | 1,730 |
| 30 | 480 | 310 | 290 | 250 | ..... | 1,320 | 1,400 | 550 | 525 | 375 | 375 | 1,560 |
| 31 | 520 | ..... | 290 | 250 | ..... | 1,320 | ..... | 500 | ..... | 390 | 375 | ..... |

NOTE.—Stage-discharge relation affected by ice from Nov. 27 to Mar. 28; 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 Oct. 28 to Nov. 1, Mar. 31, and May 5.

*Monthly discharge of Ossipee River at Cornish, Maine, for the year ending Sept. 30, 1918.*

[Drainage area, 448 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 520 | 350 | 402 | .897 | 1.03 |
| November | 600 | 310 | 442 | .987 | 1.10 |
| December | 320 | 290 | 305 | .681 | .79 |
| January | 300 | 240 | 263 | .587 | .68 |
| February | 310 | 240 | 256 | .571 | .59 |
| March | 1,400 | 340 | 624 | 1.39 | 1.60 |
| April | 2,560 | 1,320 | 1,910 | 4.26 | 4.75 |
| May | 1,910 | 480 | 989 | 2.21 | 2.55 |
| June | 750 | 375 | 492 | 1.10 | 1.23 |
| July | 600 | 340 | 439 | .980 | 1.13 |
| August | 960 | 330 | 445 | .993 | 1.14 |
| September | 1,730 | 320 | 590 | 1.32 | 1.47 |
| The year | 2,560 | 240 | 596 | 1.33 | 18.06 |

## MERRIMACK RIVER BASIN.

### PEMIGEWASSET RIVER AT PLYMOUTH, N. H.

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

DRAINAGE AREA.—615 square miles.

RECORDS AVAILABLE.—January 1, 1886, to September 30, 1918.

GAGES.—Vertical staff gage in three sections; two lower sections about 40 feet above the bridge; upper section on bridge abutment; used since July 1, 1907. Chain gage on upstream side of bridge used from September 4, 1903, to June 30, 1907. The datum of the staff is 1.11 feet higher than that of the chain gage.

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 open-water stage recorded, 1912–1918: 15.42 feet at 7 a. m. March 28, 1913 (approximate discharge, from extension of rating curve, 18,700 second-feet); a gage height of 18.17 feet was recorded at 4 p. m. February 25, 1915, but stage-discharge relation was probably affected by ice at the time: Minimum stage recorded, 0.64 foot at 7 a. m. September 20, 1913 (discharge, 71 second-feet); an estimated discharge of 60 second-feet occurred September 21, 1913.

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

REGULATION.—There are 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 practically permanent from April, 1912, to September, 1918, except when affected by ice. Rating curve well defined below 15,000 second-feet. Gage read to half inches twice daily, except Sundays. Daily discharge ascertained by applying mean daily gage height to rating table, and making corrections for effect of ice during the winter. Sunday discharge estimated by hydrograph comparisons with records at other gaging stations. Records good.

Records from October 1, 1911, to December 31, 1913, previously published have been revised by means of additional discharge measurements. Estimates for high stages prior to October 1, 1911, which have been published in various water-supply papers of the Geological Survey, are probably too high.

COOPERATION.—Gage-height records furnished by proprietors of locks and canals on Merrimack River, Arthur T. Safford, engineer.

*Discharge measurements of Pemigewasset River at Plymouth, N. H., during 1912–1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| 1912. | | *Feet.* | *Sec.-ft.* | 1914. | | *Feet.* | *Sec.-ft.* |
| Jan. 27 | Coffin and Moore | [a] 1.90 | 349 | Oct. 7 | Reported by A. T. Safford | −0.08 | 149 |
| 29 | R. J. Coffin | [a] 1.80 | 355 | 1915. | | | |
| 29 | Adams and Coffin | [a] 1.81 | 374 | Aug. 28 | Pierce and Thweatt | 1.96 | 1,090 |
| Feb. 3 | do | [a] 1.74 | 343 | Nov. 24 | Hardin Thweatt | 1.55 | 728 |
| 12 | do | [a] 1.58 | 260 | 1916. | | | |
| 18 | C. R. Adams | [a] 1.60 | 291 | Apr. 17 | Hardin Thweatt | 3.90 | 3,440 |
| 28 | Adams and Coffin | [a] 1.90 | 290 | 18 | do | 5.06 | 5,000 |
| Mar. 6 | do | [a] 1.82 | 293 | May 18 | Thweatt and Mansur | 7.68 | 8,260 |
| 12 | Smead and Moore | [a] 1.70 | 304 | 19 | do | 5.38 | 5,290 |
| Apr. 19 | C. R. Adams | 5.90 | 6,160 | June 20 | Pierce and Thweatt | 5.13 | 4,920 |
| 1913. | | | | 1918. | | | |
| Aug. 20 | Reported by A. T. Safford | .104 | 200 | May 17 | Pierce and Weeks | 2.50 | 1,700 |
| | | | | Nov. 18 | H. W. Fear | 2.88 | 2,180 |

[a] Stage-discharge relation affected by ice.

NOTE.—Six discharge measurements made in March and April, 1919, were used in determining the rating curve for high stages.

*Daily discharge, in second-feet, of Pemigewasset River at Plymouth, N. H., for the years ending Sept. 30, 1912–1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1911-12. | | | | | | | | | | | | |
| 1 | 960 | 1,030 | 1,400 | 700 | 370 | 270 | 5,200 | 2,450 | 4,720 | 266 | 255 | 335 |
| 2 | 870 | 997 | 1,100 | 660 | 410 | 270 | 5,800 | 2,200 | 4,000 | 255 | 290 | 353 |
| 3 | 900 | 870 | 870 | 660 | 343 | 260 | 5,450 | 2,050 | 3,180 | 247 | 390 | 408 |
| 4 | 1,130 | 810 | 750 | 600 | 340 | 250 | 2,450 | 1,950 | 2,160 | 242 | 700 | 390 |
| 5 | 3,170 | 760 | 660 | 540 | 330 | 250 | 1,500 | 1,880 | 1,600 | 232 | 422 | 408 |
| 6 | 1,850 | 720 | 900 | 620 | 330 | 293 | 3,350 | 1,900 | 1,260 | 222 | 390 | 422 |
| 7 | 1,240 | 997 | 997 | 580 | 310 | 290 | 6,100 | 3,340 | 1,650 | 222 | 314 | 353 |
| 8 | 1,080 | 1,570 | 870 | 540 | 320 | 290 | 11,600 | 3,340 | 1,170 | 222 | 278 | 500 |
| 9 | 932 | 1,170 | 780 | 520 | 310 | 310 | 5,190 | 2,770 | 900 | 232 | 266 | 314 |
| 10 | 780 | 997 | 870 | 700 | 290 | 300 | 3,650 | 2,610 | 700 | 222 | 266 | 320 |
| 11 | 780 | 965 | 997 | 620 | 270 | 290 | 3,090 | 2,820 | 728 | 212 | 5,460 | 302 |
| 12 | 690 | 1,030 | 1,320 | 520 | 260 | 304 | 3,110 | 3,230 | 700 | 212 | 3,760 | 290 |
| 13 | 600 | 1,170 | 3,170 | 470 | 290 | 350 | 3,450 | 3,920 | 630 | 208 | 1,450 | 290 |
| 14 | 540 | 1,240 | 2,300 | 460 | 290 | 560 | 3,370 | 6,330 | 585 | 215 | 728 | 296 |
| 15 | 480 | 1,100 | 1,570 | 450 | 290 | 640 | 3,310 | 3,290 | 545 | 222 | 482 | 300 |
| 16 | 425 | 1,030 | 1,320 | 520 | 290 | 1,150 | 6,210 | 2,300 | 555 | 232 | 450 | 326 |
| 17 | 375 | 900 | 1,100 | 410 | 280 | 1,800 | 10,300 | 4,280 | 565 | 232 | 377 | 585 |
| 18 | 690 | 997 | 840 | 390 | 291 | 2,500 | 8,270 | 3,700 | 700 | 222 | 300 | 482 |
| 19 | 4,560 | 1,650 | 870 | 390 | 300 | 2,300 | 6,570 | 2,900 | 545 | 242 | 353 | 408 |
| 20 | 2,550 | 1,170 | 810 | 3,600 | 310 | 2,700 | 5,510 | 2,100 | 500 | 227 | 365 | 422 |
| 21 | 1,660 | 1,030 | 870 | 1,000 | 310 | 2,900 | 5,160 | 2,870 | 450 | 250 | 326 | 1,750 |
| 22 | 2,160 | 965 | 932 | 620 | 310 | 2,200 | 4,820 | 4,230 | 422 | 341 | 290 | 1,000 |
| 23 | 2,670 | 810 | 4,060 | 600 | 300 | 1,800 | 10,200 | 3,290 | 375 | 482 | 302 | 605 |
| 24 | 2,420 | 720 | 4,820 | 520 | 290 | 1,600 | 6,930 | 2,610 | 329 | 302 | 326 | 545 |
| 25 | 1,480 | 780 | 2,420 | 490 | 290 | 1,300 | 4,130 | 2,610 | 314 | 290 | 400 | 466 |
| 26 | 1,170 | 765 | 1,570 | 400 | 290 | 1,150 | 3,860 | 1,930 | 353 | 266 | 302 | 397 |
| 27 | 1,200 | 750 | 1,320 | 349 | 310 | 960 | 4,600 | 1,600 | 314 | 266 | 422 | 365 |
| 28 | 997 | 780 | 1,060 | 355 | 290 | 920 | 3,950 | 1,450 | 302 | 260 | 466 | 353 |
| 29 | 900 | 2,550 | 900 | 365 | 270 | 1,200 | 3,290 | 967 | 290 | 255 | 390 | 400 |
| 30 | 810 | 1,850 | 800 | 350 | ..... | 6,100 | 2,660 | 3,020 | 278 | 242 | 326 | 605 |
| 31 | 810 | ..... | 780 | 400 | ..... | 5,500 | ..... | 4,660 | ..... | 242 | 314 | ..... |

*Daily discharge, in second-feet, of Pemigewasset River at Plymouth, N. H., for the years ending Sept. 30, 1912–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1912-13. | | | | | | | | | | | | |
| 1 | 728 | 967 | 600 | 2,710 | 1,250 | 420 | 10,500 | 1,900 | 2,300 | 314 | 278 | 106 |
| 2 | 482 | 2,660 | 565 | 1,800 | 1,600 | 450 | 4,500 | 1,650 | 1,700 | 326 | 266 | 186 |
| 3 | 436 | 1,500 | 2,100 | 1,650 | 1,350 | 430 | 2,970 | 1,360 | 1,260 | 314 | 260 | 194 |
| 4 | 422 | 1,010 | 1,750 | 5,560 | 1,150 | 415 | 2,560 | 1,250 | 1,130 | 302 | 266 | 190 |
| 5 | 408 | 756 | 1,600 | 3,550 | 1,000 | 400 | 2,820 | 1,220 | 931 | 290 | 290 | 190 |
| 6 | 385 | 728 | 1,800 | 2,660 | 850 | 365 | 2,600 | 1,170 | 728 | 300 | 266 | 186 |
| 7 | 365 | 652 | 2,770 | 1,950 | 700 | 370 | 2,300 | 1,050 | 652 | 326 | 255 | 145 |
| 8 | 365 | 9,550 | 1,600 | 1,600 | 730 | 365 | 2,200 | 931 | 600 | 302 | 250 | 106 |
| 9 | 377 | 5,460 | 1,050 | 1,400 | 640 | 360 | 1,450 | 895 | 545 | 290 | 242 | 91 |
| 10 | 353 | 3,000 | 931 | 1,600 | 590 | 355 | 1,220 | 786 | 525 | 278 | 240 | 91 |
| 11 | 365 | 2,100 | 895 | 1,350 | 525 | 350 | 1,400 | 700 | 482 | 565 | 242 | 103 |
| 12 | 408 | 1,700 | 786 | 2,300 | 500 | 540 | 2,200 | 652 | 450 | 466 | 232 | 79 |
| 13 | 1,100 | 1,400 | 756 | 1,700 | 480 | 680 | 3,500 | 585 | 436 | 400 | 222 | 74 |
| 14 | 625 | 1,400 | 652 | 1,450 | 500 | 620 | 3,230 | 565 | 422 | 365 | 217 | 90 |
| 15 | 490 | 2,100 | 600 | 1,150 | 525 | 4,050 | 3,700 | 545 | 400 | 353 | 194 | 178 |
| 16 | 482 | 1,700 | 585 | 1,050 | 515 | 12,100 | 3,760 | 482 | 390 | 314 | 186 | 202 |
| 17 | 482 | 1,350 | 565 | 1,250 | 500 | 9,200 | 3,020 | 652 | 422 | 302 | 180 | 74 |
| 18 | 436 | 1,130 | 555 | 1,700 | 465 | 6,100 | 2,400 | 750 | 545 | 290 | 186 | 91 |
| 19 | 450 | 967 | 676 | 3,500 | 435 | 5,200 | 2,300 | 728 | 525 | 290 | 194 | 128 |
| 20 | 600 | 826 | 1,800 | 2,500 | 420 | 6,600 | 2,100 | 630 | 500 | 285 | 186 | 71 |
| 21 | 466 | 700 | 1,560 | 1,600 | 450 | 14,100 | 1,650 | 525 | 450 | 278 | 128 | 60 |
| 22 | 390 | 652 | 1,450 | 3,300 | 590 | 16,500 | 1,360 | 545 | 425 | 272 | 113 | 208 |
| 23 | 605 | 676 | 1,500 | 2,050 | 1,130 | 5,680 | 1,220 | 2,000 | 408 | 266 | 113 | 5,030 |
| 24 | 7,050 | 900 | 1,130 | 1,950 | 480 | 4,280 | 2,050 | 3,650 | 390 | 266 | 140 | 1,220 |
| 25 | 9,610 | 786 | 1,010 | 2,050 | 480 | 5,030 | 2,450 | 3,000 | 390 | 260 | 194 | 545 |
| 26 | 5,240 | 714 | 756 | 1,800 | 465 | 14,600 | 3,290 | 2,450 | 365 | 255 | 212 | 390 |
| 27 | 3,500 | 676 | 585 | 1,600 | 435 | 6,770 | 2,900 | 1,840 | 341 | 248 | 204 | 353 |
| 28 | 2,450 | 652 | 605 | 1,350 | 420 | 18,700 | 2,710 | 1,320 | 326 | 242 | 208 | 330 |
| 29 | 1,600 | 652 | 650 | 1,150 | ..... | 7,440 | 2,510 | 4,820 | 300 | 314 | 198 | 302 |
| 30 | 1,130 | 630 | 728 | 850 | ..... | 4,500 | 2,820 | 4,180 | 290 | 302 | 194 | 242 |
| 31 | 1,010 | ..... | 1,840 | 1,050 | ..... | 3,240 | ..... | 3,070 | ..... | 290 | 150 | ..... |
| 1913-14. | | | | | | | | | | | | |
| 1 | 242 | 931 | 1,340 | 525 | 1,180 | 620 | 2,300 | 5,030 | 525 | 296 | 290 | 525 |
| 2 | 255 | 700 | 525 | 525 | 1,180 | 7,000 | 5,780 | 3,550 | 482 | 302 | 278 | 365 |
| 3 | 2,400 | 630 | 525 | 500 | 1,050 | 12,400 | 4,400 | 4,000 | 450 | 450 | 266 | 353 |
| 4 | 1,260 | 605 | 605 | 490 | 950 | 9,890 | 2,610 | 4,820 | 436 | 365 | 186 | 314 |
| 5 | 750 | 565 | 585 | 490 | 985 | 7,100 | 2,000 | 4,820 | 3,230 | 350 | 242 | 296 |
| 6 | 545 | 545 | 555 | 475 | 835 | 6,330 | 1,650 | 4,820 | 1,220 | 408 | 222 | 280 |
| 7 | 482 | 482 | 550 | 450 | 770 | 5,560 | 1,560 | 5,680 | 750 | 377 | 222 | 266 |
| 8 | 408 | 525 | 1,600 | 440 | 740 | 4,660 | 1,600 | 4,080 | 565 | 422 | 232 | 266 |
| 9 | 341 | 600 | 1,450 | 420 | 715 | 3,760 | 5,460 | 4,600 | 525 | 390 | 227 | 266 |
| 10 | 326 | 11,100 | 1,220 | 420 | 600 | 2,970 | 5,130 | 5,250 | 482 | 365 | 222 | 266 |
| 11 | 314 | 4,280 | 1,130 | 415 | 530 | 2,300 | 3,020 | 4,500 | 450 | 353 | 212 | 266 |
| 12 | 400 | 2,300 | 756 | 415 | 510 | 2,200 | 3,500 | 3,450 | 65 | 350 | 242 | 255 |
| 13 | 700 | 1,500 | 786 | 400 | 460 | 2,160 | 4,230 | 2,820 | 341 | 565 | 232 | 220 |
| 14 | 605 | 1,220 | 750 | 385 | 460 | 2,000 | 2,820 | 2,610 | 300 | 545 | 232 | 186 |
| 15 | 565 | 1,050 | 756 | 440 | 450 | 1,000 | 2,610 | 2,200 | 290 | 390 | 255 | 266 |
| 16 | 500 | 900 | 786 | 480 | 440 | 756 | 2,400 | 2,000 | 326 | 341 | 235 | 242 |
| 17 | 482 | 728 | 630 | 460 | 430 | 728 | 2,400 | 1,800 | 302 | 326 | 222 | 232 |
| 18 | 450 | 700 | 565 | 450 | 430 | 931 | 2,970 | 1,600 | 302 | 290 | 212 | 222 |
| 19 | 440 | 652 | 535 | 440 | 440 | 895 | 4,000 | 1,600 | 290 | 300 | 212 | 222 |
| 20 | 436 | 1,360 | 525 | 430 | 450 | 700 | 14,100 | 1,900 | 290 | 302 | 232 | 200 |
| 21 | 7,670 | 1,800 | 500 | 415 | 435 | 676 | 18,400 | 1,900 | 300 | 290 | 290 | 186 |
| 22 | 2,710 | 1,260 | 500 | 415 | 420 | 600 | 9,220 | 1,800 | 302 | 278 | 278 | 186 |
| 23 | 1,260 | 1,000 | 530 | 400 | 400 | 565 | 6,210 | 1,600 | 290 | 266 | 270 | 186 |
| 24 | 770 | 859 | 600 | 390 | 420 | 500 | 4,280 | 1,500 | 290 | 266 | 266 | 204 |
| 25 | 826 | 786 | 530 | 490 | 420 | 482 | 3,970 | 1,560 | 278 | 255 | 255 | 186 |
| 26 | 2,000 | 652 | 575 | 1,020 | 400 | 482 | 3,750 | 1,320 | 302 | 255 | 232 | 186 |
| 27 | 3,450 | 585 | 510 | 1,120 | 390 | 652 | 3,550 | 1,130 | 290 | 255 | 232 | 200 |
| 28 | 2,400 | 545 | 480 | 1,440 | 375 | 5,780 | 5,300 | 1,050 | 300 | 242 | 222 | 222 |
| 29 | 1,400 | 545 | 530 | 1,460 | ..... | 3,500 | 5,780 | 826 | 266 | 186 | 314 | 232 |
| 30 | 1,260 | 600 | 555 | 1,300 | ..... | 2,710 | 7,540 | 700 | 302 | 290 | 750 | 222 |
| 31 | 1,320 | ..... | 545 | 1,200 | ..... | 2,450 | ..... | 600 | ..... | 341 | 1,220 | ..... |

*Daily discharge, in second-feet, of Pemigewasset River at Plymouth, N. H., for the years ending Sept. 30, 1912–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1914–15. | | | | | | | | | | | | |
| 1 | 194 | 186 | 341 | 265 | 600 | 8,610 | 810 | 4,280 | 615 | 474 | 1,000 | 700 |
| 2 | 212 | 186 | 341 | 295 | 620 | 9,500 | 700 | 3,500 | 570 | 3,020 | 1,090 | 555 |
| 3 | 194 | 242 | 630 | 410 | 670 | 8,110 | 585 | 2,400 | 500 | 5,070 | 1,800 | 540 |
| 4 | 190 | 212 | 1,010 | 315 | 700 | 6,430 | 600 | 1,950 | 474 | 3,000 | 1,200 | 535 |
| 5 | 186 | 242 | 605 | 225 | 680 | 5,620 | 786 | 1,630 | 450 | 2,300 | 1,640 | 500 |
| 6 | 186 | 232 | 540 | 260 | 790 | 5,330 | 721 | 1,430 | 450 | 2,480 | 1,680 | 443 |
| 7 | 186 | 212 | 482 | 220 | 940 | 4,800 | 770 | 1,110 | 450 | 1,560 | 1,290 | 429 |
| 8 | 186 | 215 | 365 | 900 | 1,350 | 3,750 | 1,340 | 1,310 | 418 | 913 | 1,150 | 458 |
| 9 | 186 | 222 | 500 | 590 | 1,200 | 2,630 | 2,520 | 1,450 | 408 | 12,900 | 1,050 | 458 |
| 10 | 194 | 255 | 450 | 500 | 920 | 2,100 | 2,800 | 1,510 | 422 | 4,820 | 1,130 | 450 |
| 11 | 190 | 222 | 408 | 450 | 760 | 1,980 | 5,500 | 1,330 | 408 | 3,000 | 877 | 436 |
| 12 | 186 | 222 | 408 | 480 | 740 | 1,680 | 10,800 | 985 | 474 | 2,070 | 742 | 432 |
| 13 | 186 | 186 | 332 | 450 | 700 | 1,430 | 6,560 | 913 | 474 | 1,450 | 770 | 429 |
| 14 | 186 | 186 | 290 | 430 | 670 | 1,250 | 3,970 | 1,030 | 474 | 1,170 | 1,220 | 415 |
| 15 | 222 | 200 | 450 | 400 | 640 | 1,110 | 3,210 | 895 | 436 | 1,110 | 1,000 | 383 |
| 16 | 186 | 290 | 482 | 400 | 1,400 | 1,260 | 3,230 | 850 | 535 | 985 | 1,090 | 371 |
| 17 | 186 | 1,900 | 500 | 380 | 4,000 | 1,200 | 3,210 | 834 | 600 | 949 | 985 | 383 |
| 18 | 186 | 585 | 466 | 380 | 2,300 | 770 | 3,000 | 850 | 1,750 | 950 | 1,150 | 390 |
| 19 | 186 | 500 | 194 | 940 | 1,700 | 1,000 | 2,870 | 834 | 1,050 | 1,033 | 985 | 394 |
| 20 | 266 | 326 | 190 | 7,300 | 1,400 | 949 | 2,850 | 895 | 750 | 1,050 | 742 | 397 |
| 21 | 278 | 408 | 186 | 3,900 | 1,250 | 1,000 | 2,920 | 778 | 676 | 1,090 | 565 | 408 |
| 22 | 266 | 380 | 320 | 2,450 | 1,100 | 1,050 | 2,200 | 742 | 615 | 1,030 | 1,000 | 2,050 |
| 23 | 255 | 365 | 300 | 1,500 | 1,050 | 1,070 | 1,580 | 700 | 482 | 1,220 | 5,950 | 728 |
| 24 | 255 | 365 | 310 | 1,700 | 900 | 913 | 1,400 | 664 | 458 | 1,220 | 3,500 | 555 |
| 25 | 220 | 314 | 260 | 1,500 | 10,300 | 877 | 2,000 | 560 | 450 | 1,150 | 1,760 | 500 |
| 26 | 186 | 290 | 340 | 1,400 | 16,200 | 842 | 3,860 | 530 | 443 | 1,430 | 2,080 | 450 |
| 27 | 186 | 302 | 340 | 1,300 | 10,100 | 770 | 3,550 | 1,010 | 400 | 1,400 | 1,450 | 540 |
| 28 | 186 | 545 | 350 | 1,200 | 8,800 | 815 | 2,770 | 985 | 422 | 1,240 | 931 | 640 |
| 29 | 186 | 450 | 186 | 1,050 | ..... | 859 | 2,370 | 859 | 405 | 1,110 | 800 | 585 |
| 30 | 186 | 365 | 360 | 700 | ..... | 810 | 2,160 | 700 | 390 | 1,260 | 742 | 500 |
| 31 | 186 | ..... | 186 | 640 | ..... | 756 | ..... | 652 | ..... | 1,050 | 770 | ..... |
| 1915–16. | | | | | | | | | | | | |
| 1 | 450 | 585 | 1,220 | 1,330 | 3,750 | 2,050 | 10,900 | 4,230 | 2,070 | 1,070 | 535 | 359 |
| 2 | 458 | 555 | 958 | 1,550 | 4,970 | 1,550 | 6,100 | 4,180 | 1,360 | 1,030 | 450 | 341 |
| 3 | 466 | 525 | 895 | 1,500 | 3,860 | 1,350 | 4,660 | 4,340 | 1,150 | 6,670 | 429 | 335 |
| 4 | 474 | 535 | 826 | 1,400 | 2,850 | 1,200 | 3,650 | 2,920 | 1,700 | 4,230 | 397 | 326 |
| 5 | 515 | 500 | 670 | 1,200 | 1,950 | 1,150 | 2,730 | 3,050 | 3,550 | 3,400 | 450 | 320 |
| 6 | 859 | 458 | 585 | 1,300 | 1,250 | 1,100 | 2,800 | 2,630 | 2,420 | 2,300 | 440 | 335 |
| 7 | 688 | 470 | 595 | 2,500 | 1,100 | 1,050 | 2,870 | 2,700 | 2,590 | 1,750 | 429 | 341 |
| 8 | 565 | 500 | 515 | 1,300 | 850 | 1,000 | 2,320 | 2,770 | 1,980 | 1,170 | 429 | 341 |
| 9 | 615 | 482 | 490 | 1,100 | 800 | 980 | 2,180 | 2,730 | 2,120 | 1,030 | 1,820 | 314 |
| 10 | 565 | 466 | 482 | 900 | 870 | 1,100 | 1,890 | 2,350 | 4,230 | 967 | 2,350 | 302 |
| 11 | 525 | 466 | 474 | 800 | 800 | 1,000 | 2,020 | 1,770 | 6,330 | 688 | 1,200 | 290 |
| 12 | 500 | 458 | 462 | 760 | 700 | 900 | 2,560 | 1,980 | 3,500 | 676 | 949 | 278 |
| 13 | 482 | 443 | 450 | 740 | 700 | 840 | 2,820 | 1,450 | 3,290 | 1,030 | 700 | 272 |
| 14 | 450 | 470 | 466 | 720 | 660 | 940 | 3,230 | 1,130 | 2,820 | 810 | 565 | 255 |
| 15 | 458 | 535 | 466 | 700 | 720 | 840 | 2,370 | 967 | 2,100 | 700 | 490 | 266 |
| 16 | 742 | 585 | 490 | 660 | 740 | 800 | 2,900 | 1,030 | 2,010 | 615 | 474 | 3,020 |
| 17 | 615 | 605 | 490 | 600 | 820 | 860 | 3,650 | 2,720 | 2,400 | 565 | 422 | 1,130 |
| 18 | 565 | 515 | 515 | 560 | 800 | 840 | 4,720 | 11,200 | 6,330 | 540 | 429 | 545 |
| 19 | 545 | 482 | 700 | 500 | 720 | 780 | 4,620 | 5,300 | 4,870 | 575 | 390 | 605 |
| 20 | 525 | 1,560 | 2,160 | 480 | 660 | 720 | 3,360 | 3,360 | 4,870 | 515 | 374 | 525 |
| 21 | 490 | 2,180 | 1,260 | 470 | 600 | 720 | 3,050 | 2,550 | 3,450 | 535 | 359 | 482 |
| 22 | 450 | 1,050 | 985 | 700 | 620 | 700 | 3,780 | 2,200 | 2,450 | 595 | 353 | 450 |
| 23 | 450 | 859 | 913 | 2,300 | 640 | 640 | 6,100 | 2,230 | 1,750 | 1,800 | 335 | 515 |
| 24 | 432 | 721 | 786 | 2,970 | 760 | 640 | 7,490 | 2,070 | 1,260 | 1,750 | 443 | 1,130 |
| 25 | 422 | 682 | 770 | 2,510 | 780 | 620 | 4,820 | 2,120 | 1,130 | 1,470 | 422 | 931 |
| 26 | 429 | 652 | 2,300 | 2,200 | 1,450 | 700 | 4,740 | 1,980 | 1,820 | 742 | 408 | 700 |
| 27 | 520 | 630 | 5,670 | 2,370 | 4,050 | 860 | 3,800 | 1,770 | 1,380 | 615 | 436 | 535 |
| 28 | 585 | 590 | 2,860 | 4,130 | 3,850 | 1,880 | 3,260 | 1,350 | 1,200 | 1,110 | 462 | 515 |
| 29 | 565 | 570 | 2,250 | 6,270 | 2,550 | 2,900 | 3,230 | 1,090 | 1,380 | 676 | 436 | 458 |
| 30 | 575 | 1,200 | 1,920 | 4,820 | ..... | 4,400 | 3,550 | 1,380 | 1,130 | 565 | 415 | 2,240 |
| 31 | 580 | ..... | 1,560 | 3,890 | ..... | 7,700 | ..... | 3,020 | ..... | 466 | 397 | ..... |

*Daily discharge, in second-feet, of Pemigewasset River at Plymouth, N. H., for the years ending Sept. 30, 1912–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1916–17. | | | | | | | | | | | | |
| 1 | 1,320 | 450 | 5,850 | 400 | 475 | 820 | 5,400 | 3,550 | 3,050 | 2,060 | 436 | 630 |
| 2 | 913 | 580 | 2,900 | 500 | 490 | 640 | 6,110 | 3,110 | 3,110 | 1,630 | 371 | 700 |
| 3 | 700 | 585 | 1,700 | 415 | 450 | 540 | 5,130 | 2,920 | 3,170 | 1,290 | 365 | 565 |
| 4 | 664 | 535 | 1,440 | 400 | 450 | 520 | 3,790 | 2,630 | 3,700 | 895 | 320 | 482 |
| 5 | 620 | 490 | 1,400 | 390 | 490 | 500 | 3,150 | 2,660 | 2,870 | 931 | 415 | 422 |
| 6 | 565 | 458 | 2,020 | 510 | 440 | 540 | 3,300 | 2,650 | 2,480 | 810 | 359 | 397 |
| 7 | 450 | 458 | 1,720 | 640 | 460 | 500 | 4,790 | 2,630 | 2,200 | 714 | 266 | 397 |
| 8 | 400 | 436 | 1,280 | 690 | 450 | 485 | 3,550 | 2,480 | 1,880 | 670 | 266 | 397 |
| 9 | 422 | 429 | 1,110 | 680 | 475 | 500 | 2,610 | 2,770 | 4,900 | 630 | 222 | 380 |
| 10 | 422 | 429 | 1,300 | 585 | 465 | 500 | 1,980 | 2,770 | 3,550 | 575 | 353 | 365 |
| 11 | 408 | 500 | 1,050 | 550 | 320 | 480 | 1,630 | 2,630 | 5,250 | 545 | 415 | 347 |
| 12 | 390 | 450 | 850 | 440 | 350 | 520 | 1,650 | 3,170 | 11,600 | 615 | 365 | 347 |
| 13 | 384 | 422 | 826 | 425 | 440 | 500 | 1,430 | 3,050 | 8,140 | 700 | 341 | 284 |
| 14 | 976 | 466 | 688 | 490 | 420 | 475 | 1,500 | 2,920 | 4,610 | 652 | 341 | 341 |
| 15 | 640 | 415 | 640 | 840 | 420 | 500 | 1,530 | 4,180 | 3,980 | 590 | 353 | 275 |
| 16 | 535 | 436 | 600 | 1,600 | 400 | 480 | 1,560 | 2,670 | 2,800 | 555 | 359 | 235 |
| 17 | 490 | 408 | 550 | 1,250 | 400 | 465 | 1,500 | 2,500 | 4,820 | 545 | 474 | 247 |
| 18 | 466 | 408 | 500 | 1,050 | 420 | 525 | 2,540 | 2,800 | 13,500 | 482 | 714 | 314 |
| 19 | 450 | 432 | 470 | 850 | 400 | 470 | 3,310 | 2,730 | 5,650 | 482 | 540 | 218 |
| 20 | 1,400 | 458 | 450 | 700 | 420 | 430 | 5,780 | 3,550 | 3,610 | 520 | 450 | 218 |
| 21 | 1,520 | 500 | 425 | 640 | 430 | 490 | 6,980 | 5,080 | 3,980 | 490 | 408 | 212 |
| 22 | 1,130 | 436 | 425 | 650 | 400 | 520 | 8,240 | 3,600 | 2,610 | 400 | 595 | 212 |
| 23 | 770 | 380 | 700 | 665 | 420 | 700 | 9,550 | 2,950 | 2,000 | 408 | 422 | 222 |
| 24 | 664 | 5,560 | 600 | 620 | 400 | 920 | 7,500 | 4,210 | 1,820 | 422 | 422 | 240 |
| 25 | 605 | 3,340 | 500 | 610 | 380 | 2,050 | 5,130 | 3,270 | 2,350 | 482 | 1,070 | 314 |
| 26 | 600 | 1,700 | 450 | 570 | 400 | 3,210 | 4,850 | 2,710 | 1,770 | 422 | 640 | 212 |
| 27 | 545 | 1,130 | 415 | 540 | 420 | 4,030 | 3,470 | 2,480 | 1,460 | 415 | 525 | 272 |
| 28 | 500 | 1,200 | 405 | 490 | 590 | 9,280 | 3,000 | 2,320 | 1,290 | 390 | 408 | 284 |
| 29 | 470 | 949 | 390 | 520 | ..... | 9,860 | 2,800 | 2,540 | 1,090 | 380 | 422 | 255 |
| 30 | 458 | 2,420 | 350 | 550 | ..... | 6,570 | 4,340 | 2,660 | 3,110 | 384 | 470 | 235 |
| 31 | 474 | ..... | 300 | 540 | ..... | 4,690 | ..... | 2,320 | ..... | 450 | 895 | ..... |
| 1917–18. | | | | | | | | | | | | |
| 1 | 245 | 3,680 | 415 | 350 | 250 | 1,700 | 6,430 | 4,970 | 700 | 605 | 320 | 305 |
| 2 | 272 | 2,280 | 430 | 335 | 250 | 1,300 | 7,160 | 4,620 | 840 | 595 | 266 | 390 |
| 3 | 332 | 1,680 | 395 | 250 | 200 | 1,100 | 9,500 | 3,100 | 742 | 620 | 308 | 353 |
| 4 | 332 | 1,400 | 440 | 235 | 150 | 960 | 4,720 | 2,610 | 605 | 450 | 290 | 341 |
| 5 | 332 | 1,130 | 400 | 250 | 200 | 900 | 3,110 | 2,240 | 525 | 490 | 272 | 302 |
| 6 | 700 | 994 | 360 | 200 | 250 | 900 | 2,500 | 1,900 | 500 | 466 | 341 | 284 |
| 7 | 590 | 895 | 340 | 250 | 220 | 850 | 3,050 | 2,680 | 510 | 515 | 365 | 320 |
| 8 | 443 | 786 | 315 | 200 | 260 | 770 | 3,600 | 2,630 | 1,240 | 575 | 353 | 275 |
| 9 | 458 | 714 | 290 | 280 | 235 | 730 | 3,350 | 2,120 | 640 | 565 | 1,600 | 290 |
| 10 | 450 | 688 | 325 | 260 | 150 | 715 | 3,940 | 1,560 | 700 | 525 | 2,550 | 344 |
| 11 | 401 | 664 | 375 | 250 | 195 | 730 | 3,000 | 3,810 | 1,170 | 595 | 1,580 | 240 |
| 12 | 347 | 640 | 295 | 235 | 250 | 625 | 2,770 | 2,730 | 931 | 545 | 826 | 326 |
| 13 | 415 | 610 | 360 | 225 | 290 | 600 | 2,200 | 1,680 | 1,700 | 664 | 652 | 341 |
| 14 | 700 | 575 | 425 | 300 | 300 | 670 | 2,480 | 4,120 | 1,130 | 1,130 | 545 | 326 |
| 15 | 500 | 565 | 400 | 300 | 350 | 640 | 2,820 | 3,180 | 859 | 877 | 565 | 365 |
| 16 | 490 | 555 | 350 | 350 | 500 | 640 | 4,280 | 2,110 | 700 | 652 | 585 | 443 |
| 17 | 555 | 525 | 305 | 300 | 550 | 650 | 4,500 | 1,700 | 595 | 525 | 443 | 377 |
| 18 | 458 | 525 | 450 | 260 | 500 | 750 | 4,950 | 1,430 | 585 | 555 | 415 | 408 |
| 19 | 394 | 525 | 450 | 300 | 500 | 920 | 3,000 | 1,260 | 500 | 482 | 394 | 1,180 |
| 20 | 415 | 474 | 360 | 300 | 500 | 1,250 | 2,300 | 1,110 | 474 | 458 | 365 | 859 |
| 21 | 700 | 458 | 415 | 310 | 470 | 1,750 | 2,300 | 1,050 | 466 | 390 | 365 | 2,980 |
| 22 | 436 | 555 | 420 | 350 | 600 | 2,700 | 4,660 | 913 | 615 | 390 | 338 | 2,300 |
| 23 | 429 | 535 | 420 | 320 | 700 | 4,030 | 4,610 | 770 | 1,700 | 390 | 365 | 1,260 |
| 24 | 408 | 490 | 415 | 300 | 750 | 3,680 | 4,340 | 700 | 2,300 | 390 | 314 | 1,090 |
| 25 | 895 | 450 | 355 | 335 | 770 | 3,520 | 2,920 | 640 | 1,700 | 390 | 320 | 2,350 |
| 26 | 1,130 | 450 | 385 | 275 | 750 | 3,450 | 2,370 | 615 | 1,090 | 401 | 326 | 1,890 |
| 27 | 714 | 490 | 375 | 250 | 1,000 | 3,210 | 2,250 | 676 | 786 | 308 | 341 | 10,000 |
| 28 | 1,130 | 350 | 355 | 225 | 1,800 | 2,630 | 2,240 | 1,030 | 700 | 320 | 341 | 4,230 |
| 29 | 1,310 | 380 | 355 | 250 | ..... | 2,850 | 2,370 | 670 | 640 | 347 | 278 | 2,920 |
| 30 | 1,400 | 400 | 335 | 275 | ..... | 3,450 | 4,550 | 676 | 615 | 365 | 266 | 1,680 |
| 31 | 11,200 | ..... | 320 | 275 | ..... | 4,180 | ..... | 786 | ..... | 338 | 278 | ..... |

NOTE.—Stage discharge relation affected by ice Dec. 30, 1911, to Apr. 8, 1912; Jan. 7 to Mar. 21, 1913; Dec. 19, 1913, to Mar. 2, 1914; Dec. 22, 1914, to Feb. 28, 1915; Jan. 2–22 and Feb. 4 to Mar. 31, 1916; Dec. 15, 1916, to Mar. 25, 1917; Nov. 26, 1917, to Mar. 21, 1918; discharge for these periods determined from gage heights corrected for effect of ice. Discharge on Sundays (gage not read) estimated by hydrograph comparison with records of flow of other rivers.

*Monthly discharge of Pemigewasset River at Plymouth, N. H., for the years ending Sept. 30, 1912–1918.*

[Drainage area, 615 square miles].

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| 1911–12. | | | | | |
| October | 4,560 | 375 | 1,320 | 2.15 | 2.48 |
| November | 2,550 | 720 | 1,070 | 1.74 | 1.94 |
| December | 4,820 | 660 | 1,390 | 2.26 | 2.61 |
| January | 3,600 | 349 | 626 | 1.02 | 1.18 |
| February | 410 | 260 | 306 | .498 | .54 |
| March | 6,100 | 250 | 1,320 | 2.15 | 2.48 |
| April | 11,600 | 1,500 | 5,100 | 8.29 | 9.25 |
| May | 6,330 | 967 | 2,860 | 4.65 | 5.36 |
| June | 4,720 | 278 | 1,030 | 1.67 | 1.86 |
| July | 482 | 208 | 251 | .408 | .47 |
| August | 5,460 | 255 | 683 | 1.11 | 1.28 |
| September | 1,750 | 290 | 466 | .758 | .85 |
| The year | 11,600 | 208 | 1,370 | 2.23 | 30.30 |
| 1912–13. | | | | | |
| October | 9,610 | 353 | 1,380 | 2.24 | 2.58 |
| November | 9,550 | 630 | 1,600 | 2.60 | 2.90 |
| December | 2,770 | 555 | 1,110 | 1.80 | 2.08 |
| January | 5,560 | 850 | 1,970 | 3.20 | 3.69 |
| February | 1,600 | 420 | 685 | 1.11 | 1.16 |
| March | 18,700 | 350 | 4,850 | 7.89 | 9.10 |
| April | 10,500 | 1,220 | 2,790 | 4.54 | 5.06 |
| May | 4,820 | 482 | 1,480 | 2.41 | 2.78 |
| June | 2,300 | 290 | 621 | 1.01 | 1.13 |
| July | 565 | 242 | 312 | .507 | .58 |
| August | 290 | 113 | 210 | .341 | .39 |
| September | 5,030 | 60 | 375 | .610 | .68 |
| The year | 18,700 | 60 | 1,460 | 2.37 | 32.13 |
| 1913–14. | | | | | |
| October | 7,670 | 242 | 1,190 | 1.93 | 2.22 |
| November | 11,100 | 482 | 1,330 | 2.16 | 2.41 |
| December | 1,600 | 480 | 710 | 1.15 | 1.33 |
| January | 1,460 | 385 | 603 | .980 | 1.13 |
| February | 1,180 | 375 | 602 | .979 | 1.02 |
| March | 12,400 | 482 | 2,980 | 4.85 | 5.59 |
| April | 18,400 | 1,560 | 4,750 | 7.72 | 8.61 |
| May | 5,680 | 600 | 2,750 | 4.47 | 5.15 |
| June | 3,230 | 266 | 495 | .805 | .90 |
| July | 565 | 186 | 336 | .546 | .63 |
| August | 1,220 | 186 | 290 | .472 | .54 |
| September | 525 | 186 | 251 | .408 | .46 |
| The year | 18,400 | 186 | 1,360 | 2.21 | 29.99 |
| 1914–15. | | | | | |
| October | 278 | 186 | 203 | .330 | .38 |
| November | 1,900 | 186 | 354 | .576 | .64 |
| December | 1,010 | 186 | 391 | .636 | .73 |
| January | 7,300 | 220 | 1,060 | 1.72 | 1.98 |
| February | 16,200 | 600 | 2,590 | 4.21 | 4.38 |
| March | 9,500 | 756 | 2,560 | 4.16 | 4.80 |
| April | 10,800 | 600 | 2,720 | 4.42 | 4.93 |
| May | 4,280 | 530 | 1,230 | 2.00 | 2.31 |
| June | 1,750 | 390 | 548 | .891 | .99 |
| July | 12,900 | 474 | 2,050 | 3.33 | 3.84 |
| August | 5,950 | 565 | 1,360 | 2.21 | 2.55 |
| September | 2,050 | 371 | 535 | .870 | .97 |
| The year | 16,200 | 186 | 1,290 | 2.10 | 28.50 |

*Monthly discharge of Pemigewasset River at Plymouth, N. H., for the years ending Sept. 30, 1912–1918*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| 1915-16. | | | | | |
| October | 859 | 422 | 534 | 0.868 | 1.00 |
| November | 2,180 | 443 | 678 | 1.10 | 1.23 |
| December | 5,670 | 450 | 1,130 | 1.84 | 2.12 |
| January | 6,270 | 470 | 1,720 | 2.80 | 3.23 |
| February | 4,970 | 600 | 1,550 | 2.52 | 2.72 |
| March | 7,700 | 620 | 1,380 | 2.24 | 2.58 |
| April | 10,900 | 1,890 | 3,870 | 6.29 | 7.02 |
| May | 11,200 | 967 | 2,730 | 4.44 | 5.12 |
| June | 6,330 | 1,130 | 2,620 | 4.26 | 4.75 |
| July | 6,670 | 466 | 1,310 | 2.13 | 2.46 |
| August | 2,350 | 335 | 587 | .954 | 1.10 |
| September | 3,020 | 255 | 615 | 1.00 | 1.12 |
| The year | 11,200 | 255 | 1,560 | 2.54 | 34.45 |
| 1916-17. | | | | | |
| October | 1,520 | 384 | 656 | 1.07 | 1.23 |
| November | 5,560 | 380 | 895 | 1.46 | 1.63 |
| December | 5,850 | 300 | 1,040 | 1.69 | 1.95 |
| January | 1,600 | 390 | 639 | 1.04 | 1.20 |
| February | 590 | 320 | 431 | .701 | .73 |
| March | 9,860 | 430 | 1,700 | 2.76 | 3.18 |
| April | 9,550 | 1,430 | 3,940 | 6.41 | 7.15 |
| May | 5,080 | 2,320 | 2,980 | 4.85 | 5.59 |
| June | 13,500 | 1,090 | 3,880 | 6.31 | 7.04 |
| July | 2,060 | 380 | 662 | 1.08 | 1.24 |
| August | 1,070 | 222 | 452 | .735 | .85 |
| September | 700 | 212 | 334 | .543 | .61 |
| The year | 13,500 | 212 | 1,470 | 2.39 | 32.40 |
| 1917-18. | | | | | |
| October | 11,200 | 245 | 922 | 1.50 | 1.73 |
| November | 3,680 | 350 | 815 | 1.33 | 1.48 |
| December | 450 | 290 | 375 | .610 | .70 |
| January | 350 | 200 | 277 | .450 | .52 |
| February | 1,800 | 150 | 462 | .751 | .78 |
| March | 4,180 | 600 | 1,700 | 2.76 | 3.18 |
| April | 9,500 | 2,200 | 3,760 | 6.11 | 6.82 |
| May | 4,970 | 615 | 1,940 | 3.15 | 3.63 |
| June | 2,300 | 466 | 875 | 1.42 | 1.58 |
| July | 1,130 | 308 | 513 | .834 | .96 |
| August | 2,550 | 266 | 534 | .868 | 1.00 |
| September | 10,000 | 240 | 1,290 | 2.10 | 2.34 |
| The year | 11,200 | 150 | 1,120 | 1.82 | 24.72 |

*Days of deficiency in discharge of Pemigewasset River at Plymouth, N. H., during the years ending Sept. 30, 1912–1918.*

| Discharge in second-feet per square mile. | Discharge in second feet. | Theoretical horsepower per foot of fall. | Days of deficiency in discharge. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1911–12. | 1912–13. | 1913–14. | 1914–15. | 1915–16. | 1916–17. | 1917–18. |
| 0.1 | 62 | | | 1 | | | | | |
| .15 | 93 | | | 9 | | | | | |
| .2 | 123 | | | 14 | | | | | |
| .3 | 185 | 21.0 | | 21 | | | | | 2 |
| .4 | 246 | 28.0 | 19 | 46 | 39 | 47 | | 10 | 15 |
| .5 | 308 | 35.0 | 73 | 78 | 87 | 62 | 6 | 19 | 55 |
| .6 | 369 | 41.9 | 111 | 100 | 105 | 78 | 18 | 37 | 107 |
| .7 | 430 | 48.9 | 136 | 122 | 132 | 106 | 32 | 96 | 139 |
| .8 | 492 | 55.9 | 147 | 145 | 165 | 135 | 77 | 148 | 164 |
| .9 | 554 | 62.9 | 159 | 162 | 193 | 150 | 100 | 182 | 183 |
| 1.0 | 615 | 69.9 | 170 | 177 | 213 | 163 | 124 | 198 | 203 |
| 1.1 | 677 | 76.9 | 179 | 194 | 220 | 175 | 141 | 214 | 223 |
| 1.2 | 738 | 83.9 | 191 | 206 | 228 | 186 | 160 | 225 | 238 |
| 1.3 | 800 | 90.9 | 201 | 213 | 241 | 201 | 170 | 226 | 248 |
| 1.4 | 861 | 97.8 | 208 | 216 | 245 | 212 | 186 | 232 | 253 |
| 1.5 | 923 | 105 | 222 | 219 | 247 | 222 | 191 | 236 | 260 |
| 1.6 | 984 | 112 | 230 | 224 | 250 | 228 | 198 | 239 | 262 |
| 1.75 | 1,080 | 123 | 243 | 232 | 257 | 251 | 208 | 242 | 266 |
| 1.9 | 1,170 | 133 | 250 | 240 | 260 | 263 | 221 | 246 | 275 |
| 2.05 | 1,260 | 143 | 259 | 248 | 267 | 274 | 229 | 248 | 279 |
| 2.25 | 1,390 | 158 | 264 | 256 | 276 | 282 | 240 | 253 | 283 |
| 2.5 | 1,540 | 175 | 269 | 264 | 282 | 296 | 245 | 262 | 286 |
| 2.75 | 1,700 | 193 | 278 | 277 | 290 | 302 | 249 | 267 | 292 |
| 3.0 | 1,850 | 210 | 281 | 289 | 293 | 307 | 258 | 272 | 299 |
| 3.5 | 2,160 | 245 | 289 | 300 | 299 | 315 | 273 | 278 | 303 |
| 4.0 | 2,460 | 280 | 300 | 311 | 310 | 322 | 292 | 283 | 314 |
| 5.0 | 3,080 | 350 | 314 | 327 | 320 | 334 | 318 | 313 | 333 |
| 7.0 | 4,310 | 489 | 342 | 341 | 336 | 346 | 343 | 338 | 351 |
| 10.0 | 6,150 | 699 | 358 | 352 | 354 | 353 | 358 | 355 | 360 |
| 15.0 | 9,230 | 1,050 | 363 | 357 | 360 | 359 | 364 | 360 | 362 |
| 20.0 | 12,300 | 1,400 | 366 | 361 | 362 | 363 | 366 | 364 | 365 |
| 25.0 | 15,400 | 1,750 | 366 | 363 | 364 | 364 | | 365 | |
| 30.0 | 18,500 | 2,100 | | 364 | 365 | 365 | | | |
| 35.0 | 21,500 | 2,440 | | 365 | | | | | |

NOTE.—The above table gives the theoretical horsepower per foot of fall that may be developed at different rates of discharge and shows the number of days on which the discharge and corresponding horsepower were respectively less than the amounts given in the columns for discharge and horsepower. In using this table allowance should be made for the various losses, the principal ones being the wheel loss, which may be as large as 20 per cent, and the head loss, which may be as large as 5 per cent.

### 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, 1918.

GAGE.—Standard chain gage fastened to floor of bridge on upstream side over the west channel; read by F. R. Roers. A gage painted on the downstream right-hand side of the center pier gives results considerably in error for low stages.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Coarse gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.0 feet at 7 a. m. October 31 (discharge, 18,000 second-feet); minimum stage recorded, 4.0 feet at 6 a. m. August 26, 6. a. m. August 31, and 6 a. m. September 13 (discharge, 1,030 second-feet).

1903–1918: Maximum stage recorded, 19.5 feet at 5 p. m. April 21, 1914 (discharge by extension of rating curve, 32,300 second-feet); minumum stage recorded 3.30 feet October 4, 1903 (discharge by extension of rating curve, 250 second-feet).

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

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

ACCURACY.—Stage-discharge relation subject to slight changes. Rating curve fairly well defined below 10,000 second-feet. Gage read to half-tenths once or twice daily, except on Sundays and numerous other days with no readings. Gage not read from January 24 to February 26. Readings of doubtful accuracy. Daily discharge ascertained by applying mean gage height to rating table. Records poor.

COOPERATION.—Gage heights furnished by the proprietors of locks and canals on Merrimack River.

*Discharge measurements of Merrimack River at Franklin Junction, N. H., during the year ending Sept. 30, 1918.*

[Made by M. R. Stackpole.]

| Date. | Gage height. | Discharge. | Date. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | *Feet.* | *Sec.-ft.* | | *Feet.* | *Sec.-ft.* |
| Dec. 20 | [a] 4.62 | 1,260 | Feb. 26 | [a] 5.93 | 1,360 |
| Jan. 21 | [a] 5.65 | 983 | Mar. 25 | 6.07 | 3,570 |

[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, 1918.*

| Day. | Oct. | Nov. | Dec. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,440 | 6,200 | 1,530 | 4,300 | 6,000 | 6,000 | 1,620 | 1,820 | 1,220 | 1,100 |
| 2 | 1,440 | 3,790 | 1,440 | 3,600 | 13,600 | 5,800 | 1,650 | 1,530 | 1,260 | 1,150 |
| 3 | 1,440 | 3,120 | 1,350 | 3,000 | 15,500 | 5,600 | 1,720 | 1,530 | 1,220 | 1,170 |
| 4 | 1,440 | 2,800 | 1,300 | 2,800 | 8,510 | 4,660 | 1,620 | 1,400 | 1,200 | 1,220 |
| 5 | 1,440 | 2,540 | 1,260 | 2,040 | 7,250 | 4,500 | 1,620 | 1,350 | 1,170 | 1,220 |
| 6 | 1,400 | 2,280 | 1,260 | 2,040 | 6,830 | 4,448 | 1,480 | 1,350 | 1,170 | 1,170 |
| 7 | 1,600 | 2,160 | 1,260 | 1,930 | 6,300 | 4,480 | 1,480 | 1,300 | 1,170 | 1,170 |
| 8 | 1,600 | 2,040 | ..... | 2,040 | 6,000 | 4,130 | 1,530 | 1,350 | 1,170 | 1,200 |
| 9 | 1,530 | 1,930 | ..... | 1,930 | 5,800 | 3,450 | 1,600 | 1,530 | 1,620 | 1,260 |
| 10 | 1,620 | 1,820 | ..... | 2,000 | 6,410 | 2,970 | 1,720 | 1,440 | 4,130 | 1,260 |
| 11 | 1,620 | 1,750 | ..... | 2,040 | 6,200 | 3,790 | 1,820 | 1,400 | 3,400 | 1,170 |
| 12 | 1,530 | 1,720 | ..... | 2,040 | 6,000 | 3,300 | 2,040 | 1,350 | 2,820 | 1,220 |
| 13 | 1,550 | 1,620 | ..... | 1,930 | 5,800 | 2,820 | 2,540 | 1,300 | 1,620 | 1,080 |
| 14 | 1,550 | 1,530 | ..... | 2,040 | 5,300 | 4,300 | 2,160 | 1,700 | 1,600 | 1,170 |
| 15 | 1,620 | 1,440 | ..... | 2,040 | 4,840 | 5,800 | 1,820 | 1,930 | 1,530 | 1,300 |
| 16 | 1,620 | 1,620 | ..... | 1,930 | 5,200 | 3,790 | 1,700 | 1,720 | 1,350 | 1,400 |
| 17 | 1,720 | 1,440 | ..... | 1,950 | 5,600 | 3,120 | 1,620 | 1,620 | 1,300 | 1,350 |
| 18 | 1,720 | 1,450 | ..... | 1,930 | 5,200 | 2,680 | 1,620 | 1,620 | 1,300 | 1,300 |
| 19 | 1,620 | 1,440 | ..... | 2,160 | 5,200 | 2,400 | 1,530 | 1,440 | 1,350 | 1,440 |
| 20 | 1,530 | 1,530 | ..... | 1,820 | 5,800 | 2,280 | 1,440 | 1,350 | 1,260 | 2,280 |
| 21 | 1,800 | 1,530 | ..... | 1,820 | 6,200 | 2,040 | 1,440 | 1,300 | 1,300 | 2,820 |
| 22 | 1,530 | 1,530 | ..... | 2,040 | 6,410 | 2,040 | 1,620 | 1,260 | 1,260 | 2,700 |
| 23 | 1,530 | 1,530 | ..... | 2,280 | 6,000 | 1,820 | 2,800 | 1,260 | 1,260 | 2,680 |
| 24 | 1,440 | 1,530 | ..... | 4,400 | 6,620 | 1,820 | 3,620 | 1,170 | 1,260 | 3,960 |
| 25 | 1,530 | 1,500 | ..... | 3,620 | 5,800 | 1,720 | 3,120 | 1,260 | 1,200 | 3,450 |
| 26 | 2,820 | 1,480 | ..... | 3,450 | 5,020 | 1,600 | 2,040 | 1,260 | 1,170 | 3,790 |
| 27 | 2,280 | 1,440 | ..... | 3,450 | 4,480 | 1,530 | 2,040 | 1,250 | 1,260 | 14,000 |
| 28 | 2,150 | 1,480 | ..... | 3,120 | 4,100 | 1,930 | 1,930 | 1,250 | 1,260 | 8,720 |
| 29 | 2,040 | 1,500 | ..... | 1,930 | 4,480 | 1,930 | 1,820 | 1,260 | 1,260 | 5,800 |
| 30 | 2,680 | 1,480 | ..... | 5,200 | 5,200 | 1,820 | 1,800 | 1,260 | 1,170 | 3,450 |
| 31 | 17,900 | ..... | ..... | 5,500 | ..... | 1,820 | ..... | 1,260 | 1,080 | ..... |

NOTE.—Discharge on Sundays and other days gage was not read estimated by comparison with records obtained at several other stations.

*Monthly discharge of Merrimack River at Franklin Junction, N. H., for the year ending Sept. 30, 1918.*

[Drainage area, 1,460 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 17,900 | 1,400 | 2,220 | 1.52 | 1.75 |
| November | 6,200 | 1,440 | 1,970 | 1.35 | 1.51 |
| December | ..... | ..... | 1,100 | .753 | .87 |
| January | ..... | ..... | 930 | .637 | .73 |
| February | ..... | ..... | 1,230 | .842 | .88 |
| March | 5,500 | 1,820 | 2,660 | 1.82 | 2.10 |
| April | 15,500 | 4,100 | 6,390 | 4.38 | 4.89 |
| May | 6,000 | 1,530 | 3,240 | 2.22 | 2.56 |
| June | 3,620 | 1,440 | 1,890 | 1.29 | 1.44 |
| July | 1,820 | 1,170 | 1,410 | .966 | 1.11 |
| August | 4,130 | 1,080 | 1,490 | 1.02 | 1.18 |
| September | 14,000 | 1,080 | 2,570 | 1.76 | 1.96 |
| The year | 17,900 | ..... | 2,260 | 1.55 | 20.98 |

NOTE.—Mean monthly discharge for December, January, and February estimated at 1.7 times discharge of Pemigewasset River at Plymouth plus discharge from Lake Winnepesaukee at Lakeport.

### 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, 1918.

COMPUTATIONS OF DISCHARGE.—Accurate record is kept of the flow over the dam and through the various wheels and gates. This flow includes the 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. The low-water flow of the stream is affected by operation of various power plants above Lawrence.

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

COOPERATION.—The entire record has been furnished by R. A. Hale, principal assistant 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, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,316 | 14,902 | 2,499 | 985 | 2,491 | 7,823 | 18,380 | 10,832 | 3,128 | 4,063 | 2,085 | 278 |
| 2 | 2,268 | 10,312 | 1,516 | 2,442 | 1,768 | 6,967 | 20,716 | 13,487 | 2,239 | 3,554 | 2,033 | 211 |
| 3 | 2,305 | 6,772 | 4,405 | 2,754 | 629 | 6,298 | 25,296 | 14,325 | 4,778 | 2,931 | 1,241 | 2,551 |
| 4 | 2,256 | 4,754 | 3,658 | 2,613 | 2,446 | 7,253 | 26,928 | 11,562 | 3,488 | 688 | 173 | 2,521 |
| 5 | 2,276 | 5,753 | 3,364 | 1,572 | 2,620 | 6,609 | 22,954 | 9,671 | 3,590 | 3,641 | 2,155 | 2,246 |
| 6 | 1,304 | 4,868 | 3,457 | 281 | 2,558 | 6,179 | 17,944 | 9,560 | 3,497 | 2,337 | 2,179 | 2,108 |
| 7 | 302 | 4,481 | 3,843 | 2,348 | 2,516 | 6,170 | 14,461 | 8,388 | 3,570 | 688 | 2,021 | 1,116 |
| 8 | 2,457 | 4,243 | 2,616 | 2,390 | 2,344 | 6,230 | 13,955 | 7,826 | 2,163 | 3,967 | 2,035 | 31 |
| 9 | 3,220 | 3,873 | 786 | 2,246 | 1,786 | 4,741 | 13,366 | 7,868 | 536 | 3,512 | 2,139 | 1,812 |
| 10 | 3,266 | 2,433 | 3,719 | 1,973 | 603 | 4,266 | 13,694 | 7,425 | 4,018 | 2,591 | 1,551 | 2,011 |
| 11 | 3,432 | 802 | 3,175 | 1,950 | 2,561 | 5,817 | 14,112 | 6,032 | 3,420 | 2,390 | 2,066 | 1,977 |
| 12 | 1,739 | 4,521 | 2,854 | 1,532 | 2,767 | 5,068 | 13,222 | 6,366 | 3,397 | 2,667 | 5,154 | 2,031 |
| 13 | 1,492 | 3,973 | 2,631 | 539 | 2,666 | 5,034 | 11,693 | 8,096 | 3,414 | 2,165 | 3,987 | 2,075 |
| 14 | 271 | 3,737 | 2,558 | 3,095 | 2,818 | 5,001 | 10,861 | 6,733 | 3,674 | 570 | 3,601 | 1,324 |
| 15 | 2,946 | 2,821 | 2,012 | 2,853 | 3,208 | 5,309 | 12,609 | 7,821 | 3,011 | 2,959 | 3,274 | 373 |
| 16 | 3,202 | 3,507 | 688 | 2,766 | 2,917 | 3,929 | 14,495 | 9,413 | 2,363 | 3,200 | 2,650 | 2,090 |
| 17 | 3,192 | 2,572 | 2,710 | 2,896 | 1,558 | 3,816 | 15,489 | 7,974 | 4,598 | 2,936 | 2,150 | 2,105 |
| 18 | 2,548 | 589 | 2,704 | 1,651 | 4,630 | 7,284 | 15,261 | 6,056 | 3,363 | 3,453 | 546 | 2,251 |
| 19 | 2,852 | 3,727 | 2,664 | 1,476 | 4,083 | 8,141 | 14,825 | 5,286 | 3,048 | 3,883 | 2,203 | 2,595 |
| 20 | 2,028 | 3,326 | 2,833 | 1,249 | 5,972 | 8,277 | 13,572 | 6,299 | 2,869 | 2,477 | 2,362 | 3,077 |
| 21 | 449 | 2,887 | 3,279 | 3,089 | 6,518 | 9,327 | 11,581 | 4,747 | 3,015 | 599 | 2,560 | 2,581 |
| 22 | 2,910 | 3,018 | 2,557 | 2,767 | 6,279 | 11,684 | 13,143 | 4,903 | 2,196 | 2,379 | 2,392 | 4,172 |
| 23 | 3,052 | 3,659 | 779 | 2,625 | 6,714 | 13,984 | 16,153 | 4,281 | 895 | 2,774 | 2,230 | 7,605 |
| 24 | 2,774 | 2,669 | 2,545 | 2,542 | 5,139 | 15,576 | 16,998 | 4,366 | 6,427 | 2,745 | 1,202 | 5,966 |
| 25 | 3,212 | 1,056 | 1,160 | 2,508 | 6,364 | 17,505 | 15,294 | 2,964 | 6,469 | 2,516 | 405 | 5,031 |
| 28 | 3,901 | 4,487 | 4,196 | 1,683 | 6,855 | 16,937 | 13,742 | 2,576 | 5,666 | 2,514 | 1,634 | 4,402 |
| 27 | 3,413 | 3,689 | 3,561 | 587 | 7,431 | 16,463 | 11,233 | 5,221 | 4,976 | 1,481 | 1,921 | 8,402 |
| 28 | 3,616 | 2,989 | 2,835 | 2,616 | 7,779 | 15,185 | 9,615 | 4,183 | 4,410 | 304 | 1,940 | 18,165 |
| 29 | 5,112 | 692 | 2,029 | 2,662 | ..... | 14,231 | 8,925 | 3,876 | 2,812 | 2,446 | 1,982 | 13,546 |
| 30 | 4,722 | 3,098 | 540 | 2,435 | ..... | 14,003 | 8,684 | 1,388 | 780 | 2,213 | 1,974 | 10,180 |
| 31 | 7,362 | ..... | 2,663 | 2,409 | ..... | 15,455 | ..... | 5,141 | ..... | 2,169 | 1,298 | ..... |

NOTE.—Table shows the actual flow at Lawrence; not corrected for water wasted by the Metropolitan Water and Sewerage Board.

*Weekly discharge, in second-feet, of Merrimack River at Lawrence, Mass., for the year ending Sept. 30, 1918.*

[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. 8 | 1,541 | 6 | 1,535 | 0.345 |
| Sept. 1 | 1,575 | 7 | 1,568 | .352 |
| Sept. 15 | 1,658 | 26 | 1,632 | .367 |
| Aug. 4 | 1,766 | 16 | 1,750 | .393 |
| Jan. 13 | 1,854 | 44 | 1,810 | .407 |
| Oct. 7, 1917 | 1,861 | 12 | 1,849 | .415 |
| Jan. 6 | 1,901 | 36 | 1,865 | .419 |
| Aug. 25 | 1,908 | 8 | 1,900 | .427 |
| Aug. 11 | 2,020 | 12 | 2,008 | .451 |
| July 28 | 2,102 | 11 | 2,091 | .470 |
| Feb. 10 | 2,125 | 17 | 2,108 | .473 |
| Feb. 3 | 2,144 | 20 | 2,124 | .477 |
| Jan. 27 | 2,257 | 24 | 2,233 | .502 |
| Oct. 14, 1917 | 2,268 | 16 | 2,252 | .506 |
| Jan. 20 | 2,284 | 59 | 2,225 | .500 |
| Dec. 30, 1917 | 2,409 | 80 | 2,329 | .523 |
| Oct. 21, 1917 | 2,460 | 20 | 2,440 | .548 |
| Dec. 23, 1917 | 2,504 | 91 | 2,413 | .542 |
| Dec. 16, 1917 | 2,520 | 56 | 2,464 | .553 |
| July 14 | 2,552 | 19 | 2,533 | .569 |
| July 7 | 2,557 | 22 | 2,535 | .569 |
| Feb. 17 | 2,642 | 84 | 2,558 | .575 |

*Weekly discharge, in second-feet, of Merrimack River at Lawrence, Mass., for the year ending Sept. 30, 1918*—Continued.

| Week ending Sunday— | Measured at Lawrence (total drainage area 4,663 square miles). | Wasting into Merrimack River from diverted drainage basin (211 square miles). | From net drainage area of 4,452 square miles. | Per square mile of net drainage area. |
|---|---|---|---|---|
| Sept. 22 | 2,696 | 68 | 2,628 | 0.590 |
| Dec. 2, 1917 | 2,710 | 64 | 2,646 | .594 |
| July 21 | 2,787 | 21 | 2,766 | .621 |
| June 23 | 2,855 | 31 | 2,824 | .634 |
| Nov. 25, 1917 | 2,906 | 63 | 2,843 | .639 |
| Aug. 18 | 3,052 | 9 | 3,043 | .684 |
| June 9 | 3,089 | 12 | 3,077 | .691 |
| Nov. 18, 1917 | 3,103 | 65 | 3,038 | .682 |
| Dec. 9, 1917 | 3,161 | 80 | 3,081 | .692 |
| Oct. 28, 1917 | 3,268 | 109 | 3,159 | .710 |
| June 16 | 3,328 | 11 | 3,317 | .745 |
| June 2 | 3,597 | 15 | 3,582 | .805 |
| Nov. 11, 1917 | 3,779 | 108 | 3,671 | .825 |
| May 26 | 4,305 | 13 | 4,292 | .964 |
| June 30 | 4,506 | 38 | 4,468 | 1.004 |
| Mar. 17 | 4,853 | 242 | 4,611 | 1.036 |
| Feb. 24 | 5,619 | 267 | 5,352 | 1.202 |
| Mar. 10 | 5,921 | 236 | 5,685 | 1.277 |
| Mar. 3 | 7,074 | 369 | 6,705 | 1.506 |
| May 19 | 7,340 | 55 | 7,285 | 1.636 |
| May 12 | 7,638 | 78 | 7,560 | 1.698 |
| Nov. 4, 1917 | 7,705 | 135 | 7,570 | 1.700 |
| Sept. 29 | 9,017 | 134 | 8,883 | 1.995 |
| Mar. 24 | 10,610 | 197 | 10,413 | 2.339 |
| May 5 | 11,069 | 172 | 10,897 | 2.448 |
| Apr. 14 | 12,986 | 78 | 12,908 | 2.899 |
| Apr. 28 | 13,740 | 173 | 13,567 | 3.047 |
| Apr. 21 | 13,976 | 116 | 13,860 | 3.113 |
| Mar. 31 | 15,683 | 130 | 15,553 | 3.493 |
| Apr. 7 | 20,954 | 99 | 20,855 | 4.684 |

*Monthly discharge of Merrimack River at Lawrence, Mass., for the year ending Sept. 30, 1918.*

| 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. | Depth in inches on drainage area. | Per cent of rainfall. | |
| October | 2,780 | 49 | 2,731 | 0.613 | 0.707 | 12.6 | 5.60 |
| November | 4,007 | 82 | 3,925 | .882 | .984 | 91.1 | 1.08 |
| December | 2,608 | 77 | 2,531 | .569 | .656 | 23.4 | 2.80 |
| January | 2,114 | 38 | 2,076 | .466 | .537 | 18.6 | 2.88 |
| February | 3,786 | 142 | 3,644 | .819 | .853 | 29.5 | 2.89 |
| March | 9,050 | 220 | 8,830 | 1.983 | 2.286 | 103.9 | 2.20 |
| April | 14,973 | 117 | 14,856 | 3.337 | 3.724 | 126.7 | 2.94 |
| May | 6,925 | 67 | 6,858 | 1.540 | 1.776 | 82.2 | 2.16 |
| June | 3,394 | 22 | 3,372 | .757 | .845 | 22.3 | 3.79 |
| July | 2,478 | 18 | 2,460 | .553 | .638 | 19.8 | 3.23 |
| August | 2,101 | 9 | 2,092 | .470 | .542 | 19.1 | 2.84 |
| September | 3,828 | 58 | 3,770 | .847 | .945 | 12.3 | 7.70 |
| The year | 4,837 | 75 | 4,762 | 1.070 | 14.493 | 36.1 | 40.12 |

NOTE.—The monthly discharge in second-feet per square mile and the run-off in depth 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 to September 30, 1918.

GAGE.—Vertical staff attached to downstream side of left abutment of highway bridge; read by George Perry and Archie Flanders.

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 period May 11 to September 30, 2.08 feet at 6 p. m. May 14 (discharge, 311 second-feet); minimum stage recorded during period, 0.70 foot at various times during July, August, and September (discharge, 11 second-feet).

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

REGULATION.—The operation of the few small mills above the gage does not greatly affect the distribution of flow. Several small lakes in the basin; but little if any storage regulation.

ACCURACY.—Stage-discharge relation probably permanent except when affected by ice. Rating curve well defined between 10 and 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 Smith River near Bristol, N. H., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* |
| May 13 | A. N. Weeks | 1.30 | [a] 106 |
| 19 | C. H. Pierce | 1.23 | 85 |
| July 28 | ....do | .72 | 12.8 |

[a] Results uncertain; measurement not used in developing rating curve.

NOTE.—Several additional discharge measurements obtained subsequent to Sept. 30 were used in determining the rating curve.

*Daily discharge, in second-feet, of Smith River near Bristol, N.H., for the year ending Sept. 30, 1918.*

| Day. | May. | June. | July. | Aug. | Sept. | Day. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 52 | 32 | 11 | 20 | 16 | 167 | 46 | 24 | 29 | 33 |
| 2 | ..... | 49 | 33 | 13 | 22 | 17 | 129 | 42 | 23 | 31 | 32 |
| 3 | ..... | 39 | 22 | 13 | 23 | 18 | 108 | 35 | 21 | 27 | 31 |
| 4 | ..... | 32 | 24 | 11 | 25 | 19 | 92 | 34 | 20 | 23 | 33 |
| 5 | ..... | 26 | 23 | 11 | 18 | 20 | 82 | 35 | 18 | 20 | 35 |
| 6 | ..... | 28 | 22 | 12 | 11 | 21 | 84 | 28 | 18 | 14 | 43 |
| 7 | ..... | 43 | 24 | 11 | 12 | 22 | 84 | 92 | 16 | 13 | 67 |
| 8 | ..... | 46 | 26 | 18 | 13 | 23 | 67 | 86 | 14 | 13 | 62 |
| 9 | ..... | 38 | 26 | 22 | 14 | 24 | 52 | 56 | 14 | 11 | 58 |
| 10 | ..... | 38 | 26 | 33 | 13 | 25 | 52 | 49 | 14 | 11 | 50 |
| 11 | 150 | 46 | 25 | 65 | 15 | 26 | 58 | 46 | 13 | 11 | 242 |
| 12 | 116 | 52 | 24 | 52 | 20 | 27 | 72 | 41 | 11 | 11 | 262 |
| 13 | 100 | 82 | 25 | 52 | 28 | 28 | 62 | 39 | 11 | 13 | 268 |
| 14 | 282 | 69 | 26 | 55 | 28 | 29 | 46 | 37 | 13 | 13 | 248 |
| 15 | 265 | 52 | 26 | 26 | 28 | 30 | 46 | 33 | 15 | 14 | 248 |
| | | | | | | 31 | 50 | ..... | 14 | 20 | ..... |

NOTE.—Daily discharge Sept. 21–25 estimated by comparison with records at gaging stations in near-by drainage basins.

*Monthly discharge of Smith River near Bristol, N. H., for the year ending Sept. 30, 1918.*

[Drainage area, 78.5 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| May 11-13 | 282 | 46 | 103 | 1.31 | 1.02 |
| June | 92 | 26 | 46.4 | .591 | .66 |
| July | 33 | 11 | 20.7 | .264 | .30 |
| August | 65 | 11 | 21.9 | .279 | .32 |
| September | 268 | 11 | 66.7 | .850 | .95 |

### 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, 1918.

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 about 3 miles downstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.33 feet at 1 p. m. April 3 (discharge, 1,790 second-feet); a stage of 7.50 feet occurred at 1 p. m. March 23, but stage-discharge relation was affected by ice at the time; minimum stage recorded, 1.48 feet at 6.15 a. m. August 23 (discharge, 19 second-feet).

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

ACCURACY.—Stage-discharge relation probably 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 from December 11 to April 4, when it was read once daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

*Discharge measurements of Contoocook River near Elmwood, N. H., during the years ending Sept. 30, 1917-18.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| 1917. | | *Feet.* | *Sec.-ft.* | 1918. | | *Feet.* | *Sec.-ft.* |
| Sept. 7 | M. R. Stackpole | 2.58 | 130 | Feb. 2 | M. R. Stackpole | [a] 3.42 | 120 |
| 20 | do | 2.16 | 74 | Mar. 9 | H. W. Fear | [a] 4.61 | 388 |
| Dec. 10 | do | [a] 2.63 | 104 | Apr. 5 | do | 5.57 | 1,020 |
| | | | | 8 | do | 4.64 | 674 |
| | | | | Aug. 21 | J. W. Moulton | 2.38 | 101 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Contoocook River near Elmwood, N. H., for period of Sept. 20, 1917, to Sept. 30, 1918.*

| Day. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 49 | 800 | 104 | 58 | 118 | 660 | 1,110 | 530 | 182 | 104 | 73 | 68 |
| 2 | ..... | 58 | 437 | 126 | 73 | 118 | 594 | 1,420 | 594 | 111 | 104 | 78 | 45 |
| 3 | ..... | 84 | 292 | 104 | 84 | 78 | 498 | 1,780 | 498 | 126 | 78 | 68 | 26 |
| 4 | ..... | 97 | 224 | 104 | 90 | 45 | 467 | 1,370 | 353 | 118 | 49 | 58 | 30 |
| 5 | ..... | 97 | 224 | 104 | 90 | 41 | 437 | 990 | 268 | 111 | 49 | 73 | 45 |
| 6 | ..... | 111 | 246 | 111 | 37 | 26 | 408 | 765 | 292 | 111 | 68 | 54 | 68 |
| 7 | ..... | 58 | 224 | 104 | 41 | 26 | 408 | 627 | 303 | 126 | 63 | 54 | 54 |
| 8 | ..... | 68 | 162 | 84 | 49 | 26 | 437 | 695 | 257 | 118 | 63 | 37 | 41 |
| 9 | ..... | 104 | 172 | 68 | 134 | 26 | 380 | 660 | 224 | 90 | 104 | 68 | 49 |
| 10 | ..... | 111 | 152 | 78 | 152 | 49 | 328 | 800 | 234 | 111 | 97 | 68 | 73 |
| 11 | ..... | 97 | 104 | 134 | 134 | 78 | 303 | 627 | 292 | 126 | 73 | 58 | 68 |
| 12 | ..... | 84 | 172 | 118 | 134 | 111 | 280 | 594 | 213 | 126 | 84 | 63 | 45 |
| 13 | ..... | 126 | 182 | 73 | 97 | 152 | 280 | 530 | 246 | 118 | 73 | 58 | 78 |
| 14 | ..... | 84 | 172 | 68 | 90 | 152 | 303 | 627 | 467 | 143 | 49 | 64 | 73 |
| 15 | ..... | 97 | 172 | 118 | 104 | 152 | 353 | 910 | 353 | 104 | 49 | 58 | 54 |
| 16 | ..... | 126 | 172 | 73 | 118 | 192 | 303 | 835 | 292 | 84 | 84 | 54 | 37 |
| 17 | ..... | 118 | 172 | 68 | 134 | 213 | 303 | 730 | 268 | 97 | 68 | 49 | 68 |
| 18 | ..... | 111 | 97 | 90 | 143 | 234 | 353 | 765 | 224 | 97 | 97 | 54 | 73 |
| 19 | ..... | 111 | 90 | 104 | 134 | 234 | 437 | 660 | 152 | 90 | 111 | 58 | 111 |
| 20 | 78 | 126 | 118 | 118 | 104 | 437 | 498 | 530 | 192 | 90 | 90 | 62 | 172 |
| 21 | 84 | 90 | 111 | 118 | 97 | 467 | 765 | 467 | 202 | 84 | 73 | 68 | 353 |
| 22 | 84 | 73 | 111 | 126 | 90 | 627 | 1,030 | 870 | 224 | 303 | 84 | 63 | 192 |
| 23 | 73 | 78 | 162 | 90 | 104 | 660 | 1,190 | 910 | 246 | 498 | 90 | 45 | 162 |
| 24 | 49 | 118 | 224 | 78 | 104 | 594 | 1,150 | 765 | 213 | 389 | 90 | 68 | 118 |
| 25 | 68 | 530 | 152 | 73 | 118 | 562 | 1,110 | 594 | 172 | 303 | 78 | 37 | 104 |
| 26 | 84 | 353 | 224 | 68 | 118 | 594 | 1,110 | 467 | 143 | 162 | 84 | 26 | 380 |
| 27 | 84 | 224 | 172 | 84 | 111 | 730 | 910 | 353 | 192 | 126 | 68 | 58 | 1,460 |
| 28 | 84 | 257 | 134 | 78 | 104 | 730 | 660 | 353 | 213 | 111 | 45 | 63 | 594 |
| 29 | 104 | 202 | 104 | 97 | 111 | ..... | 695 | 353 | 280 | 118 | 54 | 63 | 328 |
| 30 | 68 | 303 | 104 | 104 | 118 | ..... | 800 | 353 | 152 | 78 | 73 | 63 | 234 |
| 31 | ..... | 1,110 | ..... | 37 | 118 | ..... | 870 | ..... | 172 | ..... | 73 | 63 | ..... |

NOTE.—Stage-discharge relation affected by ice from Nov. 30 to Apr. 2; daily discharge determined from gage heights corrected for effect of ice by means of three discharge measurements and weather records. Gage not read Apr. 1-2 and Aug. 13-21; discharge estimated.

*Monthly discharge of Contoocook River near Elmwood, N. H., for the year ending Sept. 30, 1918.*

[Drainage area, 168 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 1,110 | 49 | 170 | 1.01 | 1.16 |
| November | 800 | 90 | 196 | 1.17 | 1.30 |
| December | 134 | 37 | 93.7 | .558 | .64 |
| January | 152 | 37 | 103 | .613 | .71 |
| February | 730 | 26 | 267 | 1.59 | 1.66 |
| March | 1,190 | 280 | 591 | 3.52 | 4.06 |
| April | 1,780 | 353 | 750 | 4.46 | 4.98 |
| May | 594 | 143 | 273 | 1.62 | 1.87 |
| June | 498 | 78 | 148 | .881 | .98 |
| July | 111 | 45 | 76.4 | .455 | .52 |
| August | 78 | 26 | 58.9 | .351 | .40 |
| September | 1,460 | 26 | 173 | 1.03 | 1.15 |
| The year | 1,780 | 26 | 241 | 1.43 | 19.43 |

### BLACKWATER RIVER NEAR CONTOOCOOK, N. H.

LOCATION.—At covered highway bridge in town of Webster, 150 feet north of Webster-Hopkinton town line, 1.1 miles from Tyler flag station, Boston & Maine Railroad, and 3½ miles from Contoocook, Merrimack County, N. H.

DRAINAGE AREA.—131 square miles (measured on Walker maps).

RECORDS AVAILABLE.—May 16 to September 30, 1918.

GAGE.—Chain on downstream side of bridge; read by H. F. Corliss.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel deep at and above the gage. Control is at site of old dam about 100 feet below the gage; probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded May 16 to September 30, 1918, 7.55 feet at 6.55 p. m. September, 28; minimum stage recorded, 2.10 feet at 8.15 a. m. August 7.

ICE.—River usually freezes over during the winter.

REGULATION.—A small amount of storage has been developed in Pleasant Pond (New London). Several small mills above the gage, but distribution of flow not seriously affected.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined below 1,600 second-feet. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Results good.

*Discharge measurements of Blackwater River near Contoocook, N. H., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* |
| May 16 | A. N. Weeks | 4.00 | 333 |
| 20 | C. H. Pierce | 3.19 | 161 |
| June 6 | O. W. Hartwell | 2.59 | 75 |

NOTE.—Several discharge measurements obtained subsequent to Sept. 30, 1918, were used in determining the rating curve.

*Daily gage height, in feet, of Blackwater River near Contoocook, N. H., for the year ending Sept. 30, 1918.*

| Day. | May. | June. | July. | Aug. | Sept. | Day. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 105 | 69 | 40 | 44 | 16 | 311 | 86 | 73 | 78 | 63 |
| 2 | | 97 | 66 | 41 | 43 | 17 | 250 | 73 | 66 | 69 | 56 |
| 3 | | 85 | 63 | 40 | 40 | 18 | 210 | 69 | 65 | 61 | 52 |
| 4 | | 79 | 63 | 37 | 40 | 19 | 173 | 69 | 62 | 53 | 67 |
| 5 | | 75 | 62 | 37 | 39 | 20 | 164 | 62 | 58 | 48 | 94 |
| 6 | | 72 | 59 | 32 | 38 | 21 | 147 | 63 | 54 | 48 | 164 |
| 7 | | 70 | 64 | 34 | 37 | 22 | 139 | 102 | 49 | 44 | 260 |
| 8 | | 73 | 65 | 43 | 36 | 23 | 131 | 173 | 46 | 43 | 260 |
| 9 | | 75 | 65 | 120 | 37 | 24 | 118 | 210 | 48 | 41 | 173 |
| 10 | | 73 | 69 | 192 | 35 | 25 | 109 | 173 | 45 | 48 | 139 |
| 11 | | 81 | 68 | 250 | 33 | 26 | 102 | 147 | 46 | 45 | 192 |
| 12 | | 92 | 66 | 192 | 32 | 27 | 94 | 117 | 48 | 40 | 719 |
| 13 | | 106 | 63 | 147 | 37 | 28 | 102 | 94 | 45 | 37 | 1,020 |
| 14 | | 118 | 68 | 115 | 46 | 29 | 114 | 81 | 43 | 40 | 955 |
| 15 | | 109 | 69 | 88 | 54 | 30 | 117 | 75 | 40 | 41 | 547 |
| | | | | | | 31 | 108 | | 40 | 40 | |

*Monthly discharge of Blackwater River near Contoocook for the year ending Sept. 30, 1918.*

[Drainage area, 131 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| May 16–31 | 311 | 94 | 149 | 1.14 | 0.68 |
| June | 210 | 62 | 96.8 | .739 | .82 |
| July | 69 | 40 | 58.3 | .445 | .51 |
| August | 250 | 32 | 70.4 | .537 | .62 |
| September | 1,020 | 32 | 178 | 1.36 | 1.52 |

### SUNCOOK RIVER AT NORTH CHICHESTER, N. H.

LOCATION.—About 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 plane-table sheets).

RECORDS AVAILABLE.—May 21 to September 30, 1918.

GAGE.—Vertical staff attached to tree on left bank; Sanborn water-stage recorder temporarily installed at same place.

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 about 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 May 21 to September 30, 1918, from water-stage recorder, 5.0 feet at 12 noon September 27 (discharge, 800 second-feet); minimum stage, from water-stage recorder, 1.2 feet several times in July and September (discharge, 16 second-feet).

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

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

ACCURACY.—Stage-discharge relation probably permanent except when affected by ice. Rating curve fairly well defined between 20 and 800 second-feet. Staff gage read twice daily to half-tenths and used for comparison with water-stage recorder. Daily discharge ascertained by applying mean daily gage height to rating table from water-stage recorder. Records good.

*Discharge measurements of Suncook River at North Chichester, N. H., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* |
| May 21 | A. N. Weeks | 2.40 | 195 |
| 22 | C. H. Pierce | 1.80 | 70 |
| June 6 | O. W. Hartwell | 1.30 | 21.4 |

NOTE.—Several discharge measurements obtained subsequent to Sept. 30 were used in determining the discharge rating curve.

*Daily discharge, in second-feet, of Suncook River at North Chichester, N. H. for the year ending Sept. 30, 1918.*

| Day. | May. | June. | July. | Aug. | Sept. | Day. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 28 | 94 | 103 | 28 | 16 | ..... | 28 | 103 | 94 | 46 |
| 2 | ..... | 32 | 103 | 103 | 17 | 17 | ..... | 121 | 103 | 52 | 57 |
| 3 | ..... | 78 | 103 | 41 | 70 | 18 | ..... | 85 | 121 | 24 | 78 |
| 4 | ..... | 85 | 28 | 20 | 52 | 19 | ..... | 94 | 85 | 85 | 70 |
| 5 | ..... | 85 | 94 | 78 | 52 | 20 | ..... | 78 | 57 | 85 | 70 |
| 6 | ..... | 78 | 57 | 85 | 64 | 21 | 112 | 78 | 85 | 85 | 180 |
| 7 | ..... | 103 | 32 | 103 | 46 | 22 | 94 | 64 | 150 | 94 | 344 |
| 8 | ..... | 46 | 103 | 112 | 14 | 23 | 103 | 94 | 112 | 57 | 191 |
| 9 | ..... | 28 | 94 | 78 | 85 | 24 | 85 | 180 | 103 | 36 | 130 |
| 10 | ..... | 94 | 85 | 130 | 57 | 25 | 57 | 103 | 94 | 24 | 112 |
| 11 | ..... | 85 | 70 | 130 | 57 | 26 | 52 | 112 | 70 | 94 | 170 |
| 12 | ..... | 112 | 78 | 140 | 57 | 27 | 112 | 85 | 28 | 103 | 685 |
| 13 | ..... | 94 | 28 | 41 | 57 | 28 | 94 | 85 | 14 | 94 | 488 |
| 14 | ..... | 112 | 20 | 78 | 36 | 29 | 94 | 52 | 64 | 94 | 296 |
| 15 | ..... | 52 | 103 | 41 | 17 | 30 | 28 | 28 | 103 | 85 | 213 |
| | | | | | | 31 | 85 | ..... | 103 | 41 | ..... |

NOTE.—Water-stage recorder not in operation May 21 and May 31 to June 5; daily discharge computed from twice-daily readings of staff gage.

*Monthly discharge of Suncook River at North Chichester, N. H., for the year ending Sept. 30, 1918.*

[Drainage area, 157 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| May 21-31 | 112 | 28 | 83.3 | 0.530 | 0.21 |
| June | 180 | 28 | 79.9 | .509 | .57 |
| July | 150 | 14 | 80.2 | .511 | .59 |
| August | 140 | 20 | 78.4 | .499 | .58 |
| September | 685 | 14 | 128 | .815 | .91 |

### 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, 1918.

GAGES.—Gurley printing water-stage recorder on left bank about 350 feet above the falls; used since October 15, 1913. A vertical staff was used from July 13, 1909, to April 11, 1911, when it was washed out. From April 12, 1911, to October 14, 1913, a chain gage attached to a tree on left bank 350 feet above the falls was used.

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

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

ICE.—Ice forms on control for short periods in the winter, slightly affecting stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage, from water-stage recorder, 5.92 feet at 8 p. m. March 26 (discharge, 1,830 second-feet); minimum stage, from water-stage recorder, 2.03 feet at 6 p. m. August 16 (discharge, 25 second-feet).

1909–1918: Maximum stage recorded, 9.6 feet on August 5, 1915 (discharge from extension of rating curve, about 4,930 second-feet); minimum stage recorded, 1.90 feet at 8 a. m. September 8, 1909 (discharge, 15 second-feet).

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

ACCURACY.—Stage-discharge relation permanent except when affected by ice for short periods. Rating curve well defined below 2,000 second-feet. Operation of water-stage recorder satisfactory except for periods noted in footnote to daily discharge table. Daily discharge ascertained by applying mean of 24 hourly gage heights to rating table. Records good for periods when water-stage recorder was in operation.

*Discharge measurements of Souhegan River at Merrimack, N. H., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* |
| Jan. 16 | M. R. Stackpole | *a* 2.80 | 99 |
| Feb. 11 | H. W. Fear | *a* 2.55 | 71 |

*a* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Souhegan River at Merrimack, N. H., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 32 | 506 | 72 | 60 | 98 | 700 | 1,140 | 303 | 200 | 60 | 42 | 45 |
| 2 | 34 | 307 | 102 | 70 | 96 | 600 | 1,330 | 570 | 200 | 52 | 42 | 40 |
| 3 | 40 | 232 | 104 | 72 | 80 | 510 | 1,500 | 510 | 160 | 52 | 37 | 35 |
| 4 | 37 | 175 | 114 | 82 | 80 | 480 | 1,070 | 371 | 115 | 52 | 39 | 35 |
| 5 | 39 | 152 | 130 | 82 | 82 | 450 | 830 | 299 | 110 | 52 | 35 | 45 |
| 6 | 42 | 162 | 128 | 74 | 82 | 420 | 638 | 260 | 105 | 52 | 36 | 55 |
| 7 | 42 | 142 | 118 | 82 | 78 | 410 | 545 | 246 | 105 | 50 | 34 | 60 |
| 8 | 36 | 138 | 112 | 78 | 78 | 400 | 515 | 225 | 105 | 46 | 36 | 60 |
| 9 | 40 | 120 | 106 | 86 | 82 | 390 | 488 | 201 | 105 | 42 | 39 | 50 |
| 10 | 46 | 116 | 82 | 90 | 78 | 320 | 496 | 185 | 110 | 60 | 43 | 35 |
| 11 | 46 | 114 | 68 | 94 | 70 | 310 | 442 | 180 | 120 | 75 | 64 | 40 |
| 12 | 51 | 90 | 90 | 98 | 80 | 310 | 393 | 165 | 130 | 70 | 44 | 40 |
| 13 | 52 | 90 | 80 | 95 | 86 | 310 | 393 | 162 | 130 | 65 | 49 | 45 |
| 14 | 46 | 104 | 78 | 90 | 100 | 340 | 398 | 175 | 130 | 60 | 62 | 44 |
| 15 | 48 | 100 | 88 | 95 | 120 | 420 | 748 | 210 | 120 | 55 | 64 | 50 |
| 16 | 70 | 108 | 90 | 100 | 145 | 420 | 830 | 188 | 110 | 46 | 38 | 50 |
| 17 | 92 | 96 | 84 | 105 | 170 | 406 | 665 | 162 | 90 | 70 | 33 | 45 |
| 18 | 52 | 92 | 92 | 110 | 200 | 406 | 540 | 135 | 80 | 84 | 45 | 60 |
| 19 | 51 | 74 | 98 | 105 | 240 | 460 | 474 | 106 | 130 | 90 | 50 | 110 |
| 20 | 57 | 74 | 96 | 100 | 420 | 535 | 380 | 108 | 64 | 90 | 50 | 300 |
| 21 | 49 | 92 | 102 | 95 | 580 | 665 | 371 | 118 | 45 | 85 | 60 | 380 |
| 22 | 34 | 86 | 104 | 95 | 640 | 950 | 692 | 122 | 300 | 80 | 60 | 300 |
| 23 | 58 | 84 | 106 | 90 | 700 | 1,230 | 950 | 120 | 480 | 70 | 60 | 210 |
| 24 | 62 | 142 | 96 | 90 | 620 | 1,330 | 665 | 118 | 400 | 65 | 55 | 150 |
| 25 | 315 | 228 | 90 | 90 | 600 | 1,260 | 560 | 110 | 200 | 60 | 50 | 110 |
| 26 | 331 | 182 | 92 | 88 | 700 | 1,300 | 434 | 105 | 160 | 55 | 45 | 400 |
| 27 | 207 | 125 | 100 | 88 | 740 | 1,010 | 380 | 105 | 140 | 50 | 35 | 1,500 |
| 28 | 170 | 92 | 96 | 88 | 740 | 775 | 327 | 102 | 125 | 40 | 40 | 640 |
| 29 | 225 | 96 | 90 | 86 | ..... | 802 | 299 | 140 | 110 | 35 | 50 | 360 |
| 30 | 198 | 92 | 90 | 92 | ..... | 860 | 303 | 180 | 70 | 33 | 50 | 250 |
| 31 | 610 | ..... | 74 | 98 | ..... | 980 | ..... | 200 | ..... | 32 | 50 | ..... |

NOTE.—Stage-discharge relation affected by ice Jan. 12 to Feb. 12. Discharge estimated Feb. 13 to Mar. 15, May 23 to June 17, June 22 to July 28, and Aug. 17 to Sept. 30 from observer's readings and comparative hydrographs of Ashuelot, Contoocook, and Pemigewasset rivers.

*Monthly discharge of Souhegan River at Merrimack, N. H., for the year ending Sept. 30, 1918.*

[Drainage area, 168 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 610 | 32 | 104 | .619 | 0.71 |
| November | 506 | 74 | 140 | .833 | .93 |
| December | 130 | 72 | 95.9 | .571 | .66 |
| January | 110 | 60 | 89.3 | .532 | .61 |
| February | 740 | 70 | 278 | 1.65 | 1.72 |
| March | 1,330 | 310 | 637 | 3.79 | 4.37 |
| April | 1,500 | 299 | 627 | 3.73 | 4.16 |
| May | 570 | 102 | 199 | 1.18 | 1.36 |
| June | 480 | 45 | 148 | .881 | .98 |
| July | 90 | 32 | 59.0 | .351 | .40 |
| August | 64 | 33 | 46.4 | .276 | .32 |
| September | 1,500 | 35 | 185 | 1.10 | 1.23 |
| The year | 1,500 | 32 | 216 | 1.29 | 17.45 |

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

LOCATION.—At Wachusett dam near Clinton.

DRAINAGE AREA.—119 square miles 1896 to 1907; 118.19 square miles 1908–1913, 108.84 square miles 1914–1918.

RECORDS AVAILABLE.—July, 1896, to September, 1918.

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 years 1897 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 Metropolitan Water and Sewerage Board of Boston; 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 year ending Sept. 30, 1918.*

[Drainage area, 108.84 square miles.]

| Month. | Total yield (million gallons). | Yield per square mile. | | Run-off. | | Rainfall (inches). |
|---|---|---|---|---|---|---|
| | | Million gallons per day. | Second-feet. | Depth on drainage area (inches). | Per cent of rainfall. | |
| October | 1,871.8 | 0.555 | 0.858 | 0.99 | 16.4 | 6.03 |
| November | 1,021.3 | .313 | .484 | .54 | 43.1 | 1.25 |
| December | 1,312.4 | .389 | .602 | .69 | 29.9 | 2.31 |
| January | 1,634.3 | .484 | .749 | .86 | 29.0 | 2.97 |
| February | 6,166.6 | 2.024 | 3.131 | 3.26 | 76.6 | 4.25 |
| March | 8,727.4 | 2.590 | 4.008 | 4.61 | 206.0 | 2.24 |
| April | 5,249.0 | 1.608 | 2.487 | 2.78 | 80.1 | 3.47 |
| May | 2,271.6 | .673 | 1.042 | 1.20 | 112.8 | 1.07 |
| June | 1,707.2 | .523 | .809 | .90 | 19.8 | 4.57 |
| July | 943.6 | .280 | .433 | .50 | 17.9 | 2.80 |
| August | 536.4 | .159 | .246 | .28 | 9.9 | 2.82 |
| September | 1,968.6 | .603 | .933 | 1.04 | 14.5 | 7.18 |
| The year | 33,410.2 | .841 | 1.302 | 17.65 | 43.1 | 40.96 |

*Summary of yield and rainfall in South Branch of Nashua River basin (Wachusett drainage area) near Clinton, Mass., for years ending Sept. 30, 1897–1918.*

[Drainage area, 108.84 square miles.]

| Month. | Total yield (million gallons). | Yield per square mile. | | Run-off. | | Rainfall (inches). |
|---|---|---|---|---|---|---|
| | | Million gallons per day. | Second-feet. | Depth on drainage area (inches). | Per cent of rainfall. | |
| October | 37,317.6 | 0.502 | 0.777 | 0.90 | 23.6 | 3.82 |
| November | 51,750.0 | .720 | 1.114 | 1.24 | 34.3 | 3.62 |
| December | 81,514.9 | 1.098 | 1.700 | 1.96 | 52.0 | 3.77 |
| January | 87,401.9 | 1.178 | 1.824 | 2.10 | 57.9 | 3.63 |
| February | 95,523.5 | 1.413 | 2.186 | 2.28 | 60.0 | 3.80 |
| March | 189,288.3 | 2.550 | 3.946 | 4.55 | 112.9 | 4.03 |
| April | 151,902.1 | 2.115 | 3.272 | 3.65 | 98.9 | 3.69 |
| May | 87,522.3 | 1.179 | 1.825 | 2.10 | 63.8 | 3.29 |
| June | 55,854.4 | .778 | 1.205 | 1.34 | 35.6 | 3.76 |
| July | 31,822.5 | .429 | .664 | .76 | 18.8 | 4.04 |
| August | 30,889.9 | .416 | .644 | .74 | 17.9 | 4.14 |
| September | 23,615.7 | .329 | .509 | .57 | 15.9 | 3.59 |
| The year | 924,403.1 | 1.057 | 1.635 | 22.19 | 49.1 | 45.18 |

**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; 1881–1916, 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 1918, 17.58 square miles.

RECORDS AVAILABLE.—Of Sudbury River, January, 1875, to September, 1918; of Lake Cochituate, January, 1863, to September, 1918. Sudbury River and Lake Cochituate have been studied by the engineers of the city of Boston, the State Board of Health of Massachusetts, and the Metropolitan Water and Sewerage Board; records of rainfall have been kept in the Sudbury basin since 1875 and in the Cochituate basin since 1852, but the Cochituate basin records are considered of doubtful accuracy previous to 1872.

REGULATION.—The greater part of the flow from these basins is controlled by storage reservoirs constructed by the city of Boston and the Metropolitan Water and Sewerage Board. Lake Cochituate, which drains into Sudbury River a short distance below Framingham, is controlled as a storage reservoir by the Metropolitan Waterworks. 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 Wachusetts 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 unadvoidable in the measurement of large quantities of water decrease the accuracy of the determination of the Sudbury water supply during months of low yield for years subsequent to 1897.

COOPERATION.—Record furnished by the Metropolitan Water and Sewerage Board of Boston: rearranged in form of climatic year by engineers of the Geological Survey.

*Yield and rainfall in Sudbury River basin near Framingham, Mass., for year ending Sept. 30, 1918.*

[Drainage area, 75.2 square miles.]

| Month. | Total yield (million gallons). | Yield per square mile. | | Run-off. | | Rainfall (inches). |
|---|---|---|---|---|---|---|
| | | Million gallons per day. | Second-feet. | Depth on drainage area (inches). | Per cent of rainfall. | |
| October | 1,123.8 | 0.482 | 0.746 | 0.860 | 15.2 | 5.65 |
| November | 989.1 | .438 | .678 | .757 | 57.6 | 1.31 |
| December | 886.7 | .380 | .589 | .678 | 24.2 | 2.81 |
| January | 635.5 | .273 | .422 | .486 | 14.0 | 3.47 |
| February | 3,808.3 | 1.809 | 2.798 | 2.914 | 81.3 | 3.58 |
| March | 5,091.3 | 2.187 | 3.384 | 3.896 | 156.2 | 2.50 |
| April | 3,306.2 | 1.466 | 2.267 | 2.530 | 57.1 | 4.43 |
| May | 1,490.7 | .639 | .989 | 1.141 | 98.8 | 1.16 |
| June | 417.1 | .185 | .286 | .319 | 8.7 | 3.65 |
| July | 224.3 | .096 | .149 | .171 | 4.2 | 4.07 |
| August | −125.8 | −.054 | −.083 | −.096 | −6.0 | 1.61 |
| September | 1,437.9 | .637 | .986 | 1.100 | 12.8 | 8.60 |
| The year | 19,285.1 | .702 | 1.086 | 14.756 | 34.5 | 42.84 |

*Summary of yield and rainfall in Sudbury River basin near Framingham, Mass., for the years ending Sept. 30, 1876–1918.*

[Drainage area, 75.2 square miles.]

| Month. | Total yield (million gallons). | Yield per square mile. | | Run-off. | | Rainfall (inches). |
|---|---|---|---|---|---|---|
| | | Million gallons per day. | Second-feet. | Depth on drainage area (inches). | Per cent of rainfall. | |
| October | 41,361.7 | 0.412 | 0.638 | 0.74 | 19.3 | 3.82 |
| November | 70,586.2 | .728 | 1.126 | 1.26 | 34.4 | 3.66 |
| December | 94,755.1 | .945 | 1.462 | 1.69 | 44.3 | 3.81 |
| January | 118,068.9 | 1.178 | 1.823 | 2.10 | 51.5 | 4.08 |
| February | 151,709.5 | 1.660 | 2.568 | 2.67 | 64.8 | 4.12 |
| March | 271,950.1 | 2.713 | 4.198 | 4.84 | 112.5 | 4.30 |
| April | 189,208.9 | 1.951 | 3.019 | 3.37 | 95.5 | 3.53 |
| May | 106,338.0 | 1.060 | 1.640 | 1.89 | 58.0 | 3.26 |
| June | 46,735.5 | .482 | .746 | .83 | 27.8 | 2.99 |
| July | 17,588.6 | .175 | .271 | .31 | 8.5 | 3.64 |
| August | 23,291.0 | .232 | .359 | .41 | 10.6 | 3.87 |
| September | 21,599.7 | .223 | .345 | .38 | 11.3 | 3.37 |
| The year | 1,153,193.2 | .976 | 1.510 | 20.49 | 46.1 | 44.45 |

*Yield and rainfall in Lake Cochituate basin near Cochituate, Mass., for year ending Sept. 30, 1918.*

[Drainage area, 17.58 square miles.]

| Month. | Total yield (million gallons). | Yield per square mile. | | Run-off. | | Rainfall (inches). |
|---|---|---|---|---|---|---|
| | | Million gallons per day. | Second-feet. | Depth on drainage area (inches). | Per cent of rainfall. | |
| October | 361.9 | 0.664 | 1.027 | 1.18 | 18.6 | 6.33 |
| November | 280.2 | .531 | .822 | .92 | 71.9 | 1.28 |
| December | 363.0 | .666 | 1.030 | 1.19 | 44.1 | 2.70 |
| January | 276.0 | .506 | .783 | .90 | 27.6 | 3.26 |
| February | 874.1 | 1.776 | 2.748 | 2.86 | 75.3 | 3.80 |
| March | 1,023.6 | 1.878 | 2.906 | 3.35 | 148.2 | 2.26 |
| April | 700.5 | 1.328 | 2.054 | 2.29 | 49.7 | 4.61 |
| May | 333.4 | .612 | .947 | 1.09 | 99.1 | 1.10 |
| June | 109.9 | .208 | .322 | .36 | 10.8 | 3.34 |
| July | 88.3 | .162 | .251 | .29 | 8.0 | 3.64 |
| August | −17.5 | −.032 | −.050 | −.06 | −4.3 | 1.41 |
| September | 425.9 | .808 | 1.250 | 1.40 | 16.3 | 8.58 |
| The year | 4,819.3 | .759 | 1.174 | 15.77 | 37.2 | 42.31 |

*Summary of yield and rainfall in Lake Cochituate basin near Cochituate, Mass., for the years ending Sept. 30, 1864–1918.*

[Drainage area, 17.58 square miles.]

| Month. | Total yield (million gallons). | Yield per square mile. | | Run-off. | | Rainfall (inches). |
|---|---|---|---|---|---|---|
| | | Million gallons per day. | Second-feet. | Depth on drainage area (inches). | Per cent of rainfall. | |
| October | 15,573.6 | 0.519 | 0.803 | 0.93 | 22.9 | 4.06 |
| November | 21,263.5 | .733 | 1.134 | 1.26 | 32.6 | 3.86 |
| December | 26,825.8 | .895 | 1.385 | 1.60 | 44.7 | 3.58 |
| January | 32,552.6 | 1.086 | 1.682 | 1.94 | 50.3 | 3.86 |
| February | 41,150.2 | 1.507 | 2.332 | 2.45 | 62.5 | 3.92 |
| March | 64,116.7 | 2.139 | 3.309 | 3.82 | 89.5 | 4.27 |
| April | 47,959.6 | 1.653 | 2.558 | 2.85 | 81.8 | 3.48 |
| May | 28,883.9 | .966 | 1.495 | 1.72 | 48.6 | 3.54 |
| June | 13,507.9 | .466 | .721 | .80 | 26.3 | 3.04 |
| July | 7,823.9 | .261 | .404 | .47 | 12.6 | 3.72 |
| August | 11,140.1 | .372 | .576 | .66 | 16.2 | 4.07 |
| September | 11,305.9 | .390 | .603 | .67 | 18.8 | 3.57 |
| The year | 322,103.7 | .912 | 1.411 | 19.17 | 42.6 | 44.97 |

## THAMES RIVER BASIN.

### QUINEBAUG RIVER AT JEWETT CITY, CONN.

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

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

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

GAGES.—Gurley 7-day graph water-stage recorder on left bank, referred to gage datum by a hook gage inside the well; an inclined staff gage is used for auxiliary readings. Recorder inspected by A. B. Ambot.

DISCHARGE MEASUREMENTS.—Made from cable.

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

EXTREMES OF DISCHARGE.—Maximum stage July 17 to September 30, from water-stage recorder, 9.42 feet at 3 p. m. September 27 (discharge, 3,430 second-feet); minimum stage July 17 to September 30, from water-stage recorder, 4.22 feet at midnight July 28 (water held back by dams) (discharge, from extension of rating curve, 104 second-feet).

ICE.—Probably little, if any, effect from ice during the winter.

REGULATION.—The 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 plants 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 probably permanent. Rating curve well defined between 200 and 6,000 second-feet. Operation of water-stage recorder satisfactory except for short period as stated in footnote to daily-discharge table. Daily discharge ascertained by use of discharge integrator. Records good.

The following discharge measurement was made by H. W. Fear:

Sept. 21, 1918: Gage height, 7.61 feet; discharge, 1,800 second-feet.[1]

[1] Ten discharge measurements made subsequent to Sept. 30 were used in determining the discharge rating curve.

*Daily discharge, in second-feet, of Quinebaug River at Jewett City, Conn., for the year ending Sept. 30, 1918.*

| Day. | July. | Aug. | Sept. | Day. | July. | Aug. | Sept. | Day. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 880 | 195 | 11 | ..... | 500 | 355 | 21 | 245 | 490 | 1,800 |
| 2 | ..... | 730 | 200 | 12 | ..... | 1,060 | 350 | 22 | 445 | 490 | 1,580 |
| 3 | ..... | 540 | 370 | 13 | ..... | 850 | 465 | 23 | 485 | 465 | 1,500 |
| 4 | ..... | 405 | 390 | 14 | ..... | 780 | 510 | 24 | 530 | 370 | 1,180 |
| 5 | ..... | 620 | 365 | 15 | ..... | 680 | 495 | 25 | 500 | 145 | 950 |
| 6 | ..... | 620 | 395 | 16 | ..... | 740 | 550 | 26 | 490 | 370 | 940 |
| 7 | ..... | 620 | 280 | 17 | 510 | 550 | 600 | 27 | 345 | 375 | 2,750 |
| 8 | ..... | 540 | 175 | 18 | 510 | 305 | 700 | 18 | 130 | 355 | 2,700 |
| 9 | ..... | 660 | 380 | 19 | 520 | 530 | 1,400 | 29 | 430 | 365 | 2,050 |
| 10 | ..... | 560 | 375 | 20 | 390 | 510 | 1,360 | 30 | 445 | 355 | 1,700 |
| | | | | | | | | 31 | 600 | 200 | ..... |

NOTE.—Water-stage recorder not in operation Sept. 15–18; discharge estimated.

*Monthly discharge of Quinebaug River at Jewett City, Conn., for the year ending Sept. 30, 1918.*

[Drainage area, 712 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| July 17–31 | 600 | 130 | 438 | 0.615 | 0.34 |
| August | 1,060 | 145 | 537 | .754 | .87 |
| September | 2,750 | 175 | 902 | 1.27 | 1.42 |

## CONNECTICUT RIVER BASIN.

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

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

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

RECORDS AVAILABLE.—April 1, 1917, to September 30, 1918.

GAGES.—Gurley 7-day water-stage recorder on right bank about one-fourth mile below the outlet dam; installed in July, 1918; inclined staff gage at same site installed in November, 1917, and used in determining sluice-gate ratings; scales on gate frames indicate amount of sluice-gate openings; staff gage in lake above dam.

DISCHARGE MEASUREMENT.—Made from log bridge half a mile below gage, by wading, or from cable 200 feet above gage.

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

COMPUTATION OF DISCHARGE.—Beginning July 28, 1918, discharge determined from water-stage recorder. Previous to installation of water-stage recorder discharge through three sluice gates, 6 feet, 8 feet, and 20 feet in width, determined from gate ratings based on current-meter measurements and comparative readings of river gage, or from daily readings of river gage when gates remained at same opening for 24 hours. Discharge through one water wheel, used when slasher was in operation determined from figures of water-wheel efficiency and power output.

ICE.—Practically no effect from ice on the control section for river gage; formation of ice in the sluice-gate openings materially changes conditions at gates.

REGULATION.—About 4.1 billion cubic feet of storage has been developed in lakes and ponds above the gage; records of monthly discharge have been corrected for effect of storage in First Lake but not for effects of storage in lakes tributary to First Lake.

ACCURACY.—Stage-discharge relation for river gage practically permanent. Rating curve for river gage well defined below 800 second-feet. Operation of water-stage recorder satisfactory from its installation July 28, 1918. Rating curves for middle and upper leaves of 6-foot and 8-foot gates fairly well defined for periods used. Rating curves for lower sections of gates and for conditions of weir discharge somewhat uncertain. Daily discharge for January, February, March, and July to September 30, 1918, ascertained by applying gage height at river gage to rating table; daily discharge for other periods ascertained by applying records of gate openings to rating table and giving due consideration to times of opening and closing gates and changes in gate settings. Records good for periods when river gage was used and fair for periods when records of gate openings were used.

*Daily gage height, in feet, of First Lake near Pittsburg, N. H., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 20.0 | 16.5 | 18.9 | 11.9 | 6.1 | 3.8 | 3.4 | 13.1 | 20.0 | 17.9 | 19.3 | 12.5 |
| 2 | 19.7 | 16.8 | 18.7 | 11.7 | 5.9 | 3.9 | 3.8 | 14.0 | 19.9 | 17.8 | 19.2 | 12.2 |
| 3 | 19.5 | 16.9 | 18.5 | 11.5 | 5.8 | 3.8 | 4.3 | 14.6 | 19.9 | 17.7 | 19.1 | 11.9 |
| 4 | 19.3 | 17.5 | 18.2 | 11.3 | 5.6 | 3.8 | 4.7 | 15.0 | 19.8 | 17.6 | 19.0 | 11.5 |
| 5 | 19.3 | 17.9 | 18.0 | 11.0 | 5.5 | 3.8 | 5.0 | 15.4 | 19.6 | 17.6 | 18.7 | 11.3 |
| 6 | 19.2 | 18.1 | 18.0 | 10.8 | 5.4 | 3.8 | 5.2 | 15.9 | 19.5 | 17.5 | 18.5 | 10.9 |
| 7 | 19.1 | 18.1 | 17.9 | 10.5 | 5.3 | 3.8 | 5.5 | 16.4 | 19.4 | 17.4 | 18.3 | 10.6 |
| 8 | 18.9 | 18.4 | 17.7 | 10.4 | 5.2 | 3.8 | 5.7 | 17.0 | 19.4 | 17.3 | 18.0 | 10.1 |
| 9 | 18.7 | 18.6 | 17.5 | 10.2 | 5.1 | 3.8 | 6.0 | 17.6 | 19.4 | 17.3 | 17.8 | 9.9 |
| 10 | 18.5 | 18.9 | 17.4 | 10.0 | 5.0 | 3.8 | 6.1 | 18.0 | 19.4 | 17.3 | 17.8 | 9.5 |
| 11 | 18.3 | 19.2 | 17.2 | 9.7 | 4.9 | 3.8 | 6.2 | 18.3 | 19.4 | 17.4 | 17.4 | 9.1 |
| 12 | 18.0 | 19.4 | 17.0 | 9.5 | 4.9 | 3.8 | 6.3 | 19.0 | 19.4 | 17.4 | 17.2 | 8.9 |
| 13 | 17.4 | 19.5 | 16.8 | 9.4 | 4.7 | 3.8 | 6.5 | 19.2 | 19.3 | 17.2 | 16.8 | 8.4 |
| 14 | 17.2 | 19.7 | 16.6 | 9.2 | 4.6 | 3.8 | 6.6 | 19.6 | 19.2 | 17.3 | 16.4 | 8.3 |
| 15 | 17.3 | 19.9 | 16.4 | 9.0 | 4.5 | 3.8 | 6.8 | 20.1 | 19.1 | 17.4 | 16.1 | 7.9 |
| 16 | 17.2 | 20.0 | 16.2 | 8.9 | 4.4 | 3.7 | 7.1 | 20.5 | 19.0 | 18.0 | 15.7 | 7.7 |
| 17 | 17.0 | 20.1 | 16.0 | 8.6 | 4.3 | 3.8 | 7.4 | 20.5 | 18.9 | 18.1 | 15.4 | 7.5 |
| 18 | 16.8 | 20.2 | 15.8 | 8.4 | 4.2 | 3.7 | 7.6 | 20.6 | 19.0 | 18.3 | 15.3 | 7.2 |
| 19 | 16.5 | 20.3 | 15.5 | 8.2 | 4.2 | 3.7 | 7.8 | 20.6 | 19.0 | 18.4 | 15.2 | 7.1 |
| 20 | 16.3 | 20.4 | 15.2 | 8.0 | 4.1 | 3.7 | 8.0 | 20.5 | 18.9 | 18.8 | 15.0 | 7.0 |
| 21 | 16.3 | 20.4 | 14.9 | 7.8 | 4.1 | 3.5 | 8.1 | 20.5 | 18.8 | 18.9 | 14.8 | 7.0 |
| 22 | 16.1 | 20.2 | 14.7 | 7.6 | 4.0 | 3.4 | 8.3 | 20.4 | 18.6 | 19.0 | 14.7 | 7.3 |
| 23 | 15.8 | 20.1 | 14.5 | 7.4 | 4.0 | 3.4 | 8.7 | 20.3 | 18.5 | 19.2 | 14.5 | 7.8 |
| 24 | 15.6 | 19.9 | 14.2 | 7.3 | 3.9 | 3.4 | 9.2 | 20.2 | 18.5 | 19.2 | 14.4 | 8.2 |
| 25 | 15.4 | 19.8 | 13.9 | 7.1 | 3.9 | 3.4 | 9.7 | 20.1 | 18.4 | 19.2 | 14.2 | 8.5 |
| 26 | 15.2 | 19.8 | 13.6 | 6.9 | 3.9 | 3.4 | 10.0 | 20.0 | 18.4 | 19.3 | 13.9 | 8.7 |
| 27 | 14.9 | 19.6 | 13.4 | 6.7 | 3.8 | 3.4 | 10.3 | 20.1 | 18.4 | 19.4 | 13.7 | 9.2 |
| 28 | 14.6 | 19.5 | 13.1 | 6.5 | 3.8 | 3.4 | 10.6 | 20.3 | 18.2 | 19.3 | 13.5 | 9.8 |
| 29 | 14.5 | 19.3 | 12.8 | 6.4 | ..... | 3.5 | 11.0 | 20.4 | 18.0 | 19.1 | 13.2 | 10.2 |
| 30 | 14.4 | 19.0 | 12.5 | 6.3 | ..... | 3.4 | 12.0 | 20.3 | 18.0 | 19.1 | 12.9 | 10.8 |
| 31 | 15.4 | ..... | 12.2 | 6.2 | ..... | 3.5 | ..... | 20.2 | ..... | 19.3 | 12.7 | ..... |

*Discharge measurements of Connecticut River at First Lake, near Pittsburg, N. H., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Nov. 3[a] | C. H. Pierce | 1.72 | 37.2 | Nov. 7[a] | M. R. Stackpole | 2.66 | 332 |
| 3[a] | M. R. Stackpole | 1.72 | 39.6 | 7[a] | do | 2.66 | 328 |
| 4[a] | do | 2.07 | 99 | 8[a] | do | 1.86 | 58 |
| 4[c] | C. H. Pierce | 2.07 | 111 | 8[a] | J. P. Locke | 1.86 | 64 |
| 4[a] | do | 2.33 | 203 | 9[a] | M. R. Stackpole | 2.20 | 151 |
| 4[a] | M. R. Stackpole | 2.33 | 184 | 9[a] | do | 2.20 | 148 |
| 5[a] | do | 1.96 | 66 | Apr. 29[b] | do | 1.53 | 12.3 |
| 5[a] | do | 1.96 | 75 | 29[b] | do | 1.53 | 13.3 |
| 6[a] | do | 2.20 | 140 | 29[c] | do | 1.53 | 27.9 |
| 6[a] | do | 2.20 | 145 | May 10[d] | do | 2.71 | 374 |
| 7[a] | do | 2.50 | 253 | 18[d] | do | [e] 5.3 | 433 |
| 7[a] | do | 2.50 | 267 | | | | |

[a] Measurement made about half a mile below gage; practically no inflow between gage and measuring section. Section rough and conditions unsuitable for current-meter measurements.
[b] Measurement made by wading 300± feet above gage.
[c] Measurement made about half a mile below gage; considerable inflow between gage and measuring section; results of measurement not corrected for inflow. Section rough and conditions unsuitable for current-meter measurements.
[d] Measurement made about half a mile below gage; results of measurement corrected for inflow between gage and measuring section. Section rough and conditions unsuitable for current-meter measurements.
[e] Stage-discharge relation affected by log jam on control.

NOTE.—Measurements made at cable section except as noted. Twenty-three discharge measurements made subsequent to September 30 were used in determining the discharge rating curve.

*Daily discharge, in second-feet, of Connecticut River at First Lake, near Pittsburg, N. H., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 151 | 92 | 410 | 356 | 186 | 84 | 33 | 13 | 255 | 203 | 330 | 419 |
| 2 | 90 | 17 | 407 | 376 | 182 | 84 | 7 | 13 | 17 | 205 | 363 | 393 |
| 3 | 104 | 38 | 392 | 350 | 179 | 82 | 7 | 14 | 233 | 183 | 345 | 371 |
| 4 | 202 | 47 | 377 | 348 | 175 | 82 | 8 | 15 | 231 | 186 | 376 | 404 |
| 5 | 164 | 20 | 204 | 407 | 171 | 79 | 8 | 15 | 238 | 183 | 450 | 450 |
| 6 | 169 | 33 | 191 | 387 | 164 | 82 | 8 | 56 | 342 | 90 | 419 | 451 |
| 7 | 269 | 105 | 311 | 325 | 169 | 82 | 8 | 15 | 356 | 190 | 435 | 432 |
| 8 | 331 | 36 | 297 | 303 | 194 | 82 | 8 | 19 | 260 | 63 | 503 | 409 |
| 9 | 328 | 37 | 285 | 281 | 181 | 82 | 26 | 72 | 51 | 171 | 427 | 406 |
| 10 | 328 | 23 | 280 | 294 | 182 | 82 | 8 | 173 | 342 | 185 | 505 | 415 |
| 11 | 389 | 24 | 270 | 303 | 175 | 79 | 8 | 16 | 376 | 15 | 511 | 419 |
| 12 | 385 | 24 | 286 | 303 | 167 | 79 | 8 | 193 | 375 | 207 | 547 | 417 |
| 13 | 444 | 25 | 407 | 281 | 157 | 79 | 9 | 181 | 369 | 279 | 547 | 457 |
| 14 | 426 | 26 | 360 | 298 | 150 | 79 | 9 | 202 | 287 | 332 | 543 | 434 |
| 15 | 431 | 26 | 350 | 332 | 139 | 79 | 9 | 162 | 95 | 15 | 452 | 402 |
| 16 | 431 | 27 | 345 | 345 | 132 | 77 | 9 | 279 | 296 | 149 | 447 | 375 |
| 17 | 460 | 27 | 349 | 360 | 125 | 80 | 9 | 279 | 267 | 292 | 193 | 347 |
| 18 | 586 | 27 | 520 | 330 | 119 | 79 | 10 | 269 | 196 | 291 | 231 | 331 |
| 19 | 551 | 28 | 494 | 303 | 113 | 78 | 10 | 269 | 351 | 308 | 240 | 315 |
| 20 | 519 | 104 | 423 | 290 | 110 | 75 | 31 | 350 | 349 | 443 | 245 | 310 |
| 21 | 532 | 353 | 365 | 273 | 107 | 57 | 10 | 279 | 321 | 373 | 245 | 120 |
| 22 | 500 | 348 | 319 | 260 | 104 | 52 | 10 | 270 | 335 | 411 | 245 | 10 |
| 23 | 469 | 243 | 441 | 252 | 98 | 52 | 10 | 216 | 259 | 416 | 240 | 10 |
| 24 | 460 | 295 | 503 | 240 | 92 | 53 | 10 | 259 | 267 | 364 | 240 | 10 |
| 25 | 535 | 259 | 486 | 232 | 89 | 53 | 11 | 264 | 249 | 308 | 236 | 10 |
| 26 | 507 | 246 | 392 | 224 | 87 | 54 | 35 | 264 | 179 | 369 | 233 | 10 |
| 27 | 476 | 313 | 520 | 216 | 84 | 54 | 11 | 279 | 374 | 432 | 280 | 11 |
| 28 | 383 | 392 | 309 | 205 | 84 | 54 | 11 | 270 | 358 | 411 | 333 | 11 |
| 29 | 307 | 414 | 302 | 201 | ..... | 55 | 11 | 292 | 305 | 358 | 382 | 11 |
| 30 | 120 | 334 | 313 | 197 | ..... | 54 | 38 | 287 | 196 | 303 | 423 | 11 |
| 31 | 87 | ..... | 440 | 194 | ..... | 55 | ..... | 274 | ..... | 209 | 443 | ..... |

*Monthly discharge of Connecticut River at First Lake, near Pittsburg, N. H., for the year ending Sept. 30, 1918.*

[Drainage area, 81.4 square miles.]

| Months. | Observed discharge (second-feet). | | | Gain or lost in storage in First Lake (millions of cubic feet). | Discharge corrected for storage (second-feet). | | Run off (depth in inches on drainage area). |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | | Mean. | Per square mile. | |
| October | 586 | 87 | 359 | − 555.8 | 151 | 1.85 | 2.13 |
| November | 414 | 17 | 133 | + 421.5 | 296 | 3.64 | 4.06 |
| December | 520 | 191 | 366 | − 772.3 | 78 | .958 | 1.10 |
| January | 407 | 194 | 292 | − 615.0 | 62 | .762 | .88 |
| February | 194 | 84 | 140 | − 215.9 | 51 | .627 | .65 |
| March | 84 | 52 | 70.9 | − 29.1 | 60 | .737 | .85 |
| April | 38 | 7 | 13.0 | + 838.6 | 337 | 4.14 | 4.62 |
| May | 292 | 13 | 176 | + 934.2 | 525 | 6.45 | 7.44 |
| June | 376 | 17 | 268 | − 266.6 | 165 | 2.03 | 2.26 |
| July | 443 | 15 | 256 | + 156.6 | 314 | 3.86 | 4.45 |
| August | 547 | 193 | 368 | − 754.7 | 86 | 1.06 | 1.18 |
| September | 457 | 10 | 272 | − 201.7 | 194 | 2.38 | 2.66 |
| The year | 586 | 7 | 228 | − 1,060.2 | 193 | 2.38 | 32.28 |

NOTE.—Not corrected for effect of storage in Second Lake.

### CONNECTICUT RIVER AT ORFORD, N. H.

LOCATION.—At covered highway bridge between Orford, N. H., and Fairlee, Vt., 10 miles downstream (by river) from mouth of Waits River.

DRAINAGE AREA.—3,100 square miles.

RECORDS AVAILABLE.—August 6, 1900, to September 30, 1918.

GAGES.—Inclined staff on left bank 25 feet below bridge; chain attached to upstream side of bridge is also used at certain stages.

DISCHARGE MEASUREMENTS.—Open-water measurements made from cable.

CHANNEL AND CONTROL.—Channel wide and deep, with gravelly bottom; control for high stages is at the dam at Wilder, 20 miles below station.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 21.5 feet at 7 a. m. April 3 (discharge, 29,300 second-feet); minimum stage recorded, 3.08 feet at 6 p. m. August 30 (discharge, 920 second-feet).

1900–1918: Maximum stage recorded, 33.4 feet at 12 noon March 28, 1913 (discharge, by extension of rating curve, about 57,300 second-feet); minimum 24-hour discharge, 288 second-feet, September 28, 1908.

ICE.—Stage-discharge relation seriously affected by ice, usually from December to March; ice cover usually remains in place throughout the 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 plants above the station, but the operation of these mills does not seriously affect the distribution of flow.

ACCURACY.—Stage-discharge relation affected at times by use of flashboards at Wilder dam and, during the winter, by ice. Several rating curves were used during the year, depending upon the condition of flashboards. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Discharge measurements of Connecticut River at Orford, N. H., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 9 | M. R. Stackpole | 8.46 | 5,380 | Apr. 6 | H. W. Fear | 16.85 | 19,700 |
| 9 | do | 8.38 | 5,460 | 15 | M. R. Stackpole | 11.71 | 10,400 |
| Nov. 1 | do | 19.72 | 25,400 | 15 | do | 11.82 | 10,900 |
| 10 | do | 7.89 | 5,030 | May 23 | do | 7.72 | 5,230 |
| Dec. 3 | H. W. Fear | [a] 7.00 | 2,650 | June 14 | H. W. Fear | 7.04 | 4,420 |
| Jan. 3 | M. R. Stackpole | [a] 5.48 | 1,460 | 14 | do | 7.21 | 4,780 |
| 23 | do | [a] 5.90 | 1,540 | July 21[b] | C. H. Pierce | 6.22 | 2,340 |
| Feb. 14 | do | [a] 5.70 | 1,290 | 22[c] | H. W. Fear | 5.86 | 2,310 |
| Mar. 8 | do | [a] 7.90 | 2,820 | Aug. 22[c] | J. W. Moulton | 3.86 | 1,390 |
| 21 | do | [a] 8.52 | 3,360 | Sept. 2[c] | do | 4.46 | 1,570 |

[a] Stage-discharge relation affected by ice.
[b] 5 feet of flashboards on dam at Wilder; mill not running (Sunday).
[c] 5 feet of flashboards on dam at Wilder; mill in operation.

*Daily discharge, in second-feet, of Connecticut River at Orford, N. H., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,350 | 24,300 | 2,070 | 1,720 | 1,250 | 4,800 | 20,300 | 16,700 | 4,840 | 2,850 | 1,770 | 1,260 |
| 2 | 2,840 | 23,100 | 2,510 | 1,590 | 1,200 | 4,580 | 24,700 | 20,500 | 5,460 | 2,950 | 2,430 | 1,670 |
| 3 | 3,020 | 18,000 | 2,670 | 1,590 | 1,200 | 4,360 | 28,900 | 20,500 | 5,080 | 2,850 | 2,220 | 2,310 |
| 4 | 3,020 | 11,900 | 2,670 | 1,410 | 1,200 | 3,700 | 26,000 | 16,400 | 2,850 | 2,470 | 1,920 | 1,840 |
| 5 | 3,500 | 8,800 | 2,510 | 1,410 | 1,250 | 3,300 | 22,700 | 12,600 | 2,380 | 2,110 | 1,820 | 1,780 |
| 6 | 4,920 | 7,340 | 2,510 | 1,530 | 1,350 | 3,200 | 20,300 | 10,400 | 2,030 | 1,950 | 1,670 | 1,620 |
| 7 | 6,480 | 6,370 | 2,350 | 1,470 | 1,250 | 3,020 | 16,500 | 9,770 | 2,110 | 2,030 | 1,620 | 1,520 |
| 8 | 6,000 | 5,850 | 2,070 | 1,590 | 1,250 | 2,750 | 15,000 | 9,920 | 3,050 | 2,110 | 1,970 | 1,520 |
| 9 | 5,280 | 5,460 | 2,070 | 1,470 | 1,250 | 2,590 | 15,700 | 10,100 | 5,460 | 2,500 | 3,630 | 1,720 |
| 10 | 5,040 | 4,840 | 2,070 | 1,530 | 1,150 | 2,590 | 17,000 | 8,600 | 5,330 | 2,710 | 8,520 | 2,310 |
| 11 | 4,800 | 4,720 | 1,930 | 1,590 | 1,150 | 2,430 | 15,000 | 9,770 | 3,710 | 2,860 | 7,120 | 2,700 |
| 12 | 4,140 | 4,240 | 1,790 | 1,590 | 1,150 | 2,350 | 12,800 | 11,300 | 2,650 | 3,100 | 4,940 | 2,380 |
| 13 | 4,140 | 4,020 | 1,590 | 1,590 | 1,150 | 2,210 | 11,200 | 10,700 | 3,710 | 3,100 | 3,910 | 1,670 |
| 14 | 4,580 | 3,800 | 1,530 | 1,590 | 1,200 | 2,210 | 10,600 | 13,300 | 4,500 | 3,100 | 3,140 | 1,350 |
| 15 | 4,360 | 3,400 | 1,590 | 1,470 | 1,250 | 2,210 | 10,600 | 17,800 | 5,330 | 3,540 | 3,050 | 1,520 |
| 16 | 4,360 | 3,200 | 1,720 | 1,350 | 1,350 | 2,000 | 12,600 | 17,400 | 5,080 | 4,430 | 3,320 | 1,960 |
| 17 | 4,800 | 3,100 | 1,790 | 1,530 | 1,590 | 2,070 | 15,000 | 14,200 | 4,380 | 4,330 | 2,620 | 2,540 |
| 18 | 5,280 | 3,000 | 1,860 | 1,530 | 1,720 | 2,210 | 16,900 | 10,100 | 3,710 | 3,630 | 2,240 | 2,540 |
| 19 | 4,580 | 3,000 | 1,860 | 1,530 | 2,000 | 2,280 | 16,700 | 8,020 | 3,270 | 3,100 | 1,960 | 2,700 |
| 20 | 4,250 | 3,000 | 2,000 | 1,650 | 2,000 | 2,590 | 13,600 | 6,900 | 3,050 | 2,710 | 1,520 | 3,620 |
| 21 | 4,580 | 2,910 | 2,140 | 1,650 | 2,280 | 3,400 | 10,800 | 6,360 | 2,650 | 2,430 | 1,370 | 6,220 |
| 22 | 4,800 | 3,000 | 2,140 | 1,590 | 2,590 | 5,280 | 11,600 | 5,840 | 2,650 | 2,360 | 1,210 | 10,100 |
| 23 | 4,580 | 3,000 | 2,280 | 1,470 | 2,750 | 7,320 | 14,100 | 5,080 | 3,600 | 2,030 | 1,160 | 10,200 |
| 24 | 4,030 | 2,910 | 2,140 | 1,410 | 2,930 | 8,040 | 15,000 | 4,840 | 4,610 | 1,720 | 1,160 | 8,600 |
| 25 | 4,250 | 2,730 | 2,210 | 1,410 | 2,840 | 8,530 | 15,400 | 4,260 | 5,700 | 1,620 | 1,210 | 7,600 |
| 26 | 5,280 | 2,550 | 2,140 | 1,410 | 2,840 | 9,180 | 14,000 | 2,850 | 5,700 | 1,580 | 1,060 | 9,320 |
| 27 | 5,520 | 2,460 | 1,860 | 1,410 | 3,920 | 9,050 | 11,900 | 2,650 | 4,720 | 1,520 | 1,210 | 14,800 |
| 29 | 5,640 | 2,190 | 1,860 | 1,470 | 4,590 | 8,160 | 10,200 | 4,610 | 3,930 | 1,430 | 1,010 | 17,800 |
| 29 | 5,760 | 2,020 | 1,860 | 1,410 | ..... | 8,160 | 10,600 | 4,840 | 3,050 | 1,430 | 1,010 | 16,300 |
| 30 | 6,960 | 2,020 | 1,720 | 1,410 | ..... | 9,440 | 12,600 | 4,960 | 2,650 | 1,430 | 910 | 12,100 |
| 31 | 21,800 | ..... | 1,720 | 1,300 | ..... | 12,500 | ..... | 4,380 | ..... | 1,520 | 1,060 | ..... |

NOTE.—Stage-discharge relation affected by ice from Nov. 24 to Mar 31; daily discharge determined from gage heights corrected for effect of ice by means of six discharge measurements, observer's notes, and weather records.

*Monthly discharge of Connecticut River at Orford, N. H., for the year ending Sept. 30, 1918.*

[Drainage area, 3,100 square miles.]

| Month. | Observed discharge (second-feet). | | | Gain or loss in storage at First Connecticut Lake (millions of cubic feet). | Discharge corrected for storage (second-feet). | | Run-off. (depth in inches on drainage area). |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | | Mean. | Per square mile. | |
| October | 21,800 | 2,350 | 5,190 | − 555.8 | 4,980 | 1.61 | 1.86 |
| November | 24,300 | 2,020 | 5,910 | + 421.5 | 6,070 | 1.96 | 2.19 |
| December | 2,670 | 1,530 | 2,040 | − 772.3 | 1,750 | .565 | .65 |
| January | 1,720 | 1,300 | 1,510 | − 615.0 | 1,280 | .413 | .48 |
| February | 4,590 | 1,150 | 1,840 | − 215.9 | 1,750 | .565 | .59 |
| March | 12,500 | 2,000 | 4,730 | − 29.1 | 4,720 | 1.52 | 1.75 |
| April | 28,900 | 10,200 | 15,600 | + 838.6 | 15,900 | 5.13 | 5.72 |
| May | 20,500 | 2,650 | 9,860 | + 934.2 | 10,200 | 3.29 | 3.79 |
| June | 5,700 | 2,030 | 3,910 | − 266.6 | 3,810 | 1.23 | 1.37 |
| July | 4,430 | 1,430 | 2,500 | + 156.6 | 2,440 | .787 | .91 |
| August | 8,520 | 910 | 2,380 | − 754.7 | 2,100 | .677 | .78 |
| September | 17,800 | 1,260 | 5,120 | − 201.7 | 5,040 | 1.63 | 1.82 |
| The year | 28,900 | 910 | 5,050 | −1,060.2 | 5,020 | 1.62 | 21.91 |

### 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 a direct line and 24 miles by river above dam at Holyoke. Deerfield River enters from west about 8 miles above station.

DRAINAGE AREA.—8,000 square miles.

RECORDS AVAILABLE.—March 31, 1904, to September 30, 1918.

GAGES.—Chain on downstream side of bridge read by V. Lawer. Sanborn water-stage recorder installed September 3, 1916.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 21.6 feet at 6 p. m. April 3 (discharge, 70,200 second-feet); minimum stage recorded, 0.6 foot at 6 a. m. August 26 (discharge, 700 second-feet).

1904–1918: Maximum stage recorded, 30.7 feet during the night of March 28, 1913, determined by leveling from flood marks (discharge, computed from extension of rating curve,[1] about 108,000 second-feet); minimum stage recorded, 0.6 foot September 28, 1914, and August 26, 1918 (discharge, 700 second-feet).

ICE.—The river usually freezes over early in the winter, but the 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 the station, causing several feet of backwater at the 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.) The effect of the regulation is shown by low water at the gage on Sundays and Mondays. Storage in Somerset reservoir and First Connecticut Lake has little effect on the monthly discharge as measured at Sunderland.

[1] Taken from revised rating curve and supersedes figures published in previous reports.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve (fig. 1) used in revision of records is well defined between 1,000 and 75,000 second-feet. Chain gage read to half-tenths twice daily; gage heights from water-stage recorder used for stages below 10.0 feet (24,700 second-feet). Daily discharge ascertained by applying gage height to rating table and making correction for effect of ice during winter. Records previously published have been revised by means of a more accurately determined rating curve making use of all discharge measurements. Records good.

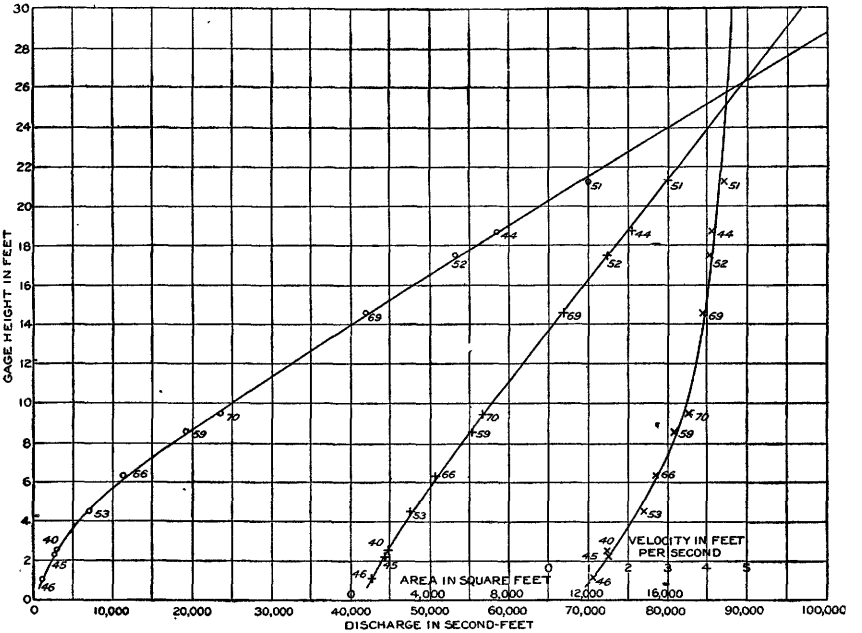



FIGURE 1.—Rating curves for Connecticut River at Sunderland, Mass. Measurements 40–70 were made during period 1913–1919. Measurements made when stage-discharge relation was affected by ice not shown on diagram.

*Discharge measurements of Connecticut River at Sunderland, Mass., during 1913–1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| 1913. | | *Feet.* | *Sec.-ft.* | 1916. | | *Feet.* | *Sec.-ft.* |
| Aug. 10 | C. H. Pierce | 2.54 | 2,940 | Jan. 22 | Pierce and Barnes | a 9.03 | c 8,500 |
| 1914. | | | | Feb. 1 | R. S. Barnes | a 16.94 | 46,800 |
| Jan. 17 | R. S. Barnes | a 4.20 | 4,700 | 4 | do | a 15.88 | 33,500 |
| Mar. 5 | Pierce and Barnes | a 13.42 | 26,400 | Mar. 24 | Hardin Thweatt | a 8.27 | 8,490 |
| Apr. 30 | do | 18.69 | 58,400 | 31 | do | a 19.05 | 50,900 |
| Aug. 20 | C. H. Pierce | 2.22 | 2,530 | Dec. 7 | A. H. Davison | 8.60 | 19,300 |
| Nov. 2 | R. S. Barnes | 1.10 | 1,180 | 1917. | | | |
| Dec. 22 | do | a 3.60 | 2,760 | Jan. 3 | A. H. Davison | a 5.92 | 6,490 |
| 1915. | | | | Feb. 1 | do | a 6.36 | 6,700 |
| Jan. 9 | R. S. Barnes | a 5.88 | 5,780 | Mar. 3 | do | a 8.44 | 10,600 |
| Feb. 7 | do | a 6.45 | 7,800 | 1918. | | | |
| 24 | do | a 7.15 | 9,040 | Jan. 9 | M. R. Stackpole | a 5.27 | 4,450 |
| 27 | do | 21.27 | b 70,000 | Feb. 11 | do | a 3.53 | 1,680 |
| 28 | do | 17.50 | b 53,200 | Mar. 17 | do | a 7.40 | 6,330 |
| Sept. 25 | Hardin Thweatt | 4.48 | 7,050 | June 12 | H. W. Fear | 6.31 | 11,300 |

a Stage-discharge relation affected by ice.
b Measurement recomputed since publication in Water-Supply Papers 401 and 415.
c Partly estimated.

NOTE.—Two discharge measurements obtained in April, 1919, were used in determining the rating curve.

*Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1904. | | | | | | | | | | | | |
| 1 | ..... | ..... | ..... | ..... | ..... | ..... | 34,200 | 62,100 | 12,000 | 5,410 | 4,400 | 3,850 |
| 2 | ..... | ..... | ..... | ..... | ..... | ..... | 42,000 | 54,900 | 9,240 | 6,950 | 3,500 | 3,500 |
| 3 | ..... | ..... | ..... | ..... | ..... | ..... | 43,100 | 48,600 | 9,240 | 6,950 | 3,330 | 3,020 |
| 4 | ..... | ..... | ..... | ..... | ..... | ..... | 36,100 | 44,700 | 8,960 | 5,830 | 3,670 | 2,720 |
| 5 | ..... | ..... | ..... | ..... | ..... | ..... | 31,200 | 40,800 | 8,160 | 5,200 | 3,850 | 2,720 |
| 6 | ..... | ..... | ..... | ..... | ..... | ..... | 31,500 | 36,100 | 7,660 | 4,990 | 3,670 | 3,330 |
| 7 | ..... | ..... | ..... | ..... | ..... | ..... | 34,200 | 33,100 | 9,240 | 4,790 | 3,500 | 3,330 |
| 8 | ..... | ..... | ..... | ..... | ..... | ..... | 38,800 | 29,600 | 11,000 | 4,790 | 3,330 | 5,200 |
| 9 | ..... | ..... | ..... | ..... | ..... | ..... | 47,000 | 26,600 | 15,700 | 4,590 | 2,450 | 5,200 |
| 10 | ..... | ..... | ..... | ..... | ..... | ..... | 56,900 | 25,500 | 17,400 | 4,400 | 3,170 | 4,790 |
| 11 | ..... | ..... | ..... | ..... | ..... | ..... | 58,100 | 25,800 | 13,300 | 4,030 | 3,670 | 4,400 |
| 12 | ..... | ..... | ..... | ..... | ..... | ..... | 54,100 | 28,100 | 10,100 | 3,670 | 3,500 | 4,030 |
| 13 | ..... | ..... | ..... | ..... | ..... | ..... | 48,600 | 28,500 | 8,420 | 3,170 | 2,720 | 3,670 |
| 14 | ..... | ..... | ..... | ..... | ..... | ..... | 42,300 | 26,200 | 7,910 | 3,330 | 2,580 | 3,500 |
| 15 | ..... | ..... | ..... | ..... | ..... | ..... | 35,700 | 22,100 | 6,950 | 3,170 | 2,450 | 13,000 |
| 16 | ..... | ..... | ..... | ..... | ..... | ..... | 30,000 | 22,500 | 6,270 | 3,170 | 1,960 | 19,900 |
| 17 | ..... | ..... | ..... | ..... | ..... | ..... | 26,200 | 25,100 | 5,830 | 3,170 | 3,020 | 14,700 |
| 18 | ..... | ..... | ..... | ..... | ..... | ..... | 24,700 | 28,100 | 5,410 | 3,670 | 3,020 | 13,300 |
| 19 | ..... | ..... | ..... | ..... | ..... | ..... | 25,500 | 32,700 | 4,400 | 3,330 | 3,170 | 12,000 |
| 20 | ..... | ..... | ..... | ..... | ..... | ..... | 25,100 | 42,300 | 3,850 | 3,500 | 3,670 | 9,520 |
| 21 | ..... | ..... | ..... | ..... | ..... | ..... | 23,200 | 44,300 | 4,030 | 3,330 | 8,420 | 7,660 |
| 22 | ..... | ..... | ..... | ..... | ..... | ..... | 21,700 | 40,000 | 4,210 | 3,020 | 7,910 | 6,950 |
| 23 | ..... | ..... | ..... | ..... | ..... | ..... | 22,100 | 33,800 | 3,850 | 2,720 | 8,160 | 8,160 |
| 24 | ..... | ..... | ..... | ..... | ..... | ..... | 23,200 | 27,400 | 3,670 | 2,080 | 7,910 | 9,240 |
| 25 | ..... | ..... | ..... | ..... | ..... | ..... | 26,200 | 22,500 | 3,670 | 2,720 | 8,160 | 8,420 |
| 26 | ..... | ..... | ..... | ..... | ..... | ..... | 32,700 | 20,300 | 3,670 | 3,020 | 7,180 | 7,910 |
| 27 | ..... | ..... | ..... | ..... | ..... | ..... | 36,900 | 19,500 | 3,670 | 2,720 | 6,720 | 11,000 |
| 28 | ..... | ..... | ..... | ..... | ..... | ..... | 47,800 | 17,800 | 3,500 | 2,870 | 5,830 | 12,000 |
| 29 | ..... | ..... | ..... | ..... | ..... | ..... | 68,500 | 15,300 | 3,670 | 3,020 | 4,790 | 12,000 |
| 30 | ..... | ..... | ..... | ..... | ..... | ..... | 69,300 | 14,000 | 4,030 | 3,170 | 4,210 | 13,600 |
| 31 | ..... | ..... | ..... | ..... | ..... | 37,700 | ..... | 13,300 | ..... | 3,670 | 4,030 | ..... |
| 1904–5. | | | | | | | | | | | | |
| 1 | 18,400 | 9,520 | 6,950 | 2,300 | 2,100 | 2,000 | 93,300 | 22,100 | 8,690 | 12,000 | 27,000 | 7,180 |
| 2 | 17,800 | 8,690 | 6,950 | 2,600 | 2,000 | 2,000 | 79,200 | 22,500 | 7,660 | 9,520 | 21,400 | 10,100 |
| 3 | 18,400 | 8,420 | 8,420 | 2,700 | 2,000 | 2,000 | 63,700 | 21,400 | 6,950 | 7,420 | 17,400 | 16,400 |
| 4 | 18,100 | 7,910 | 9,240 | 2,700 | 2,000 | 2,000 | 53,300 | 20,300 | 6,490 | 13,600 | 15,700 | 33,800 |
| 5 | 16,000 | 7,660 | 7,660 | 2,700 | 1,900 | 2,000 | 45,500 | 19,500 | 6,270 | 22,100 | 12,600 | 42,300 |
| 6 | 14,000 | 7,420 | 7,180 | 2,700 | 2,000 | 2,100 | 45,500 | 20,300 | 6,950 | 21,700 | 8,960 | 35,000 |
| 7 | 11,300 | 6,720 | 7,420 | 2,700 | 2,000 | 2,200 | 49,400 | 21,000 | 7,180 | 17,000 | 7,910 | 27,700 |
| 8 | 9,810 | 6,950 | 7,180 | 2,600 | 2,100 | 2,200 | 43,900 | 21,000 | 8,960 | 12,600 | 7,660 | 22,500 |
| 9 | 8,690 | 6,490 | 7,180 | 2,900 | 2,100 | 2,300 | 37,700 | 20,600 | 9,810 | 9,520 | 6,950 | 18,100 |
| 10 | 8,160 | 6,270 | 6,720 | 3,000 | 2,200 | 2,300 | 33,800 | 19,500 | 8,960 | 7,660 | 6,270 | 14,700 |
| 11 | 8,420 | 5,830 | 5,200 | 3,200 | 2,000 | 2,400 | 38,400 | 18,800 | 7,910 | 7,180 | 6,720 | 12,000 |
| 12 | 9,240 | 5,620 | 4,800 | 3,200 | 2,000 | 2,400 | 49,000 | 17,400 | 6,720 | 6,270 | 8,420 | 12,600 |
| 13 | 9,810 | 5,200 | 4,400 | 3,300 | 2,200 | 2,600 | 47,800 | 16,700 | 6,720 | 5,830 | 8,420 | 17,400 |
| 14 | 9,520 | 5,200 | 4,000 | 3,300 | 2,300 | 2,600 | 42,300 | 16,000 | 7,420 | 5,620 | 7,910 | 16,700 |
| 15 | 9,520 | 5,830 | 3,700 | 3,200 | 2,300 | 2,600 | 38,400 | 14,700 | 8,420 | 5,200 | 7,420 | 13,300 |
| 16 | 9,240 | 5,830 | 3,300 | 3,000 | 2,300 | 2,600 | 34,600 | 15,000 | 8,960 | 4,790 | 7,660 | 11,000 |
| 17 | 8,160 | 5,830 | 3,200 | 3,000 | 2,300 | 2,600 | 30,800 | 16,700 | 8,960 | 4,590 | 12,600 | 9,520 |
| 18 | 8,160 | 5,200 | 2,700 | 2,900 | 2,300 | 2,600 | 27,400 | 16,700 | 7,660 | 4,990 | 16,000 | 9,810 |
| 19 | 7,420 | 4,790 | 2,900 | 2,700 | 2,000 | 2,900 | 24,000 | 16,000 | 6,720 | 4,990 | 14,000 | 39,200 |
| 20 | 7,180 | 5,200 | 2,700 | 2,700 | 2,200 | 4,000 | 21,000 | 14,700 | 6,950 | 5,410 | 11,300 | 39,200 |
| 21 | 7,420 | 5,200 | 2,600 | 2,600 | 2,100 | 5,200 | 19,900 | 13,600 | 7,910 | 5,830 | 8,960 | 34,200 |
| 22 | 25,500 | 6,050 | 2,400 | 2,300 | 2,100 | 5,600 | 22,500 | 12,600 | 15,000 | 5,830 | 7,910 | 33,100 |
| 23 | 22,500 | 7,420 | 2,400 | 2,600 | 2,000 | 6,000 | 27,000 | 12,600 | 16,700 | 5,620 | 6,490 | 27,000 |
| 24 | 18,800 | 7,180 | 2,400 | 2,600 | 2,000 | 7,900 | 28,500 | 11,700 | 13,300 | 4,790 | 5,620 | 21,700 |
| 25 | 15,700 | 6,950 | 2,200 | 2,600 | 2,000 | 12,300 | 27,400 | 10,700 | 9,810 | 4,790 | 5,410 | 17,400 |
| 26 | 15,300 | 6,490 | 2,400 | 2,600 | 1,900 | 31,200 | 24,700 | 8,960 | 8,420 | 4,400 | 4,790 | 14,700 |
| 27 | 11,700 | 6,490 | 2,600 | 2,600 | 2,000 | 61,300 | 22,500 | 8,420 | 9,520 | 4,210 | 4,790 | 12,600 |
| 28 | 12,300 | 6,490 | 2,600 | 2,600 | 2,000 | 73,800 | 21,000 | 7,660 | 9,520 | 4,210 | 4,400 | 11,700 |
| 29 | 12,000 | 6,720 | 2,600 | 2,300 | ..... | 73,400 | 20,300 | 8,690 | 11,300 | 4,030 | 4,210 | 10,700 |
| 30 | 10,700 | 7,180 | 2,600 | 2,300 | ..... | 84,200 | 21,000 | 10,700 | 13,000 | 4,030 | 4,790 | 10,100 |
| 31 | 10,100 | ..... | 2,600 | 2,200 | ..... | 92,400 | ..... | 9,810 | ..... | 10,700 | 6,950 | ..... |

*Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1905–6. | | | | | | | | | | | | |
| 1 | 8,960 | 6,050 | 15,300 | 18,100 | 15,300 | 16,700 | 26,200 | 22,500 | 36,900 | 10,700 | 8,690 | 5,830 |
| 2 | 8,160 | 6,050 | 12,000 | 17,000 | 14,300 | 15,000 | 22,500 | 22,500 | 28,100 | 17,400 | 8,420 | 4,790 |
| 3 | 8,420 | 6,050 | 13,300 | 14,000 | 14,000 | 14,700 | 19,200 | 26,600 | 22,500 | 16,700 | 7,660 | 4,210 |
| 4 | 7,910 | 6,490 | 37,300 | 13,300 | 9,500 | 24,700 | 19,200 | 31,500 | 21,000 | 15,000 | 7,910 | 3,670 |
| 5 | 7,660 | 7,180 | 30,800 | 14,700 | 9,800 | 30,000 | 24,000 | 30,000 | 19,900 | 14,000 | 7,910 | 3,500 |
| 6 | 7,180 | 7,660 | 24,300 | 15,700 | 10,000 | 24,000 | 30,000 | 27,000 | 18,100 | 13,000 | 6,950 | 4,030 |
| 7 | 6,720 | 9,520 | 20,300 | 14,700 | 10,000 | 19,900 | 31,500 | 26,200 | 17,800 | 11,000 | 6,270 | 4,400 |
| 8 | 6,270 | 12,300 | 17,000 | 14,000 | 10,000 | 17,400 | 27,400 | 25,500 | 19,500 | 9,240 | 6,490 | 4,210 |
| 9 | 5,620 | 11,700 | 15,300 | 13,300 | 10,000 | 16,700 | 24,700 | 24,000 | 24,300 | 8,160 | 5,620 | 4,030 |
| 10 | 6,050 | 10,400 | 13,300 | 13,000 | 10,000 | 14,300 | 23,200 | 28,900 | 25,500 | 7,420 | 4,790 | 4,030 |
| 11 | 6,050 | 9,520 | 12,600 | 12,300 | 8,600 | 10,100 | 22,500 | 32,700 | 24,700 | 7,420 | 4,400 | 3,670 |
| 12 | 6,270 | 8,960 | 10,700 | 12,600 | 8,600 | 8,960 | 25,500 | 31,200 | 22,500 | 7,420 | 4,210 | 3,330 |
| 13 | 8,420 | 8,160 | 10,700 | 14,700 | 8,600 | 7,660 | 30,400 | 28,100 | 19,500 | 7,420 | 4,030 | 3,500 |
| 14 | 8,960 | 8,420 | 9,520 | 15,700 | 8,000 | 7,420 | 34,200 | 28,500 | 16,400 | 7,420 | 3,850 | 3,170 |
| 15 | 8,690 | 8,420 | 11,300 | 14,700 | 7,800 | 7,910 | 48,600 | 32,700 | 14,000 | 6,490 | 3,850 | 3,020 |
| 16 | 7,910 | 8,160 | 14,000 | 14,700 | 7,400 | 10,700 | 76,300 | 31,500 | 11,300 | 5,830 | 3,670 | 2,450 |
| 17 | 7,910 | 7,910 | 13,300 | 16,000 | 7,400 | 12,000 | 75,100 | 29,300 | 10,400 | 5,200 | 3,670 | 3,020 |
| 18 | 7,180 | 7,660 | 13,000 | 16,000 | 6,700 | 8,690 | 67,700 | 27,000 | 12,300 | 6,270 | 3,330 | 2,580 |
| 19 | 6,950 | 7,420 | 12,600 | 15,700 | 6,700 | 6,490 | 62,100 | 24,000 | 16,000 | 7,660 | 2,580 | 2,720 |
| 20 | 7,420 | 7,180 | 13,000 | 14,300 | 6,800 | 9,520 | 58,900 | 22,100 | 15,700 | 6,720 | 2,870 | 2,720 |
| 21 | 8,960 | 6,720 | 13,000 | 13,600 | 7,000 | 10,700 | 55,300 | 21,400 | 13,300 | 5,620 | 2,450 | 2,720 |
| 22 | 9,520 | 6,050 | 15,000 | 14,300 | 7,400 | 7,660 | 51,300 | 20,300 | 11,000 | 5,410 | 3,020 | 3,020 |
| 23 | 8,690 | 5,830 | 16,000 | 27,700 | 11,000 | 6,050 | 49,000 | 18,100 | 9,240 | 6,490 | 4,400 | 2,580 |
| 24 | 8,960 | 5,830 | 15,700 | 46,200 | 15,000 | 5,620 | 46,600 | 16,000 | 10,700 | 6,720 | 3,330 | 3,330 |
| 25 | 8,420 | 6,050 | 14,000 | 54,100 | 17,000 | 5,620 | 41,600 | 14,000 | 15,700 | 6,950 | 3,330 | 2,720 |
| 26 | 7,660 | 5,830 | 12,600 | 41,200 | 18,100 | 5,200 | 35,300 | 14,700 | 16,000 | 6,270 | 2,870 | 2,870 |
| 27 | 7,420 | 5,830 | 12,300 | 34,600 | 18,100 | 5,830 | 28,900 | 17,400 | 14,300 | 5,620 | 3,500 | 3,020 |
| 28 | 6,950 | 6,490 | 11,700 | 30,000 | 17,400 | 16,400 | 26,600 | 45,500 | 12,000 | 4,790 | 3,330 | 2,720 |
| 29 | 6,270 | 6,950 | 12,000 | 25,500 | ..... | 26,200 | 22,500 | 68,100 | 10,700 | 4,790 | 3,500 | 2,720 |
| 30 | 5,830 | 15,300 | 15,700 | 19,500 | ..... | 28,100 | 21,700 | 62,900 | 8,960 | 5,830 | 6,050 | 1,960 |
| 31 | 5,830 | ..... | 17,400 | 16,400 | ..... | 27,400 | ..... | 49,000 | ..... | 7,180 | 6,490 | ..... |
| 1906–7. | | | | | | | | | | | | |
| 1 | 2,720 | 6,050 | 7,910 | 5,000 | 5,400 | 4,400 | 55,300 | 49,400 | 12,600 | 12,600 | 6,490 | 2,080 |
| 2 | 2,200 | 5,830 | 7,420 | 5,000 | 5,400 | 4,800 | 49,400 | 52,500 | 11,300 | 13,300 | 7,180 | 2,080 |
| 3 | 2,580 | 5,620 | 6,050 | 5,000 | 4,800 | 4,400 | 40,000 | 54,100 | 14,700 | 14,300 | 8,420 | 2,200 |
| 4 | 2,870 | 5,200 | 6,500 | 7,000 | 5,400 | 4,800 | 33,800 | 53,700 | 19,900 | 15,300 | 9,520 | 2,320 |
| 5 | 2,720 | 4,790 | 6,500 | 20,300 | 5,600 | 4,800 | 30,800 | 53,300 | 17,800 | 16,000 | 9,240 | 4,030 |
| 6 | 2,450 | 4,790 | 6,300 | 19,200 | 5,600 | 5,000 | 32,300 | 48,200 | 20,600 | 14,700 | 8,960 | 6,490 |
| 7 | 1,730 | 4,400 | 5,800 | 17,400 | 5,400 | 4,800 | 30,800 | 40,400 | 20,300 | 12,300 | 8,420 | 6,950 |
| 8 | 3,020 | 4,400 | 5,600 | 18,800 | 5,400 | 4,800 | 27,700 | 35,300 | 17,800 | 10,100 | 7,910 | 8,960 |
| 9 | 2,720 | 4,210 | 5,000 | 17,000 | 5,400 | 4,800 | 25,500 | 32,300 | 15,300 | 8,160 | 7,180 | 7,910 |
| 10 | 3,170 | 4,030 | 5,600 | 14,700 | 4,800 | 4,400 | 24,000 | 28,900 | 13,600 | 7,420 | 6,720 | 6,950 |
| 11 | 3,330 | 3,850 | 5,600 | 14,000 | 5,200 | 4,600 | 22,500 | 27,700 | 13,000 | 7,180 | 6,050 | 6,270 |
| 12 | 3,670 | 4,030 | 5,600 | 13,300 | 5,200 | 4,800 | 21,000 | 27,700 | 11,700 | 7,420 | 5,200 | 6,050 |
| 13 | 3,500 | 4,590 | 5,400 | 10,700 | 5,000 | 5,200 | 21,000 | 27,000 | 10,700 | 11,000 | 4,790 | 6,490 |
| 14 | 4,030 | 4,790 | 5,400 | 11,700 | 4,800 | 5,400 | 21,700 | 24,700 | 9,520 | 10,400 | 4,030 | 6,270 |
| 15 | 5,200 | 4,790 | 5,200 | 11,000 | 4,800 | 5,600 | 24,000 | 21,700 | 7,910 | 8,960 | 3,850 | 6,950 |
| 16 | 5,410 | 4,790 | 4,800 | 9,500 | 4,400 | 5,600 | 26,200 | 20,300 | 7,420 | 8,420 | 4,030 | 6,950 |
| 17 | 4,790 | 4,400 | 5,200 | 8,700 | 3,700 | 4,800 | 25,500 | 28,500 | 6,950 | 8,420 | 3,670 | 6,720 |
| 18 | 4,210 | 4,400 | 5,400 | 7,900 | 4,400 | 7,400 | 24,000 | 36,100 | 6,490 | 8,160 | 3,330 | 5,830 |
| 19 | 4,030 | 6,720 | 5,400 | 7,000 | 4,400 | 10,100 | 23,200 | 33,400 | 6,270 | 7,910 | 3,500 | 4,990 |
| 20 | 4,400 | 12,300 | 5,400 | 6,000 | 4,400 | 15,300 | 21,700 | 30,000 | 6,050 | 6,490 | 2,580 | 4,790 |
| 21 | 7,420 | 13,300 | 5,200 | 6,500 | 4,200 | 20,300 | 19,500 | 26,200 | 6,270 | 6,050 | 2,870 | 4,400 |
| 22 | 6,720 | 13,600 | 5,200 | 6,500 | 4,200 | 21,700 | 18,400 | 22,800 | 8,960 | 6,490 | 3,020 | 4,030 |
| 23 | 6,720 | 14,000 | 4,400 | 6,300 | 4,000 | 27,400 | 18,100 | 19,900 | 13,600 | 5,830 | 3,170 | 4,030 |
| 24 | 6,490 | 13,300 | 5,000 | 5,800 | 3,700 | 49,800 | 22,500 | 17,400 | 12,600 | 5,620 | 3,020 | 8,420 |
| 25 | 6,270 | 11,300 | 5,000 | 5,600 | 4,000 | 40,000 | 42,000 | 15,300 | 10,700 | 7,910 | 2,200 | 9,520 |
| 26 | 6,720 | 9,520 | 5,000 | 5,400 | 4,000 | 28,500 | 48,200 | 14,000 | 8,420 | 8,960 | 2,720 | 9,240 |
| 27 | 7,180 | 8,960 | 5,000 | 4,800 | 4,000 | 22,100 | 55,300 | 13,300 | 7,660 | 7,420 | 2,080 | 8,420 |
| 28 | 7,910 | 8,960 | 5,000 | 5,800 | 4,000 | 26,200 | 62,500 | 16,400 | 7,910 | 6,720 | 2,080 | 7,910 |
| 29 | 7,910 | 8,960 | 5,000 | 5,800 | ..... | 43,100 | 55,300 | 16,700 | 7,910 | 6,050 | 2,720 | 8,960 |
| 30 | 7,660 | 9,240 | 4,600 | 5,800 | ..... | 57,300 | 50,500 | 15,300 | 9,520 | 5,620 | 2,580 | 27,000 |
| 31 | 6,720 | ..... | 4,800 | 5,600 | ..... | 60,900 | ..... | 13,600 | ..... | 5,830 | 2,200 | ..... |

*Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1907–8. | | | | | | | | | | | | |
| 1 | 25,100 | 36,900 | 10,400 | 27,000 | 8,700 | 9,500 | 47,800 | 58,100 | 24,700 | 3,670 | 2,720 | 2,720 |
| 2 | 22,500 | 30,000 | 8,960 | 23,200 | 7,300 | 11,000 | 41,600 | 60,900 | 20,600 | 3,330 | 2,720 | 2,580 |
| 3 | 20,300 | 47,000 | 8,420 | 19,500 | 9,000 | 10,000 | 35,700 | 53,300 | 19,900 | 3,330 | 2,720 | 2,320 |
| 4 | 18,800 | 49,800 | 8,420 | 17,000 | 8,200 | 11,000 | 30,000 | 48,600 | 19,500 | 3,330 | 2,450 | 2,200 |
| 5 | 22,500 | 45,500 | 8,160 | 16,000 | 6,900 | 9,800 | 24,700 | 44,300 | 16,700 | 3,670 | 2,720 | 2,200 |
| 6 | 18,400 | 38,800 | 8,690 | 14,600 | 7,000 | 9,500 | 22,100 | 38,000 | 13,300 | 3,500 | 3,020 | 2,080 |
| 7 | 16,700 | 70,200 | 8,960 | 15,000 | 6,500 | 8,800 | 24,700 | 32,700 | 11,300 | 4,030 | 4,790 | 2,080 |
| 8 | 16,700 | 71,000 | 8,690 | 15,300 | 5,600 | 8,800 | 27,700 | 40,800 | 9,240 | 3,670 | 5,410 | 1,840 |
| 9 | 25,500 | 54,500 | 8,960 | 16,000 | 5,200 | 10,000 | 36,100 | 46,200 | 8,960 | 3,330 | 7,910 | 1,840 |
| 10 | 27,400 | 42,300 | 9,520 | 16,400 | 9,000 | 11,000 | 38,400 | 45,500 | 7,660 | 3,330 | 8,160 | 2,080 |
| 11 | 25,800 | 36,100 | 41,600 | 12,300 | 7,000 | 9,700 | 35,000 | 42,300 | 6,950 | 3,020 | 7,420 | 1,960 |
| 12 | 25,800 | 30,800 | 51,300 | 10,100 | 6,500 | 10,000 | 36,100 | 39,200 | 6,490 | 2,720 | 6,490 | 1,960 |
| 13 | 27,700 | 26,200 | 47,400 | 11,000 | 6,400 | 11,000 | 35,300 | 35,300 | 6,270 | 2,720 | 5,620 | 1,730 |
| 14 | 25,500 | 23,600 | 38,400 | 13,300 | 6,400 | 13,300 | 32,300 | 32,300 | 6,050 | 2,450 | 6,050 | 1,730 |
| 15 | 23,200 | 21,000 | 30,400 | 12,600 | 7,000 | 25,000 | 28,500 | 36,500 | 5,410 | 2,450 | 5,410 | 1,620 |
| 16 | 20,600 | 18,400 | 24,700 | 11,300 | 35,000 | 34,600 | 28,500 | 36,100 | 5,830 | 3,170 | 4,790 | 1,510 |
| 17 | 18,100 | 17,000 | 21,700 | 10,100 | 59,700 | 40,000 | 28,900 | 30,800 | 8,160 | 2,450 | 4,400 | 1,730 |
| 18 | 15,300 | 15,300 | 19,500 | 9,500 | 51,300 | 32,300 | 27,700 | 26,200 | 15,300 | 2,200 | 4,400 | 1,730 |
| 19 | 13,600 | 15,000 | 16,700 | 8,400 | 36,900 | 25,500 | 28,500 | 23,200 | 16,400 | 1,960 | 5,620 | 1,730 |
| 20 | 12,300 | 14,300 | 16,000 | 8,400 | 27,400 | 23,200 | 31,500 | 20,600 | 14,000 | 2,450 | 4,790 | 1,730 |
| 21 | 10,700 | 14,000 | 14,700 | 7,900 | 19,200 | 19,500 | 29,600 | 19,200 | 11,000 | 2,450 | 4,400 | 1,730 |
| 22 | 11,300 | 13,600 | 14,000 | 7,400 | 17,000 | 18,800 | 25,500 | 19,500 | 8,690 | 2,720 | 4,400 | 1,730 |
| 23 | 10,400 | 14,000 | 14,000 | 7,900 | 15,000 | 21,000 | 22,500 | 24,700 | 7,420 | 5,200 | 4,400 | 1,620 |
| 24 | 9,810 | 13,300 | 21,400 | 8,400 | 12,600 | 28,500 | 23,600 | 21,400 | 6,490 | 5,200 | 4,400 | 1,510 |
| 25 | 9,240 | 12,600 | 35,000 | 10,700 | 11,700 | 36,100 | 25,100 | 17,400 | 5,830 | 4,790 | 4,403 | 1,510 |
| 26 | 8,420 | 13,300 | 33,800 | 10,100 | 9,500 | 41,200 | 28,500 | 15,300 | 5,620 | 8,420 | 3,850 | 1,510 |
| 27 | 8,160 | 13,300 | 28,100 | 10,100 | 10,400 | 44,700 | 34,600 | 14,700 | 4,990 | 6,270 | 3,670 | 1,080 |
| 28 | 12,000 | 12,600 | 24,700 | 10,400 | 11,000 | 53,700 | 40,800 | 14,000 | 4,790 | 4,400 | 3,330 | 1,730 |
| 29 | 45,500 | 12,000 | 25,500 | 10,100 | 11,300 | 58,900 | 48,600 | 12,300 | 4,030 | 4,790 | 3,170 | 1,730 |
| 30 | 60,500 | 11,700 | 26,200 | 8,700 | ..... | 63,700 | 53,300 | 12,600 | 4,030 | 3,330 | 3,020 | 1,510 |
| 31 | 48,600 | ..... | 28,500 | 8,300 | ..... | 56,500 | ..... | 20,600 | ..... | 2,720 | 2,720 | ..... |
| 1908–9. | | | | | | | | | | | | |
| 1 | 1,620 | 1,960 | 3,670 | 2,300 | 4,700 | 20,300 | 20,600 | 33,100 | 16,700 | 3,500 | 2,320 | 2,450 |
| 2 | 1,730 | 2,080 | 4,400 | 2,300 | 4,600 | 18,300 | 21,700 | 35,300 | 16,700 | 3,020 | 2,450 | 2,320 |
| 3 | 1,730 | 1,730 | 3,670 | 1,900 | 4,400 | 15,400 | 24,000 | 34,600 | 14,300 | 3,020 | 2,320 | 2,450 |
| 4 | 1,560 | 1,960 | 3,330 | 2,100 | 4,100 | 16,400 | 24,700 | 32,700 | 12,600 | 3,020 | 2,200 | 2,320 |
| 5 | 1,840 | 1,960 | 2,720 | 2,300 | 3,900 | 16,700 | 28,500 | 32,300 | 11,000 | 3,670 | 2,450 | 1,510 |
| 6 | 1,620 | 1,960 | 2,320 | 6,200 | 3,900 | 14,200 | 38,000 | 30,800 | 13,600 | 4,030 | 2,450 | 1,960 |
| 7 | 1,560 | 1,960 | 2,720 | 11,700 | 4,000 | 13,100 | 54,100 | 31,200 | 21,000 | 4,400 | 2,580 | 1,960 |
| 8 | 2,080 | 1,240 | 3,020 | 12,300 | 7,200 | 13,100 | 75,100 | 33,400 | 20,600 | 4,120 | 2,450 | 2,200 |
| 9 | 2,200 | 1,960 | 3,850 | 12,000 | 8,700 | 12,100 | 75,100 | 33,800 | 14,000 | 4,030 | 2,720 | 2,200 |
| 10 | 2,200 | 1,730 | 3,850 | 10,900 | 10,100 | 14,200 | 63,300 | 33,100 | 12,000 | 3,670 | 2,320 | 2,200 |
| 11 | 1,960 | 1,840 | 4,400 | 10,400 | 11,500 | 16,300 | 50,100 | 32,300 | 12,300 | 3,670 | 2,450 | 2,580 |
| 12 | 2,080 | 1,960 | 5,830 | 9,500 | 11,300 | 16,300 | 42,000 | 33,800 | 9,520 | 3,850 | 2,200 | 2,450 |
| 13 | 1,840 | 2,200 | 5,200 | 8,200 | 11,000 | 17,200 | 38,400 | 34,600 | 9,520 | 3,330 | 3,020 | 3,020 |
| 14 | 1,960 | 2,200 | 6,050 | 7,300 | 9,600 | 17,900 | 57,300 | 33,800 | 9,520 | 3,170 | 3,330 | 3,020 |
| 15 | 1,960 | 1,730 | 4,990 | 6,500 | 9,700 | 17,000 | 89,100 | 31,500 | 7,420 | 2,870 | 2,720 | 2,720 |
| 16 | 1,840 | 1,960 | 4,790 | 6,000 | 9,200 | 15,700 | 95,400 | 28,500 | 6,490 | 3,020 | 2,580 | 2,450 |
| 17 | 1,730 | 1,960 | 4,790 | 4,600 | 8,600 | 14,700 | 90,000 | 27,000 | 12,600 | 3,020 | 3,670 | 2,450 |
| 18 | 1,400 | 2,320 | 3,200 | 4,700 | 10,400 | 12,600 | 85,000 | 29,600 | 12,000 | 3,020 | 5,410 | 2,200 |
| 19 | 1,840 | 2,580 | 3,200 | 4,500 | 12,300 | 11,300 | 79,600 | 33,100 | 12,600 | 2,720 | 5,620 | 1,560 |
| 20 | 1,840 | 2,450 | 2,600 | 4,500 | 14,200 | 10,100 | 77,100 | 33,800 | 9,810 | 2,450 | 4,400 | 2,320 |
| 21 | 1,620 | 2,450 | 2,800 | 4,400 | 20,300 | 8,690 | 71,800 | 31,900 | 12,300 | 2,320 | 3,500 | 2,320 |
| 22 | 1,840 | 1,730 | 2,400 | 4,400 | 21,000 | 7,910 | 64,500 | 29,300 | 10,100 | 2,450 | 3,020 | 2,450 |
| 23 | 1,730 | 2,450 | 2,600 | 4,500 | 20,300 | 7,910 | 62,100 | 25,500 | 6,950 | 2,580 | 3,170 | 2,200 |
| 24 | 1,730 | 1,840 | 2,500 | 5,200 | 22,500 | 8,160 | 55,700 | 22,800 | 6,720 | 4,030 | 2,720 | 2,080 |
| 25 | 1,180 | 1,960 | 2,300 | 5,600 | 25,300 | 10,100 | 47,800 | 20,600 | 6,720 | 5,200 | 2,870 | 1,840 |
| 26 | 1,730 | 2,450 | 2,500 | 5,900 | 23,200 | 20,300 | 42,000 | 19,200 | 6,490 | 3,330 | 2,720 | 1,290 |
| 27 | 1,730 | 2,720 | 1,900 | 5,600 | 23,200 | 18,800 | 37,700 | 18,100 | 4,210 | 2,450 | 2,450 | 1,620 |
| 28 | 1,960 | 2,450 | 2,400 | 5,200 | 21,400 | 18,800 | 35,000 | 15,300 | 3,670 | 2,320 | 2,720 | 3,500 |
| 29 | 2,200 | 1,840 | 2,400 | 4,900 | ..... | 19,900 | 34,600 | 15,700 | 5,200 | 2,450 | 1,960 | 5,830 |
| 30 | 2,200 | 1,960 | 2,300 | 4,800 | ..... | 19,500 | 32,700 | 17,400 | 5,200 | 2,720 | 2,450 | 6,950 |
| 31 | 2,200 | ..... | 2,300 | 4,000 | ..... | 19,900 | ..... | 17,400 | ..... | 2,720 | 2,870 | ..... |

*Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909–10. | | | | | | | | | | | | |
| 1 | 8,960 | 3,670 | 5,620 | 3,600 | 11,700 | 68,500 | 52,500 | 24,700 | 18,400 | 5,620 | 2,080 | 2,450 |
| 2 | 8,960 | 4,030 | 5,200 | 3,500 | 11,000 | 85,800 | 51,700 | 16,000 | 18,400 | 5,410 | 3,020 | 2,450 |
| 3 | 7,180 | 3,670 | 4,790 | 3,300 | 10,700 | 78,400 | 49,400 | 20,600 | 19,200 | 4,400 | 3,170 | 2,450 |
| 4 | 6,720 | 3,670 | 4,790 | 3,200 | 11,700 | 68,500 | 42,700 | 21,700 | 18,100 | 4,210 | 3,020 | 1,510 |
| 5 | 5,830 | 3,500 | 4,590 | 3,000 | 10,400 | 56,500 | 41,200 | 24,000 | 16,700 | 4,210 | 3,500 | 1,180 |
| 6 | 5,410 | 3,330 | 4,500 | 3,200 | 10,700 | 46,200 | 38,400 | 26,600 | 18,100 | 4,590 | 10,700 | 1,960 |
| 7 | 5,620 | 2,580 | 4,400 | 3,800 | 9,000 | 42,300 | 36,100 | 26,600 | 21,700 | 4,030 | 9,240 | 3,670 |
| 8 | 5,410 | 3,500 | 4,200 | 5,000 | 7,000 | 45,500 | 36,900 | 23,200 | 22,500 | 4,030 | 6,950 | 4,030 |
| 9 | 4,790 | 4,210 | 4,100 | 6,000 | 6,000 | 42,700 | 38,400 | 20,600 | 21,400 | 3,500 | 6,050 | 5,830 |
| 10 | 3,020 | 4,210 | 4,000 | 5,000 | 5,600 | 35,000 | 39,200 | 18,100 | 19,500 | 3,170 | 4,400 | 5,200 |
| 11 | 3,330 | 4,030 | 3,800 | 4,500 | 5,300 | 30,000 | 31,500 | 17,400 | 18,100 | 3,020 | 4,400 | 3,670 |
| 12 | 4,030 | 4,030 | 3,800 | 4,000 | 5,000 | 25,500 | 30,000 | 17,400 | 22,500 | 4,030 | 4,400 | 3,850 |
| 13 | 3,670 | 4,030 | 4,200 | 3,700 | 5,200 | 24,000 | 24,700 | 16,700 | 24,300 | 4,030 | 4,590 | 4,400 |
| 14 | 3,670 | 3,330 | 6,950 | 3,500 | 5,400 | 24,700 | 21,700 | 15,300 | 21,000 | 3,500 | 4,030 | 4,400 |
| 15 | 3,500 | 3,850 | 6,270 | 3,200 | 5,600 | 22,100 | 18,800 | 14,000 | 16,000 | 3,020 | 3,330 | 4,030 |
| 16 | 3,170 | 4,030 | 5,200 | 3,000 | 5,600 | 21,000 | 18,400 | 14,000 | 15,300 | 3,020 | 4,030 | 4,400 |
| 17 | 2,200 | 3,670 | 4,990 | 2,800 | 5,800 | 19,500 | 15,000 | 12,600 | 14,000 | 2,080 | 4,030 | 4,030 |
| 18 | 2,870 | 3,670 | 4,790 | 5,000 | 6,000 | 17,000 | 14,700 | 12,600 | 15,000 | 2,080 | 4,030 | 2,580 |
| 19 | 3,330 | 4,030 | 4,400 | 8,000 | 6,000 | 16,000 | 18,100 | 12,000 | 13,300 | 2,320 | 4,210 | 2,200 |
| 20 | 3,330 | 3,850 | 4,400 | 12,000 | 5,600 | 15,300 | 19,500 | 12,000 | 13,600 | 2,720 | 4,030 | 3,170 |
| 21 | 3,170 | 2,320 | 4,400 | 20,000 | 5,600 | 21,000 | 18,800 | 12,000 | 12,300 | 2,870 | 3,850 | 3,500 |
| 22 | 3,330 | 3,330 | 4,300 | 45,100 | 5,800 | 25,500 | 18,400 | 14,300 | 10,100 | 3,020 | 3,670 | 3,020 |
| 23 | 3,330 | 3,670 | 4,100 | 57,300 | 6,000 | 27,000 | 18,800 | 10,100 | 8,960 | 2,580 | 4,400 | 3,020 |
| 24 | 2,720 | 3,670 | 3,900 | 40,400 | 6,000 | 31,500 | 20,600 | 12,300 | 7,910 | 1,840 | 4,030 | 2,870 |
| 25 | 3,670 | 4,030 | 3,800 | 33,100 | 10,000 | 36,100 | 23,600 | 11,300 | 6,950 | 1,400 | 4,210 | 1,840 |
| 26 | 4,590 | 4,210 | 4,000 | 27,400 | 12,000 | 56,100 | 27,000 | 12,000 | 7,910 | 2,200 | 4,210 | 1,510 |
| 27 | 5,410 | 5,200 | 4,200 | 23,200 | 15,000 | 58,100 | 34,200 | 18,100 | 4,210 | 2,580 | 3,330 | 2,200 |
| 28 | 4,400 | 5,620 | 4,400 | 19,500 | 20,000 | 51,300 | 33,800 | 25,500 | 5,830 | 3,170 | 1,960 | 2,450 |
| 29 | 4,400 | 6,050 | 4,000 | 17,800 | ..... | 49,400 | 31,500 | 25,100 | 5,410 | 3,020 | 1,840 | 2,720 |
| 30 | 4,030 | 6,490 | 3,900 | 15,000 | ..... | 52,500 | 28,100 | 23,200 | 6,050 | 3,020 | 2,450 | 2,450 |
| 31 | 3,330 | ..... | 3,800 | 11,300 | ..... | 53,700 | ..... | 20,300 | ..... | 2,200 | 2,720 | ..... |
| 1910–11. | | | | | | | | | | | | |
| 1 | 5,200 | 4,590 | 3,670 | 5,800 | 6,100 | 5,000 | 22,800 | 47,000 | 5,830 | 4,400 | 4,590 | 8,160 |
| 2 | 5,410 | 4,590 | 4,030 | 6,400 | 5,800 | 5,200 | 16,000 | 51,300 | 6,050 | 2,720 | 4,590 | 7,180 |
| 3 | 4,790 | 4,790 | 4,030 | 10,000 | 5,200 | 5,400 | 12,600 | 53,700 | 6,050 | 1,840 | 4,400 | 6,950 |
| 4 | 4,400 | 5,620 | 2,450 | 30,000 | 4,600 | 5,900 | 12,600 | 50,100 | 4,990 | 1,510 | 4,400 | 4,030 |
| 5 | 4,400 | 6,490 | 2,320 | 26,000 | 4,200 | 4,000 | 11,000 | 44,700 | 5,830 | 1,960 | 3,850 | 3,020 |
| 6 | 4,400 | 9,520 | 2,500 | 19,600 | 4,600 | 4,600 | 12,600 | 39,200 | 6,270 | 2,200 | 2,200 | 4,790 |
| 7 | 4,400 | 8,960 | 3,800 | 17,000 | 4,800 | 4,800 | 34,200 | 31,200 | 6,490 | 2,450 | 2,200 | 5,200 |
| 8 | 4,400 | 8,420 | 3,000 | 15,000 | 4,800 | 5,000 | 49,400 | 22,800 | 7,910 | 2,320 | 2,870 | 4,400 |
| 9 | 2,870 | 7,910 | 2,600 | 13,700 | 4,600 | 5,000 | 49,400 | 21,400 | 6,720 | 1,510 | 3,170 | 5,830 |
| 10 | 2,450 | 6,950 | 2,300 | 12,000 | 4,500 | 6,000 | 41,200 | 20,600 | 8,960 | 1,290 | 2,870 | 11,700 |
| 11 | 4,030 | 6,050 | 1,800 | 10,700 | 4,000 | 6,900 | 34,200 | 20,300 | 6,050 | 2,200 | 2,450 | 7,910 |
| 12 | 4,590 | 5,620 | 1,600 | 9,200 | 2,600 | 4,000 | 32,300 | 19,200 | 3,670 | 3,020 | 2,200 | 6,490 |
| 13 | 4,400 | 4,590 | 2,500 | 9,000 | 3,300 | 3,300 | 32,700 | 18,400 | 9,520 | 2,720 | 1,240 | 6,050 |
| 14 | 4,030 | 3,330 | 2,500 | 8,600 | 3,700 | 5,200 | 37,700 | 18,800 | 9,240 | 2,720 | 1,060 | 5,410 |
| 15 | 3,330 | 5,200 | 2,500 | 8,300 | 3,900 | 6,000 | 48,600 | 13,300 | 8,160 | 2,580 | 1,960 | 5,620 |
| 16 | 1,730 | 4,990 | 2,300 | 8,000 | 4,000 | 6,300 | 58,900 | 13,000 | 7,420 | 1,290 | 1,960 | 5,200 |
| 17 | 1,620 | 4,790 | 2,000 | 7,700 | 4,000 | 6,400 | 53,300 | 12,000 | 6,270 | 1,240 | 2,200 | 3,850 |
| 18 | 2,320 | 4,790 | 1,700 | 7,400 | 4,000 | 6,500 | 47,400 | 11,000 | 6,720 | 2,200 | 2,080 | 6,490 |
| 19 | 2,320 | 4,790 | 1,700 | 7,200 | 2,800 | 5,200 | 40,800 | 12,600 | 6,950 | 2,320 | 1,960 | 5,830 |
| 20 | 2,720 | 3,330 | 2,000 | 6,800 | 3,000 | 4,200 | 38,800 | 9,810 | 6,270 | 2,450 | 1,080 | 5,620 |
| 21 | 2,720 | 3,500 | 2,300 | 6,400 | 3,200 | 6,500 | 37,700 | 8,960 | 5,620 | 2,200 | 1,080 | 5,620 |
| 22 | 2,450 | 4,590 | 2,300 | 6,000 | 4,000 | 7,000 | 37,300 | 8,960 | 5,830 | 2,200 | 1,840 | 5,410 |
| 23 | 1,730 | 5,200 | 2,300 | 6,000 | 4,300 | 7,100 | 35,000 | 7,660 | 5,830 | 1,400 | 1,840 | 4,400 |
| 24 | 1,840 | 4,400 | 2,300 | 6,200 | 4,400 | 7,100 | 30,800 | 7,420 | 5,200 | 1,180 | 2,200 | 2,870 |
| 25 | 3,020 | 2,720 | 2,200 | 6,600 | 4,000 | 6,300 | 33,400 | 6,490 | 3,330 | 2,080 | 2,200 | 2,720 |
| 26 | 3,020 | 3,020 | 2,200 | 7,000 | 3,400 | 6,400 | 35,300 | 6,270 | 2,450 | 2,450 | 3,330 | 3,330 |
| 27 | 3,020 | 1,620 | 2,700 | 7,300 | 4,000 | 6,720 | 38,400 | 6,950 | 4,590 | 2,720 | 2,450 | 4,990 |
| 28 | 2,870 | 2,200 | 3,600 | 7,200 | 4,800 | 36,100 | 39,200 | 4,790 | 4,590 | 3,020 | 2,720 | 4,990 |
| 29 | 3,670 | 2,870 | 4,700 | 6,600 | ..... | 30,800 | 47,000 | 3,020 | 4,400 | 2,580 | 3,850 | 4,590 |
| 30 | 2,870 | 3,330 | 5,600 | 6,600 | ..... | 31,200 | 49,400 | 4,400 | 4,790 | 1,960 | 5,620 | 5,410 |
| 31 | 2,720 | ..... | 5,600 | 7,000 | ..... | 27,700 | ..... | 6,270 | ..... | 3,020 | 7,910 | ..... |

*Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1911–12. | | | | | | | | | | | | |
| 1 | 4,790 | 11,300 | 19,200 | 18,800 | 5,200 | 4,800 | 45,500 | 32,300 | 47,000 | 2,450 | 2,720 | 4,210 |
| 2 | 7,420 | 12,000 | 19,500 | 20,300 | 5,200 | 4,600 | 54,100 | 28,100 | 50,100 | 5,200 | 3,500 | 3,330 |
| 3 | 9,520 | 11,300 | 19,500 | 19,500 | 5,200 | 3,300 | 47,000 | 24,300 | 49,800 | 5,200 | 3,850 | 5,200 |
| 4 | 8,960 | 10,100 | 13,300 | 19,500 | 4,600 | 4,000 | 36,100 | 21,400 | 49,800 | 4,400 | 2,720 | 6,050 |
| 5 | 13,300 | 8,690 | 12,600 | 18,800 | 3,800 | 4,000 | 29,300 | 21,400 | 44,300 | 1,960 | 2,080 | 6,050 |
| 6 | 13,300 | 9,240 | 8,960 | 18,400 | 4,000 | 4,200 | 38,000 | 11,700 | 37,700 | 2,320 | 2,870 | 5,620 |
| 7 | 14,700 | 9,520 | 7,910 | 18,100 | 4,400 | 4,400 | 60,500 | 19,500 | 31,900 | 1,730 | 3,670 | 5,620 |
| 8 | 13,600 | 13,300 | 8,960 | 15,000 | 4,800 | 4,400 | 78,000 | 21,000 | 28,500 | 1,730 | 3,670 | 4,790 |
| 9 | 12,000 | 12,600 | 9,520 | 12,100 | 4,800 | 4,600 | 82,500 | 20,600 | 25,500 | 4,030 | 3,670 | 4,210 |
| 10 | 12,000 | 12,600 | 10,100 | 10,500 | 4,800 | 4,200 | 69,800 | 21,000 | 15,300 | 4,030 | 3,500 | 4,790 |
| 11 | 9,240 | 11,700 | 10,100 | 9,000 | 2,700 | 4,400 | 56,500 | 19,500 | 17,400 | 3,670 | 3,330 | 5,200 |
| 12 | 9,520 | 10,700 | 11,700 | 5,600 | 3,100 | 5,200 | 48,200 | 18,100 | 14,700 | 3,850 | 3,330 | 4,790 |
| 13 | 7,910 | 12,000 | 14,000 | 4,000 | 4,300 | 5,800 | 43,500 | 19,200 | 13,300 | 4,030 | 4,990 | 4,790 |
| 14 | 6,950 | 12,600 | 16,700 | 3,800 | 4,200 | 9,000 | 42,300 | 19,900 | 13,300 | 2,720 | 5,200 | 4,400 |
| 15 | 7,180 | 12,600 | 24,000 | 4,000 | 4,000 | 9,500 | 41,200 | 20,300 | 12,600 | 2,450 | 4,990 | 3,020 |
| 16 | 5,410 | 13,000 | 27,700 | 4,400 | 3,900 | 22,500 | 43,900 | 21,000 | 12,000 | 2,870 | 5,200 | 6,050 |
| 17 | 5,830 | 12,600 | 26,600 | 4,600 | 3,800 | 25,500 | 58,900 | 33,100 | 7,660 | 2,450 | 5,410 | 11,000 |
| 18 | 6,950 | 12,600 | 24,700 | 4,600 | 3,200 | 19,200 | 64,100 | 39,600 | 10,100 | 2,450 | 4,030 | 9,520 |
| 19 | 41,600 | 19,500 | 20,300 | 4,700 | 3,900 | 30,400 | 65,300 | 32,700 | 8,960 | 3,170 | 5,200 | 9,240 |
| 20 | 47,800 | 15,300 | 17,000 | 4,800 | 4,400 | 26,200 | 66,900 | 27,000 | 8,960 | 4,400 | 6,050 | 8,690 |
| 21 | 34,600 | 16,000 | 12,600 | 6,500 | 4,900 | 24,700 | 61,300 | 25,100 | 8,160 | 3,020 | 5,830 | 12,600 |
| 22 | 34,600 | 17,000 | 9,240 | 7,000 | 5,400 | 19,200 | 54,100 | 30,000 | 7,420 | 4,790 | 4,790 | 13,600 |
| 23 | 30,000 | 14,300 | 16,000 | 7,000 | 5,400 | 16,000 | 49,000 | 36,500 | 4,790 | 3,020 | 4,030 | 17,400 |
| 24 | 28,500 | 12,000 | 33,800 | 6,600 | 5,500 | 15,300 | 49,400 | 32,700 | 6,490 | 3,330 | 3,670 | 17,400 |
| 25 | 24,000 | 12,300 | 33,800 | 5,600 | 4,500 | 15,000 | 47,800 | 27,700 | 6,950 | 3,500 | 3,170 | 14,000 |
| 26 | 20,300 | 12,700 | 32,700 | 5,000 | 4,900 | 14,700 | 46,200 | 24,300 | 6,720 | 4,400 | 2,720 | 9,810 |
| 27 | 18,100 | 11,700 | 30,000 | 4,500 | 5,200 | 14,000 | 43,100 | 19,500 | 6,490 | 4,400 | 3,170 | 7,910 |
| 28 | 20,300 | 10,100 | 24,700 | 4,000 | 5,200 | 14,000 | 39,200 | 19,500 | 6,490 | 3,020 | 3,670 | 6,950 |
| 29 | 19,500 | 12,600 | 19,500 | 5,000 | 5,100 | 19,900 | 33,100 | 17,000 | 6,050 | 2,580 | 4,990 | 7,180 |
| 30 | 6,950 | 19,900 | 15,300 | 5,200 | ..... | 40,800 | 34,200 | 22,100 | 2,720 | 2,450 | 5,620 | 5,410 |
| 31 | 10,100 | ..... | 14,000 | 5,200 | ..... | 42,300 | ..... | 41,600 | ..... | 1,960 | 6,490 | ..... |
| 1912–13. | | | | | | | | | | | | |
| 1 | 6,270 | 12,600 | 12,300 | 22,500 | 16,000 | 25,100 | 60,100 | 22,500 | 31,200 | 4,590 | 6,050 | 1,730 |
| 2 | 7,420 | 12,000 | 6,270 | 18,800 | 23,600 | 16,700 | 54,100 | 19,200 | 25,500 | 5,200 | 6,050 | 1,960 |
| 3 | 8,960 | 18,100 | 10,100 | 19,200 | 14,700 | 11,300 | 45,500 | 17,800 | 22,500 | 5,620 | 3,850 | 2,200 |
| 4 | 8,420 | 13,000 | 22,500 | 24,700 | 13,300 | 10,700 | 39,200 | 15,000 | 16,700 | 5,200 | 4,030 | 1,450 |
| 5 | 7,910 | 11,700 | 20,300 | 26,600 | 13,300 | 10,700 | 37,700 | 14,700 | 13,600 | 3,020 | 6,050 | 1,130 |
| 6 | 6,950 | 10,100 | 21,000 | 22,800 | 12,000 | 10,700 | 40,000 | 13,300 | 13,300 | 2,080 | 4,990 | 1,960 |
| 7 | 6,490 | 10,700 | 24,300 | 20,300 | 12,000 | 11,700 | 38,800 | 12,600 | 11,300 | 2,320 | 3,670 | 1,840 |
| 8 | 6,050 | 17,400 | 22,500 | 26,200 | 10,400 | 12,600 | 36,100 | 12,000 | 12,000 | 2,450 | 4,030 | 1,620 |
| 9 | 5,830 | 33,100 | 17,400 | 25,500 | 20,600 | 9,810 | 31,500 | 10,400 | 7,420 | 3,020 | 3,850 | 2,200 |
| 10 | 6,050 | 34,200 | 15,300 | 19,500 | 13,300 | 8,420 | 27,000 | 10,100 | 8,420 | 3,020 | 3,020 | 1,730 |
| 11 | 6,050 | 23,600 | 12,600 | 16,700 | 13,600 | 19,200 | 24,700 | 8,960 | 8,960 | 3,020 | 2,320 | 1,840 |
| 12 | 5,620 | 23,200 | 12,000 | 20,300 | 13,000 | 24,000 | 34,200 | 5,620 | 8,420 | 3,020 | 3,020 | 2,200 |
| 13 | 3,020 | 18,800 | 10,700 | 17,400 | 12,600 | 18,800 | 23,600 | 7,910 | 8,420 | 2,720 | 3,020 | 1,960 |
| 14 | 3,670 | 18,800 | 10,700 | 21,700 | 12,300 | 22,800 | 30,800 | 7,180 | 7,910 | 2,720 | 2,450 | 1,730 |
| 15 | 5,830 | 23,200 | 10,100 | 18,800 | 10,400 | 47,800 | 30,800 | 8,420 | 5,200 | 3,330 | 3,670 | 1,730 |
| 16 | 6,270 | 21,700 | 8,960 | 16,700 | 6,500 | 60,900 | 28,500 | 7,420 | 5,830 | 4,210 | 2,720 | 2,580 |
| 17 | 6,050 | 27,000 | 9,810 | 17,400 | 5,600 | 51,700 | 27,000 | 6,490 | 8,160 | 4,400 | 2,200 | 2,200 |
| 18 | 6,050 | 10,700 | 9,520 | 26,600 | 9,200 | 39,200 | 26,200 | 8,960 | 7,420 | 5,200 | 1,730 | 2,450 |
| 19 | 5,830 | 14,700 | 8,960 | 35,700 | 9,500 | 31,500 | 25,100 | 7,180 | 5,620 | 4,030 | 2,720 | 1,960 |
| 20 | 4,030 | 13,300 | 12,000 | 36,100 | 9,500 | 29,300 | 24,000 | 9,240 | 4,790 | 2,580 | 2,450 | 1,960 |
| 21 | 4,990 | 13,300 | 15,300 | 32,300 | 9,000 | 38,400 | 24,700 | 7,910 | 4,790 | 2,450 | 1,960 | 1,840 |
| 22 | 6,490 | 11,300 | 17,400 | 36,900 | 10,100 | 46,600 | 24,300 | 7,910 | 3,330 | 3,170 | 2,450 | 1,620 |
| 23 | 11,700 | 12,000 | 7,420 | 31,500 | 10,100 | 52,500 | 22,800 | 8,690 | 3,670 | 2,720 | 2,720 | 4,400 |
| 24 | 44,700 | 17,800 | 8,160 | 27,700 | 15,000 | 47,800 | 21,400 | 24,000 | 5,620 | 3,020 | 1,960 | 3,020 |
| 25 | 54,100 | 7,420 | 13,000 | 28,500 | 14,000 | 46,200 | 19,500 | 30,000 | 5,200 | 3,670 | 1,620 | 6,270 |
| 26 | 45,500 | 10,700 | 16,400 | 24,000 | 12,300 | 63,700 | 19,500 | 26,600 | 4,590 | 3,500 | 2,450 | 4,030 |
| 27 | 37,700 | 11,700 | 14,300 | 20,300 | 11,700 | 88,300 | 25,800 | 25,500 | 4,400 | 2,580 | 2,200 | 2,200 |
| 28 | 17,400 | 10,700 | 15,000 | 17,400 | 14,000 | 107,000 | 15,000 | 19,500 | 4,030 | 2,720 | 2,080 | 1,620 |
| 29 | 20,300 | 10,100 | 14,000 | 15,300 | ..... | 104,000 | 25,800 | 28,100 | 2,720 | 4,210 | 2,450 | 1,290 |
| 30 | 15,300 | 9,810 | 12,000 | 13,300 | ..... | 86,200 | 26,200 | 36,100 | 1,960 | 4,400 | 2,870 | 3,500 |
| 31 | 14,700 | ..... | 21,400 | 12,300 | ..... | 69,300 | ..... | 33,400 | ..... | 4,400 | 2,450 | ..... |

*Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1913–14.** | | | | | | | | | | | | |
| 1 | 3,330 | 9,240 | 4,990 | 3,800 | 5,200 | 2,300 | 41,600 | 61,300 | 6,720 | 3,670 | 3,850 | 7,910 |
| 2 | 3,170 | 8,160 | 7,910 | 4,000 | 4,600 | 3,700 | 54,900 | 53,300 | 7,420 | 4,210 | 2,320 | 8,420 |
| 3 | 3,020 | 7,910 | 7,910 | 4,200 | 7,400 | 11,400 | 62,100 | 45,500 | 7,180 | 3,850 | 2,580 | 7,180 |
| 4 | 3,020 | 8,420 | 7,910 | 2,700 | 6,300 | 22,800 | 50,100 | 40,800 | 6,950 | 2,450 | 3,500 | 4,990 |
| 5 | 2,320 | 7,910 | 6,490 | 2,300 | 5,600 | 24,700 | 40,800 | 38,800 | 6,490 | 2,450 | 3,170 | 3,670 |
| 6 | 1,510 | 6,490 | 6,050 | 3,600 | 3,300 | 22,000 | 34,600 | 45,500 | 8,960 | 3,330 | 3,020 | 2,450 |
| 7 | 4,400 | 6,050 | 5,200 | 3,600 | 4,000 | 18,000 | 30,800 | 44,700 | 10,400 | 8,160 | 3,850 | 2,320 |
| 8 | 4,030 | 5,620 | 10,100 | 4,000 | 2,600 | 13,600 | 32,700 | 42,300 | 6,490 | 7,660 | 3,330 | 2,870 |
| 9 | 4,400 | 3,850 | 15,000 | 3,800 | 2,200 | 11,500 | 50,500 | 39,600 | 7,660 | 6,270 | 1,960 | 3,670 |
| 10 | 3,670 | 30,000 | 11,300 | 3,800 | 3,700 | 10,000 | 59,700 | 39,600 | 8,690 | 6,490 | 2,200 | 4,030 |
| 11 | 3,330 | 18,800 | 8,960 | 3,500 | 3,500 | 8,600 | 52,500 | 28,500 | 7,910 | 6,950 | 3,330 | 3,500 |
| 12 | 2,200 | 16,700 | 9,810 | 2,700 | 3,000 | 8,000 | 56,100 | 31,500 | 6,720 | 5,830 | 3,670 | 3,330 |
| 12 | 2,080 | 14,000 | 8,690 | 3,800 | 2,900 | 8,600 | 55,300 | 35,300 | 5,620 | 4,590 | 3,500 | 3,170 |
| 14 | 3,330 | 8,960 | 6,270 | 5,200 | 2,700 | 9,200 | 48,600 | 36,500 | 3,020 | 6,050 | 3,170 | 3,170 |
| 15 | 4,030 | 10,100 | 6,270 | 4,800 | 1,400 | 7,000 | 43,500 | 31,900 | 3,170 | 6,050 | 3,330 | 3,330 |
| 16 | 4,400 | 11,000 | 8,420 | 4,200 | 2,100 | 5,200 | 41,600 | 26,600 | 4,790 | 4,990 | 1,730 | 3,670 |
| 17 | 3,670 | 5,830 | 8,690 | 2,900 | 2,600 | 9,000 | 39,200 | 24,300 | 4,400 | 5,200 | 2,080 | 3,670 |
| 18 | 3,670 | 6,490 | 8,160 | 2,700 | 2,800 | 9,400 | 40,000 | 16,000 | 3,850 | 3,850 | 2,720 | 3,670 |
| 19 | 2,200 | 7,420 | 7,910 | 1,500 | 3,000 | 11,300 | 47,800 | 18,100 | 4,030 | 2,320 | 3,020 | 4,400 |
| 20 | 2,080 | 6,050 | 11,700 | 3,000 | 2,800 | 11,900 | 70,600 | 16,700 | 3,670 | 2,720 | 2,720 | 2,870 |
| 21 | 4,210 | 6,950 | 7,910 | 3,000 | 2,200 | 10,900 | 88,300 | 15,000 | 2,580 | 4,400 | 3,170 | 1,510 |
| 22 | 4,400 | 7,420 | 6,050 | 3,300 | 2,100 | 7,900 | 87,500 | 14,700 | 2,870 | 3,850 | 4,030 | 2,870 |
| 23 | 8,160 | 9,520 | 6,050 | 3,600 | 1,500 | 8,600 | 80,000 | 14,700 | 4,210 | 3,850 | 2,720 | 2,450 |
| 24 | 7,660 | 9,520 | 6,270 | 3,500 | 2,200 | 9,400 | 70,600 | 16,000 | 3,500 | 3,500 | 2,580 | 2,450 |
| 25 | 8,960 | 9,810 | 4,030 | 3,800 | 2,100 | 9,400 | 60,500 | 8,160 | 3,670 | 3,170 | 4,030 | 2,580 |
| 26 | 12,300 | 8,160 | 4,030 | 4,000 | 2,100 | 10,000 | 50,900 | 10,400 | 3,670 | 1,840 | 3,670 | 2,450 |
| 27 | 16,700 | 6,950 | 6,490 | 4,600 | 2,100 | 11,000 | 49,400 | 7,910 | 3,330 | 2,320 | 3,500 | 1,730 |
| 28 | 17,000 | 6,950 | 6,950 | 3,450 | 2,800 | 39,200 | 52,900 | 6,950 | 2,320 | 3,850 | 3,330 | 1,290 |
| 29 | 15,300 | 8,420 | 6,800 | 3,200 | ..... | 50,500 | 52,500 | 8,960 | 2,450 | 3,670 | 2,720 | 2,450 |
| 30 | 13,300 | 4,990 | 6,000 | 4,600 | ..... | 47,400 | 58,100 | 8,960 | 3,850 | 3,500 | 3,170 | 2,320 |
| 31 | 11,300 | ..... | 5,200 | 6,000 | ..... | 40,800 | ..... | 6,050 | ..... | 3,500 | 6,050 | ..... |
| **1914–15.** | | | | | | | | | | | | |
| 1 | 2,200 | 1,730 | 5,620 | 3,330 | 6,050 | 41,600 | 7,660 | 22,100 | 6,490 | 3,670 | 13,300 | 8,960 |
| 2 | 2,450 | 1,450 | 5,620 | 3,170 | 6,050 | 32,700 | 7,660 | 24,700 | 5,620 | 8,690 | 19,200 | 9,240 |
| 3 | 2,580 | 2,080 | 4,790 | 2,870 | 5,830 | 28,500 | 6,950 | 24,000 | 4,590 | 16,000 | 14,300 | 9,520 |
| 4 | 3,020 | 2,720 | 6,050 | 2,580 | 5,830 | 23,600 | 7,910 | 23,200 | 4,990 | 18,400 | 22,500 | 6,950 |
| 5 | 2,200 | 2,870 | 7,180 | 2,320 | 5,830 | 18,100 | 8,160 | 18,400 | 5,200 | 17,800 | 54,900 | 3,020 |
| 6 | 3,500 | 2,720 | 6,270 | 1,960 | 6,950 | 13,300 | 9,810 | 16,700 | 3,330 | 12,000 | 36,100 | 2,450 |
| 7 | 3,020 | 2,720 | 6,050 | 3,020 | 7,660 | 14,700 | 9,810 | 13,600 | 3,330 | 14,300 | 27,400 | 4,210 |
| 8 | 2,720 | 1,290 | 7,660 | 7,910 | 7,910 | 15,000 | 10,100 | 12,600 | 4,210 | 11,700 | 25,100 | 5,830 |
| 9 | 2,450 | 1,510 | 6,050 | 7,420 | 7,420 | 12,600 | 15,000 | 12,000 | 3,330 | 65,300 | 18,100 | 5,410 |
| 10 | 2,870 | 2,720 | 4,990 | 6,950 | 6,720 | 12,600 | 18,800 | 13,000 | 3,670 | 54,100 | 19,200 | 5,620 |
| 11 | 1,620 | 3,330 | 4,400 | 6,050 | 5,830 | 12,300 | 33,800 | 12,600 | 3,500 | 44,700 | 18,800 | 4,790 |
| 12 | 1,400 | 3,330 | 4,400 | 5,830 | 5,200 | 12,000 | 53,300 | 12,000 | 3,330 | 32,700 | 17,400 | 3,670 |
| 13 | 2,320 | 3,670 | 3,020 | 6,050 | 4,590 | 11,300 | 57,300 | 11,000 | 1,740 | 34,600 | 18,800 | 4,030 |
| 14 | 2,200 | 3,670 | 3,670 | 4,030 | 4,400 | 8,690 | 51,700 | 9,240 | 2,200 | 16,400 | 17,800 | 5,200 |
| 15 | 2,200 | 1,730 | 5,410 | 3,850 | 4,210 | 8,160 | 42,700 | 8,420 | 3,170 | 13,300 | 16,000 | 5,200 |
| 16 | 2,080 | 2,320 | 7,420 | 3,850 | 12,000 | 8,960 | 36,900 | 7,420 | 3,670 | 15,300 | 12,000 | 4,400 |
| 17 | 2,200 | 6,270 | 6,270 | 3,170 | 18,100 | 8,160 | 31,900 | 8,420 | 4,400 | 14,700 | 13,300 | 4,400 |
| 18 | 1,730 | 6,720 | 5,200 | 2,580 | 18,800 | 8,690 | 26,200 | 8,420 | 5,200 | 16,000 | 12,300 | 4,400 |
| 19 | 1,400 | 6,950 | 4,400 | 7,180 | 15,700 | 8,960 | 24,000 | 6,490 | 6,270 | 9,240 | 10,400 | 3,170 |
| 20 | 2,450 | 4,990 | 3,330 | 13,000 | 12,600 | 7,660 | 22,500 | 8,420 | 4,400 | 13,300 | 7,910 | 2,870 |
| 21 | 2,720 | 4,790 | 2,080 | 12,300 | 10,700 | 5,620 | 21,000 | 10,100 | 5,410 | 20,300 | 7,180 | 4,400 |
| 22 | 3,020 | 4,030 | 2,870 | 11,700 | 8,960 | 6,720 | 19,500 | 8,960 | 6,950 | 16,400 | 7,910 | 7,180 |
| 23 | 3,170 | 4,030 | 3,020 | 8,160 | 9,240 | 6,950 | 17,000 | 3,330 | 8,420 | 14,000 | 24,000 | 7,180 |
| 24 | 3,020 | 4,990 | 2,580 | 7,910 | 9,520 | 6,950 | 19,500 | 4,400 | 5,830 | 14,700 | 14,700 | 6,490 |
| 25 | 1,960 | 4,590 | 1,960 | 7,420 | 43,100 | 8,420 | 11,300 | 7,180 | 4,590 | 14,000 | 16,700 | 7,180 |
| 26 | 2,200 | 3,170 | 1,330 | 7,180 | 63,700 | 11,300 | 8,960 | 7,910 | 5,200 | 9,520 | 18,100 | 7,180 |
| 27 | 3,500 | 2,720 | 1,740 | 6,950 | 70,200 | 13,600 | 14,700 | 6,720 | 2,720 | 6,270 | 16,700 | 6,490 |
| 28 | 3,330 | 3,330 | 2,080 | 6,720 | 55,700 | 10,700 | 20,300 | 6,050 | 2,450 | 18,800 | 15,300 | 6,270 |
| 29 | 3,330 | 2,320 | 2,450 | 6,490 | ..... | 10,700 | 21,000 | 6,720 | 4,030 | 10,400 | 8,160 | 6,490 |
| 30 | 2,720 | 3,020 | 2,870 | 6,490 | ..... | 10,700 | 22,500 | 4,400 | 3,670 | 13,300 | 10,100 | 8,420 |
| 31 | 2,200 | ..... | 3,330 | 6,270 | ..... | 9,520 | ..... | 3,170 | ..... | 13,300 | 11,300 | ..... |

*Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1915–16. | | | | | | | | | | | | |
| 1 | 6,720 | 4,790 | 9,520 | 15,300 | 47,200 | 22,500 | 58,100 | 36,500 | 13,300 | 12,600 | 9,520 | 4,590 |
| 2 | 5,620 | 6,050 | 9,240 | 14,000 | 41,200 | 20,300 | 63,700 | 33,800 | 14,000 | 10,000 | 8,160 | 4,790 |
| 3 | 4,210 | 6,720 | 10,700 | 10,700 | 37,700 | 18,400 | 72,600 | 32,300 | 14,700 | 10,100 | 5,200 | 3,170 |
| 4 | 3,670 | 6,720 | 10,700 | 11,700 | 33,400 | 16,700 | 62,100 | 30,000 | 17,000 | 16,700 | 4,990 | 2,450 |
| 5 | 6,490 | 7,420 | 6,490 | 12,600 | 31,200 | 16,400 | 52,900 | 29,300 | 15,700 | 16,000 | 5,200 | 3,850 |
| 6 | 6,270 | 7,420 | 4,400 | 11,300 | 24,300 | 7,910 | 49,800 | 27,000 | 17,400 | 20,600 | 2,720 | 5,200 |
| 7 | 6,950 | 6,950 | 7,660 | 13,000 | 25,500 | 12,300 | 44,700 | 27,000 | 21,700 | 21,400 | 3,850 | 4,210 |
| 8 | 7,420 | 3,500 | 6,490 | 11,700 | 25,100 | 12,600 | 40,400 | 18,800 | 21,700 | 16,400 | 4,790 | 4,030 |
| 9 | 6,270 | 5,620 | 5,830 | 8,960 | 17,000 | 12,300 | 33,800 | 23,200 | 22,800 | 11,300 | 4,990 | 2,870 |
| 10 | 6,050 | 4,790 | 5,410 | 8,420 | 18,400 | 11,000 | 32,300 | 21,400 | 21,400 | 11,000 | 9,240 | 2,080 |
| 11 | 7,660 | 4,590 | 8,960 | 10,100 | 17,400 | 11,000 | 30,800 | 19,900 | 22,800 | 13,300 | 9,810 | 3,020 |
| 12 | 6,950 | 5,830 | 7,660 | 9,520 | 17,000 | 8,690 | 33,100 | 17,100 | 24,700 | 11,000 | 16,000 | 4,590 |
| 13 | 5,410 | 5,620 | 5,200 | 9,810 | 11,700 | 6,950 | 38,000 | 19,500 | 26,200 | 10,100 | 17,400 | 4,590 |
| 14 | 5,410 | 4,210 | 5,830 | 7,910 | 11,300 | 11,000 | 37,300 | 10,100 | 25,800 | 12,600 | 10,700 | 4,030 |
| 15 | 6,050 | 4,400 | 4,990 | 9,520 | 13,600 | 10,300 | 36,900 | 8,420 | 24,000 | 11,300 | 8,160 | 4,790 |
| 16 | 6,490 | 7,420 | 4,590 | 7,180 | 11,700 | 9,520 | 36,900 | 14,700 | 18,100 | 6,050 | 7,910 | 14,000 |
| 17 | 5,620 | 7,910 | 4,400 | 6,490 | 14,300 | 9,810 | 40,000 | 20,600 | 21,000 | 7,420 | 5,830 | 11,700 |
| 18 | 4,590 | 10,100 | 4,400 | 10,700 | 17,000 | 11,000 | 40,800 | 42,700 | 29,300 | 10,100 | 5,200 | 8,420 |
| 19 | 6,050 | 9,240 | 18,100 | 11,000 | 13,300 | 5,830 | 42,000 | 44,700 | 26,600 | 7,910 | 6,050 | 6,270 |
| 20 | 5,620 | 11,300 | 11,000 | 7,180 | 8,760 | 5,200 | 43,900 | 39,600 | 28,100 | 5,830 | 3,170 | 7,180 |
| 21 | 5,620 | 11,700 | 12,000 | 7,180 | 4,210 | 8,420 | 43,500 | 34,200 | 28,900 | 9,810 | 3,330 | 6,270 |
| 22 | 5,830 | 8,690 | 11,700 | 8,960 | 10,400 | 8,420 | 41,600 | 30,800 | 24,700 | 7,910 | 4,590 | 6,720 |
| 23 | 7,180 | 11,300 | 11,700 | 16,700 | 12,600 | 8,960 | 44,700 | 25,100 | 24,000 | 6,950 | 4,400 | 6,270 |
| 24 | 4,030 | 9,240 | 9,810 | 18,100 | 14,700 | 8,960 | 56,100 | 22,800 | 17,400 | 6,490 | 5,200 | 3,330 |
| 25 | 3,020 | 8,420 | 8,420 | 17,400 | 17,000 | 10,400 | 58,900 | 21,700 | 16,000 | 12,000 | 5,620 | 6,490 |
| 26 | 4,400 | 8,160 | 23,600 | 17,000 | 34,200 | 5,620 | 52,900 | 21,000 | 15,300 | 12,000 | 3,850 | 5,950 |
| 27 | 4,790 | 8,960 | 34,600 | 23,600 | 40,000 | 6,950 | 49,000 | 18,400 | 16,000 | 19,500 | 2,320 | 6,050 |
| 28 | 5,620 | 7,420 | 31,500 | 39,000 | 33,100 | 16,000 | 44,700 | 12,600 | 16,000 | 17,400 | 3,330 | 5,620 |
| 29 | 5,410 | 4,400 | 25,500 | 61,700 | 26,600 | 24,000 | 42,300 | 9,810 | 14,300 | 15,700 | 4,790 | 5,620 |
| 30 | 6,490 | 7,180 | 19,900 | 56,900 | ..... | 33,100 | 38,000 | 12,600 | 12,600 | 10,700 | 5,830 | 8,420 |
| 31 | 4,400 | ..... | 17,400 | 49,800 | ..... | 53,700 | ..... | 13,000 | ..... | 9,520 | 5,200 | ..... |
| 1916–17. | | | | | | | | | | | | |
| 1 | 14,300 | 6,950 | 26,200 | 4,590 | 6,270 | 15,700 | 40,400 | 23,200 | 19,900 | 10,100 | 3,330 | 11,300 |
| 2 | 8,960 | 5,620 | 30,800 | 6,720 | 5,830 | 13,600 | 46,200 | 30,800 | 16,700 | 17,400 | 3,330 | 10,700 |
| 3 | 10,100 | 5,200 | 29,300 | 6,490 | 6,270 | 9,810 | 46,200 | 34,600 | 23,600 | 17,000 | 4,210 | 10,100 |
| 4 | 10,100 | 5,830 | 27,000 | 6,270 | 3,020 | 8,960 | 47,800 | 33,800 | 11,300 | 16,400 | 7,910 | 9,810 |
| 5 | 8,690 | 5,200 | 22,500 | 6,720 | 3,330 | 5,200 | 50,100 | 31,900 | 18,100 | 11,000 | 2,720 | 9,240 |
| 6 | 7,180 | 6,720 | 18,800 | 7,660 | 5,200 | 7,180 | 46,600 | 33,100 | 20,300 | 10,400 | 2,080 | 9,520 |
| 7 | 6,050 | 6,950 | 18,800 | 7,660 | 5,620 | 6,270 | 44,700 | 32,700 | 19,200 | 10,400 | 4,030 | 8,690 |
| 8 | 3,020 | 6,050 | 17,400 | 11,700 | 5,200 | 6,270 | 45,500 | 30,000 | 22,800 | 6,050 | 4,590 | 6,050 |
| 9 | 5,410 | 5,620 | 17,400 | 10,400 | 5,200 | 6,720 | 45,100 | 28,900 | 22,100 | 7,910 | 4,400 | 3,330 |
| 10 | 6,050 | 5,620 | 15,300 | 10,400 | 4,590 | 7,910 | 40,400 | 27,000 | 21,700 | 7,420 | 4,400 | 3,330 |
| 11 | 5,620 | 6,490 | 14,000 | 8,690 | 2,450 | 6,490 | 33,100 | 25,500 | 23,200 | 6,270 | 6,050 | 4,400 |
| 12 | 4,030 | 5,620 | 14,000 | 7,910 | 3,020 | 5,830 | 30,400 | 24,000 | 36,900 | 6,490 | 3,330 | 5,620 |
| 13 | 4,990 | 4,590 | 13,300 | 7,180 | 5,200 | 8,160 | 20,300 | 30,800 | 48,600 | 6,270 | 5,200 | 4,790 |
| 14 | 5,200 | 6,490 | 12,000 | 4,210 | 4,210 | 8,420 | 24,000 | 19,900 | 47,800 | 7,660 | 6,950 | 4,790 |
| 15 | 3,020 | 6,950 | 11,700 | 11,700 | 4,210 | 9,810 | 27,700 | 24,000 | 43,100 | 4,790 | 5,200 | 4,210 |
| 16 | 3,500 | 7,420 | 11,300 | 11,700 | 4,400 | 9,520 | 18,100 | 24,000 | 35,700 | 6,050 | 6,490 | 2,720 |
| 17 | 6,050 | 7,420 | 8,960 | 12,300 | 4,400 | 8,690 | 21,000 | 22,500 | 30,400 | 7,910 | 6,490 | 3,500 |
| 18 | 5,200 | 6,720 | 7,180 | 12,300 | 2,200 | 5,830 | 21,700 | 20,300 | 28,500 | 8,160 | 7,420 | 4,990 |
| 19 | 6,050 | 3,330 | 9,520 | 11,000 | 1,960 | 8,690 | 24,700 | 17,800 | 38,000 | 7,660 | 10,700 | 4,790 |
| 20 | 6,720 | 3,330 | 9,520 | 10,700 | 4,590 | 8,160 | 33,100 | 15,700 | 39,600 | 6,950 | 10,700 | 4,400 |
| 21 | 10,400 | 5,620 | 8,420 | 7,420 | 4,400 | 7,660 | 48,200 | 17,800 | 35,300 | 6,490 | 12,600 | 4,210 |
| 22 | 8,960 | 5,620 | 9,810 | 6,270 | 4,030 | 9,520 | 56,500 | 18,800 | 31,500 | 7,910 | 13,300 | 3,020 |
| 23 | 10,100 | 5,200 | 7,420 | 7,910 | 4,030 | 10,100 | 59,700 | 20,300 | 27,700 | 5,200 | 12,000 | 1,620 |
| 24 | 10,700 | 9,810 | 10,100 | 6,720 | 4,210 | 11,700 | 58,100 | 22,900 | 22,500 | 6,490 | 15,000 | 2,200 |
| 25 | 8,960 | 22,500 | 11,300 | 6,490 | 2,200 | 34,500 | 53,300 | 22,100 | 24,000 | 6,950 | 14,000 | 3,330 |
| 26 | 7,910 | 19,500 | 9,520 | 6,270 | 3,020 | 32,300 | 48,200 | 20,300 | 22,500 | 6,720 | 11,300 | 3,170 |
| 27 | 6,950 | 14,700 | 9,240 | 6,050 | 6,950 | 38,400 | 43,500 | 19,900 | 18,800 | 7,180 | 16,000 | 3,330 |
| 28 | 6,050 | 14,000 | 8,420 | 4,590 | 14,000 | 56,500 | 37,700 | 17,000 | 16,700 | 5,830 | 12,000 | 3,330 |
| 29 | 4,210 | 13,300 | 10,100 | 5,200 | ..... | 61,300 | 36,100 | 19,900 | 14,700 | 3,020 | 10,400 | 3,020 |
| 30 | 5,830 | 17,000 | 7,910 | 6,720 | ..... | 59,700 | 29,300 | 25,500 | 11,000 | 3,500 | 10,700 | 1,960 |
| 31 | 6,950 | ..... | 5,410 | 5,830 | ..... | 45,500 | ..... | 23,600 | ..... | 4,210 | 11,700 | ..... |

*Daily discharge, in second-feet, of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1917–18. | | | | | | | | | | | | |
| 1 | 2,580 | 41,600 | 6,490 | 4,030 | 5,200 | 16,700 | 49,400 | 29,300 | 8,420 | 4,210 | 4,160 | 1,600 |
| 2 | 4,030 | 40,000 | 6,050 | 4,030 | 5,200 | 17,000 | 57,300 | 36,900 | 7,910 | 5,860 | 4,090 | 945 |
| 3 | 4,030 | 34,200 | 4,790 | 4,030 | 3,330 | 14,000 | 68,500 | 36,900 | 7,910 | 6,170 | 3,440 | 1,700 |
| 4 | 4,030 | 29,600 | 6,050 | 4,210 | 2,200 | 13,000 | 68,500 | 35,000 | 10,700 | 4,850 | 2,330 | 2,890 |
| 5 | 4,400 | 22,800 | 6,050 | 4,400 | 2,200 | 13,000 | 59,700 | 30,800 | 10,100 | 5,360 | 2,870 | 3,090 |
| 6 | 6,950 | 17,800 | 6,050 | 3,020 | 4,030 | 13,600 | 49,400 | 27,400 | 8,960 | 6,270 | 3,500 | 3,240 |
| 7 | 4,790 | 15,700 | 6,950 | 3,020 | 4,210 | 14,700 | 46,200 | 22,100 | 6,950 | 3,530 | 3,340 | 3,230 |
| 8 | 9,240 | 13,600 | 6,490 | 4,790 | 4,590 | 13,300 | 39,600 | 19,500 | 5,620 | 4,380 | 3,270 | 1,800 |
| 9 | 10,100 | 9,520 | 6,270 | 4,400 | 4,400 | 14,300 | 40,000 | 18,800 | 4,030 | 5,670 | 3,290 | 2,620 |
| 10 | 8,960 | 8,690 | 6,050 | 4,590 | 2,720 | 11,700 | 44,300 | 19,200 | 5,620 | 4,630 | 4,820 | 3,430 |
| 11 | 8,420 | 6,490 | 6,950 | 4,210 | 1,620 | 8,690 | 43,100 | 18,800 | 10,400 | 4,450 | 9,200 | 3,510 |
| 12 | 7,420 | 6,950 | 6,490 | 3,670 | 2,450 | 9,810 | 39,200 | 25,500 | 10,600 | 4,320 | 11,400 | 2,980 |
| 13 | 6,720 | 8,690 | 5,620 | 3,020 | 3,670 | 9,810 | 33,100 | 17,000 | 9,360 | 3,590 | 10,100 | 3,300 |
| 14 | 5,200 | 8,420 | 5,200 | 2,450 | 4,030 | 9,810 | 33,100 | 27,000 | 12,800 | 3,310 | 6,580 | 2,680 |
| 15 | 6,050 | 7,420 | 4,400 | 2,720 | 4,400 | 9,810 | 28,900 | 32,700 | 10,600 | 5,700 | 5,740 | 1,570 |
| 16 | 8,160 | 7,660 | 2,450 | 4,400 | 4,030 | 11,700 | 35,300 | 31,500 | 8,630 | 7,900 | 6,140 | 2,240 |
| 17 | 7,910 | 7,180 | 2,580 | 4,590 | 3,670 | 6,270 | 36,900 | 29,300 | 5,740 | 7,550 | 5,690 | 3,440 |
| 18 | 8,420 | 3,670 | 4,030 | 4,210 | 4,210 | 8,690 | 40,800 | 23,600 | 8,690 | 9,320 | 3,340 | 3,550 |
| 19 | 8,420 | 4,990 | 4,030 | 3,330 | 5,200 | 13,000 | 43,900 | 20,300 | 8,170 | 10,500 | 3,910 | 5,530 |
| 20 | 8,420 | 6,720 | 4,400 | 2,720 | 10,700 | 17,800 | 40,000 | 17,800 | 7,620 | 7,590 | 4,430 | 5,400 |
| 21 | 4,790 | 6,950 | 4,590 | 3,330 | 17,400 | 29,600 | 33,800 | 16,000 | 7,030 | 3,270 | 4,240 | 6,850 |
| 22 | 4,990 | 6,720 | 6,490 | 3,170 | 16,400 | 48,200 | 41,600 | 14,700 | 6,400 | 4,060 | 4,270 | 8,710 |
| 23 | 7,420 | 6,950 | 4,210 | 4,210 | 15,700 | 58,100 | 42,700 | 12,300 | 8,360 | 5,170 | 3,770 | 13,900 |
| 24 | 7,180 | 7,910 | 2,870 | 4,990 | 9,810 | 58,900 | 40,800 | 11,700 | 13,100 | 4,300 | 2,750 | 14,000 |
| 25 | 12,000 | 4,990 | 3,500 | 5,620 | 12,300 | 52,900 | 38,400 | 12,000 | 12,300 | 4,510 | 1,300 | 11,900 |
| 26 | 12,600 | 5,620 | 3,500 | 5,620 | 14,000 | 42,000 | 34,600 | 7,180 | 11,200 | 4,590 | 1,980 | 17,000 |
| 27 | 11,700 | 7,660 | 4,400 | 3,020 | 20,300 | 35,300 | 34,600 | 6,950 | 10,700 | 3,530 | 2,760 | 35,300 |
| 28 | 10,700 | 6,720 | 4,590 | 2,080 | 18,400 | 30,800 | 27,700 | 8,960 | 12,500 | 1,770 | 2,750 | 35,700 |
| 29 | 11,000 | 5,620 | 4,030 | 4,030 | ..... | 30,000 | 20,300 | 10,100 | 8,470 | 2,820 | 2,810 | 31,200 |
| 30 | 15,700 | 5,200 | 2,450 | 5,830 | ..... | 31,200 | 24,700 | 7,910 | 3,930 | 4,650 | 2,760 | 25,800 |
| 31 | 40,000 | ..... | 2,200 | 5,830 | ..... | 38,400 | ..... | 7,420 | ..... | 4,460 | 2,270 | ..... |

NOTE.—Stage-discharge relation affected by ice as follows: Dec. 11, 1904, to Mar. 26, 1905; Feb. 3 to Mar. 2, 1906; Dec. 4, 1906, to Mar. 20, 1907; Jan. 8 to Mar. 25, 1908; Dec. 18, 1908, to Mar. 16, 1909; Dec. 6–13 and Dec. 20, 1909, to Jan. 21, 1910; Feb. 7–28, and Dec. 6, 1910, to Mar. 26, 1911; Jan. 9 to Mar. 27, 1912; Feb. 5–26, 1913; Dec. 29, 1913, to Mar. 29, 1914; Dec. 22, 1914, to Feb. 26, 1915; Dec. 14, 1915, to Apr. 2, 1916; Dec. 16, 1916, to Mar. 25, 1917; Dec. 1, 1917, to Mar. 21, 1918; daily discharge for these periods determined from gage heights corrected for effect of ice by means of discharge measurements, observer's notes, weather records, and hydrographic comparison with other Connecticut River records.

*Monthly discharge of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918.*

[Drainage area, 8,000 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| 1904. | | | | | |
| April | 69,300 | 21,700 | 37,900 | 4.74 | 5.29 |
| May | 62,100 | 13,300 | 30,700 | 3.84 | 4.43 |
| June | 17,400 | 3,500 | 7,300 | .912 | 1.02 |
| July | 6,950 | 2,080 | 3,890 | .486 | .56 |
| August | 8,420 | 1,960 | 4,450 | .556 | .64 |
| September | 19,900 | 2,720 | 7,750 | .969 | 1.08 |
| 1904–5. | | | | | |
| October | 25,500 | 7,180 | 12,500 | 1.56 | 1.80 |
| November | 9,520 | 4,790 | 6,560 | .820 | .91 |
| December | 9,240 | 2,200 | 4,490 | .561 | .65 |
| January | 3,300 | 2,200 | 2,730 | .341 | .39 |
| February | 2,300 | 1,900 | 2,090 | .261 | .27 |
| March | 92,400 | 2,000 | 16,200 | 2.02 | 2.33 |
| April | 93,300 | 19,900 | 37,800 | 4.72 | 5.27 |
| May | 22,500 | 7,660 | 15,700 | 1.96 | 2.26 |
| June | 16,700 | 6,270 | 8,960 | 1.12 | 1.25 |
| July | 22,100 | 4,030 | 7,950 | .994 | 1.15 |
| August | 27,000 | 4,210 | 9,570 | 1.20 | 1.38 |
| September | 42,300 | 7,180 | 20,600 | 2.58 | 2.88 |
| The year | 93,300 | 1,900 | 12,100 | 1.51 | 20.54 |

*Monthly discharge of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| 1905–6. | | | | | |
| October | 9,520 | 5,620 | 7,520 | 0.940 | 1.08 |
| November | 15,300 | 5,830 | 7,870 | .984 | 1.10 |
| December | 37,300 | 9,520 | 15,300 | 1.91 | 2.20 |
| January | 54,100 | 12,300 | 19,900 | 2.49 | 2.87 |
| February | 18,100 | 6,700 | 10,700 | 1.32 | 1.38 |
| March | 30,000 | 5,200 | 13,800 | 1.72 | 1.98 |
| April | 76,300 | 19,200 | 37,600 | 4.70 | 5.24 |
| May | 68,100 | 14,000 | 29,000 | 3.26 | 4.17 |
| June | 36,900 | 8,960 | 17,300 | 2.16 | 2.41 |
| July | 17,400 | 4,790 | 8,260 | 1.03 | 1.19 |
| August | 8,690 | 2,450 | 4,820 | .602 | .69 |
| September | 5,830 | 1,960 | 3,350 | .419 | .47 |
| The year | 76,300 | 1,960 | 14,600 | 1.82 | 24.78 |
| 1906–7. | | | | | |
| October | 7,910 | 1,730 | 4,720 | .590 | .68 |
| November | 14,000 | 3,850 | 7,170 | .896 | 1.00 |
| December | 7,910 | 4,400 | 5,490 | .686 | .79 |
| January | 20,300 | 4,800 | 9,450 | 1.18 | 1.36 |
| February | 5,600 | 3,700 | 4,700 | .588 | .61 |
| March | 60,900 | 4,400 | 16,600 | 2.08 | 2.40 |
| April | 62,500 | 18,100 | 32,400 | 4.05 | 4.52 |
| May | 54,100 | 13,300 | 29,600 | 3.70 | 4.27 |
| June | 20,600 | 6,050 | 11,400 | 1.42 | 1.58 |
| July | 16,000 | 5,620 | 9,070 | 1.13 | 1.30 |
| August | 9,520 | 2,080 | 4,830 | .604 | .70 |
| September | 27,000 | 2,080 | 6,770 | .846 | .94 |
| The year | 62,500 | 1,730 | 11,900 | 1.49 | 20.15 |
| 1907–8. | | | | | |
| October | 60,500 | 8,160 | 21,200 | 2.65 | 3.06 |
| November | 71,000 | 11,700 | 27,800 | 3.48 | 3.88 |
| December | 51,300 | 8,160 | 21,400 | 2.68 | 3.09 |
| January | 27,000 | 7,900 | 12,500 | 1.56 | 1.80 |
| February | 59,700 | 5,200 | 15,000 | 1.88 | 2.03 |
| March | 63,700 | 8,800 | 24,700 | 3.09 | 3.56 |
| April | 53,300 | 22,100 | 32,400 | 4.05 | 4.52 |
| May | 60,900 | 12,300 | 31,700 | 3.96 | 4.56 |
| June | 24,700 | 4,030 | 10,200 | 1.28 | 1.43 |
| July | 8,420 | 1,960 | 3,580 | .448 | .52 |
| August | 8,160 | 2,450 | 4,480 | .560 | .65 |
| September | 2,720 | 1,080 | 1,830 | .229 | .26 |
| The year | 63,700 | 1,080 | 17,300 | 2.16 | 29.36 |
| 1908–9. | | | | | |
| October | 2,200 | 1,560 | 1,830 | .229 | .26 |
| November | 2,720 | 1,240 | 2,050 | .256 | .29 |
| December | 6,050 | 1,900 | 3,390 | .424 | .49 |
| January | 12,300 | 1,900 | 5,960 | .745 | .86 |
| February | 25,300 | 3,900 | 12,200 | 1.52 | 1.58 |
| March | 20,300 | 7,910 | 14,900 | 1.86 | 2.14 |
| April | 95,400 | 20,600 | 53,800 | 6.72 | 7.50 |
| May | 35,300 | 15,300 | 28,400 | 3.55 | 4.09 |
| June | 21,000 | 3,670 | 10,700 | 1.34 | 1.50 |
| July | 5,200 | 2,320 | 3,230 | .404 | .47 |
| August | 5,620 | 1,960 | 2,910 | .364 | .42 |
| September | 6,950 | 1,290 | 2,550 | .319 | .36 |
| The year | 95,400 | 1,240 | 11,800 | 1.48 | 19.96 |
| 1909–10. | | | | | |
| October | 8,960 | 2,200 | 4,430 | .554 | .64 |
| November | 6,490 | 2,320 | 3,980 | .498 | .56 |
| December | 6,950 | 3,800 | 4,510 | .564 | .65 |
| January | 57,300 | 2,800 | 12,900 | 1.61 | 1.86 |
| February | 20,000 | 5,000 | 8,200 | 1.02 | 1.06 |
| March | 85,800 | 15,300 | 40,200 | 5.02 | 5.79 |
| April | 52,500 | 14,700 | 29,800 | 3.72 | 4.15 |
| May | 26,600 | 10,100 | 17,800 | 2.22 | 2.56 |
| June | 24,300 | 4,210 | 14,800 | 1.85 | 2.06 |
| July | 5,620 | 1,400 | 3,250 | .406 | .47 |
| August | 10,700 | 1,840 | 4,190 | .524 | .60 |
| September | 5,830 | 1,180 | 3,100 | .388 | .43 |
| The year | 85,800 | 1,180 | 12,300 | 1.54 | 20.83 |

*Monthly discharge of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| 1910–11. | | | | | |
| October | 5,410 | 1,620 | 3,350 | 0.419 | 0.48 |
| November | 9,520 | 1,620 | 4,960 | .620 | .69 |
| December | 5,600 | 1,600 | 2,810 | .351 | .40 |
| January | 30,000 | 5,800 | 10,000 | 1.25 | 1.44 |
| February | 6,100 | 2,600 | 4,160 | .520 | .54 |
| March | 36,100 | 3,300 | 8,960 | 1.12 | 1.29 |
| April | 58,900 | 11,000 | 35,700 | 4.46 | 4.98 |
| May | 53,700 | 3,020 | 19,400 | 2.42 | 2.79 |
| June | 9,520 | 2,450 | 6,070 | .759 | .85 |
| July | 4,400 | 1,180 | 2,250 | .281 | .32 |
| August | 7,910 | 1,060 | 2,850 | .356 | .41 |
| September | 11,700 | 2,720 | 5,470 | .684 | .76 |
| The year | 58,900 | 1,060 | 8,820 | 1.10 | 14.95 |
| 1911–12. | | | | | |
| October | 47,800 | 4,790 | 16,300 | 2.04 | 2.35 |
| November | 19,900 | 8,690 | 12,700 | 1.59 | 1.77 |
| December | 33,800 | 7,910 | 18,200 | 2.28 | 2.63 |
| January | 20,300 | 3,800 | 9,100 | 1.14 | 1.31 |
| February | 5,500 | 2,700 | 4,500 | .562 | .61 |
| March | 43,500 | 3,300 | 14,100 | 1.76 | 2.03 |
| April | 82,500 | 29,300 | 51,000 | 6.38 | 7.12 |
| May | 41,600 | 11,700 | 24,800 | 3.10 | 3.57 |
| June | 50,100 | 2,720 | 18,700 | 2.34 | 2.61 |
| July | 5,200 | 1,730 | 3,210 | .401 | .46 |
| August | 6,490 | 2,080 | 4,130 | .516 | .59 |
| September | 17,400 | 3,020 | 7,630 | .954 | 1.06 |
| The year | 82,500 | 1,730 | 15,300 | 1.91 | 26.11 |
| 1912–13. | | | | | |
| October | 54,100 | 3,020 | 12,800 | 1.60 | 1.84 |
| November | 34,200 | 7,420 | 16,100 | 2.01 | 2.24 |
| December | 24,300 | 6,270 | 13,900 | 1.74 | 2.01 |
| January | 36,900 | 12,300 | 23,000 | 2.88 | 3.32 |
| February | 23,600 | 5,600 | 12,400 | 1.55 | 1.61 |
| March | 107,000 | 8,420 | 39,400 | 4.92 | 5.67 |
| April | 60,100 | 15,000 | 30,300 | 3.79 | 4.23 |
| May | 36,100 | 5,620 | 15,200 | 1.90 | 2.19 |
| June | 31,200 | 1,960 | 9,100 | 1.14 | 1.27 |
| July | 5,620 | 2,080 | 3,500 | .438 | .50 |
| August | 6,050 | 1,620 | 3,130 | .391 | .45 |
| September | 4,400 | 1,139 | 2,270 | .284 | .32 |
| The year | 107,000 | 1,130 | 15,100 | 1.89 | 25.65 |
| 1913–14. | | | | | |
| October | 17,000 | 1,510 | 5,910 | .739 | .85 |
| November | 30,000 | 3,850 | 9,260 | 1.16 | 1.29 |
| December | 15,000 | 4,030 | 7,530 | .941 | 1.08 |
| January | 6,000 | 1,500 | 3,650 | .456 | .53 |
| February | 1,400 | 1,400 | 3,170 | .396 | .41 |
| March | 50,500 | 2,300 | 15,300 | 1.91 | 2.20 |
| April | 88,300 | 30,800 | 53,500 | 6.69 | 7.46 |
| May | 61,300 | 6,050 | 26,900 | 3.36 | 3.87 |
| June | 10,400 | 2,320 | 5,220 | .652 | .73 |
| July | 8,160 | 1,840 | 4,340 | .542 | .62 |
| August | 6,050 | 1,730 | 3,160 | .395 | .46 |
| September | 8,420 | 1,290 | 3,480 | .435 | .49 |
| The year | 88,300 | 1,290 | 11,800 | 1.48 | 19.99 |

*Monthly discharge of Connecticut River at Sunderland, Mass., for the years ending Sept. 30, 1904–1918*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| 1914–15. | | | | | |
| October | 3,500 | 1,400 | 2,510 | 0.314 | 0.36 |
| November | 6,950 | 1,290 | 3,390 | .424 | .47 |
| December | 7,660 | 1,330 | 4,330 | .541 | .62 |
| January | 13,000 | 1,960 | 5,960 | .745 | .86 |
| February | 70,200 | 4,210 | 15,700 | 1.96 | 2.04 |
| March | 41,600 | 5,620 | 13,200 | 1.65 | 1.90 |
| April | 57,300 | 6,950 | 21,900 | 2.74 | 3.06 |
| May | 24,700 | 3,170 | 11,000 | 1.38 | 1.59 |
| June | 8,420 | 1,740 | 4,400 | .550 | .61 |
| July | 65,300 | 3,670 | 18,800 | 2.35 | 2.71 |
| August | 54,900 | 7,180 | 17,600 | 2.20 | 2.54 |
| September | 9,520 | 2,450 | 5,690 | .711 | .79 |
| The year | 70,200 | 1,290 | 10,300 | 1.29 | 17.55 |
| 1915–16. | | | | | |
| October | 7,660 | 2,020 | 5,690 | .711 | .82 |
| November | 11,700 | 3,500 | 7,200 | .900 | 1.00 |
| December | 34,600 | 4,400 | 11,500 | 1.44 | 1.66 |
| January | 61,700 | 6,490 | 16,900 | 2,11 | 2.43 |
| February | 47,200 | 4,210 | 21,700 | 2.71 | 2.92 |
| March | 53,700 | 5,200 | 13,700 | 1.71 | 1.97 |
| April | 72,600 | 30,800 | 45,400 | 5.68 | 6.34 |
| May | 44,700 | 8,420 | 23,800 | 2.98 | 3.44 |
| June | 29,300 | 12,600 | 20,400 | 2.55 | 2.84 |
| July | 21,400 | 5,830 | 11,900 | 1.49 | 1.72 |
| August | 17,400 | 2,320 | 6,370 | .796 | .92 |
| September | 14,000 | 2,080 | 5,650 | .706 | .79 |
| The year | 72,600 | 2,080 | 15,800 | 1.98 | 26.85 |
| 1916–17. | | | | | |
| October | 14,300 | 3,020 | 7,010 | .876 | 1.01 |
| November | 22,500 | 3,330 | 8,180 | 1.02 | 1.14 |
| December | 30,800 | 5,410 | 14,000 | 1.75 | 2.02 |
| January | 12,300 | 4,210 | 7,930 | .991 | 1.14 |
| February | 14,000 | 1,960 | 4,640 | .580 | .60 |
| March | 61,300 | 5,200 | 17,200 | 2.15 | 2.48 |
| April | 59,700 | 18,100 | 39,300 | 4.91 | 5.48 |
| May | 34,600 | 15,700 | 24,500 | 3.06 | 3.53 |
| June | 48,600 | 11,000 | 26,400 | 3.30 | 3.68 |
| July | 17,400 | 3,020 | 7,930 | .991 | 1.14 |
| August | 16,000 | 2,080 | 8,020 | 1.00 | 1.15 |
| September | 11,300 | 1,620 | 5,180 | .648 | .72 |
| The year | 61,300 | 1,620 | 14,200 | 1.78 | 24.09 |
| 1917–18. | | | | | |
| October | 40,000 | 2,580 | 8,780 | 1.10 | 1.27 |
| November | 41,600 | 3,670 | 12,200 | 1.52 | 1.70 |
| December | 6,950 | 2,200 | 4,850 | .606 | .70 |
| January | 5,830 | 2,080 | 3,990 | .499 | .58 |
| February | 20,300 | 1,620 | 7,370 | .921 | .96 |
| March | 58,900 | 6,270 | 22,600 | 2.82 | 3.25 |
| April | 68,500 | 20,300 | 41,200 | 5.15 | 5.75 |
| May | 36,900 | 6,950 | 20,500 | 2.56 | 2.95 |
| June | 13,100 | 3,930 | 8,760 | 1.10 | 1.23 |
| July | 10,500 | 1,770 | 5,110 | .639 | .74 |
| August | 11,400 | 1,300 | 4,300 | .538 | .62 |
| September | 35,700 | 945 | 8,640 | 1.08 | 1.20 |
| The year | 68,500 | 945 | 12,300 | 1.54 | 20.95 |

*Days of deficiency in discharge of Connecticut River at Sunderland, Mass., during the years ending Sept. 30, 1905–1918.*

| Discharge in second-feet per square mile. | Discharge in second-feet. | Theoretical horsepower per foot of fall. | Days of deficiency in discharge. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1904–5. | 1905–6. | 1906–7. | 1907–8. | 1908–9. | 1909–10. | 1910–11. | 1911–12. | 1912–13. | 1913–14. | 1914–15. | 1915–16. | 1916–17. | 1917–18. |
| 0.15 | 1,200 | 136 | ..... | ..... | ..... | 1 | 1 | 1 | 4 | ..... | 1 | ..... | ..... | ..... | ..... | 1 |
| .2 | 1,600 | 182 | ..... | ..... | ..... | 6 | 8 | 4 | 11 | ..... | 3 | 6 | 6 | ..... | ..... | 3 |
| .3 | 2,400 | 273 | 44 | 1 | 10 | 30 | 89 | 19 | 57 | 6 | 34 | 33 | 31 | 2 | 7 | 16 |
| .4 | 3,200 | 364 | 87 | 21 | 26 | 52 | 152 | 56 | 105 | 29 | 67 | 83 | 72 | 9 | 19 | 43 |
| .5 | 4,000 | 455 | 95 | 37 | 36 | 65 | 173 | 106 | 127 | 51 | 78 | 144 | 98 | 17 | 33 | 73 |
| .6 | 4,800 | 545 | 113 | 51 | 79 | 82 | 197 | 172 | 183 | 95 | 95 | 173 | 125 | 46 | 63 | 128 |
| .7 | 5,600 | 636 | 126 | 54 | 131 | 89 | 207 | 189 | 209 | 129 | 102 | 184 | 139 | 61 | 81 | 144 |
| .8 | 6,400 | 727 | 144 | 85 | 168 | 99 | 216 | 213 | 245 | 142 | 124 | 205 | 166 | 92 | 117 | 170 |
| .9 | 7,200 | 818 | 175 | 110 | 198 | 111 | 223 | 220 | 274 | 158 | 131 | 225 | 197 | 117 | 150 | 194 |
| 1.0 | 8,000 | 909 | 198 | 138 | 219 | 119 | 228 | 222 | 286 | 164 | 142 | 243 | 214 | 132 | 170 | 209 |
| 1.1 | 8,800 | 1,000 | 213 | 156 | 229 | 137 | 233 | 223 | 292 | 167 | 151 | 260 | 229 | 146 | 181 | 226 |
| 1.2 | 9,600 | 1,090 | 231 | 171 | 247 | 152 | 238 | 228 | 301 | 184 | 163 | 274 | 243 | 162 | 194 | 234 |
| 1.3 | 10,400 | 1,180 | 240 | 178 | 249 | 163 | 245 | 231 | 303 | 191 | 173 | 280 | 248 | 176 | 207 | 243 |
| 1.4 | 11,200 | 1,270 | 246 | 190 | 255 | 176 | 250 | 236 | 306 | 194 | 185 | 285 | 255 | 192 | 222 | 252 |
| 1.5 | 12,000 | 1,360 | 252 | 194 | 259 | 182 | 254 | 240 | 307 | 200 | 193 | 292 | 261 | 206 | 233 | 259 |
| 1.6 | 12,800 | 1,450 | 264 | 206 | 264 | 192 | 266 | 250 | 313 | 220 | 211 | 293 | 275 | 219 | 239 | 266 |
| 1.75 | 14,000 | 1,590 | 270 | 218 | 274 | 200 | 269 | 252 | 316 | 229 | 224 | 295 | 286 | 225 | 243 | 275 |
| 1.9 | 15,200 | 1,730 | 278 | 242 | 281 | 213 | 275 | 261 | 317 | 240 | 236 | 300 | 297 | 233 | 252 | 281 |
| 2.05 | 16,400 | 1,860 | 284 | 259 | 287 | 221 | 281 | 267 | 318 | 247 | 241 | 303 | 303 | 243 | 256 | 285 |
| 2.25 | 18,000 | 2,050 | 296 | 274 | 294 | 231 | 290 | 273 | 319 | 254 | 255 | 307 | 312 | 262 | 267 | 294 |
| 2.5 | 20,000 | 2,270 | 305 | 286 | 301 | 244 | 298 | 291 | 323 | 278 | 268 | 310 | 327 | 273 | 279 | 299 |
| 2.75 | 22,000 | 2,500 | 318 | 291 | 312 | 254 | 309 | 304 | 326 | 289 | 279 | 310 | 331 | 284 | 287 | 302 |
| 3.0 | 24,000 | 2,730 | 325 | 300 | 317 | 264 | 313 | 311 | 328 | 291 | 292 | 312 | 337 | 291 | 300 | 305 |
| 3.5 | 28,000 | 3,180 | 334 | 323 | 332 | 289 | 318 | 326 | 330 | 306 | 318 | 315 | 344 | 307 | 313 | 311 |
| 4.0 | 32,000 | 3,640 | 337 | 340 | 338 | 304 | 326 | 332 | 335 | 315 | 329 | 320 | 346 | 316 | 325 | 322 |
| 4.5 | 36,000 | 4,090 | 343 | 345 | 343 | 317 | 343 | 336 | 342 | 326 | 335 | 323 | 350 | 327 | 335 | 334 |
| 5.0 | 40,000 | 4,550 | 348 | 347 | 344 | 330 | 346 | 342 | 350 | 332 | 345 | 329 | 352 | 336 | 341 | 341 |
| 7.0 | 56,000 | 6,360 | 357 | 358 | 362 | 357 | 352 | 357 | 364 | 356 | 357 | 354 | 361 | 358 | 359 | 359 |
| 10.0 | 80,000 | 9,090 | 362 | 365 | 365 | 366 | 361 | 364 | 365 | 365 | 361 | 362 | 365 | 366 | 365 | 365 |
| 15.0 | 120,000 | 13,600 | 365 | ..... | ..... | ..... | 365 | 365 | ..... | 366 | 365 | 365 | ..... | ..... | ..... | ..... |

NOTE.—The above table gives the theoretical horsepower per foot of fall that may be developed at different rates of discharge, and shows the number of days on which the discharge and corresponding horsepower were respectively less than the amounts given in the columns for discharge and horsepower. In using this table allowance should be made for the various losses, the principal ones being the wheel loss, which may be as large as 20 per cent, and the head loss, which may be as large as 5 per cent.

### PASSUMPSIC RIVER AT PIERCE'S MILLS, NEAR ST. JOHNSBURY, VT.

LOCATION.—At suspension footbridge just below Pierce's mills, 2 miles below mouth of Sheldon Branch, 4 miles above mouth of Moose River, and 5 miles north of St. Johnsbury, Caledonia County.

DRAINAGE AREA.—237 square miles.

RECORDS AVAILABLE.—May 26, 1909, to September 30, 1918.

GAGE.—Staff, in two sections; low-water section a vertical staff bolted to ledge just above bridge; high-water section an inclined staff bolted to ledge below bridge; read by W. I. Cox and Clinton G. Taylor.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading below the bridge.

CHANNEL AND CONTROL.—Channel composed of ledge rock partly covered with gravel and alluvial deposits. At high stages the control is probably at the dam near Centervale.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year water over top of gage on mornings of October 31 and April 3 (discharge about 2,900 second-feet); minimum stage recorded, 1.2 feet at 6 p. m. August 25 and 5.30 p. m. August 31 (discharge, 71 second-feet).

1909–1918: Maximum stage recorded, 14.8 feet during the night of March 27, 1913, determined by leveling from flood marks (discharge not computed); minimum stage recorded, zero flow at various times due to water being held back by mills.

ICE.—River freezes over at the control, causing the stage-discharge relation to be seriously affected, ice jams occasionally form below the gage.

REGULATION.—There is a small diurnal fluctuation caused by the operation of Pierce's mills,[a] just above the station, and by other mills farther upstream. The effect of the diurnal fluctuation was studied by means of a portable automatic gage from August 16 to September 11, 1914. Although the results obtained from twice-a-day gage heights were found to be occasionally in error for individual days, the mean discharge for the period determined from twice-a-day gage heights and was found to be identical with that obtained from the hourly record

ACCURACY.—The stage-discharge relation practically permanent except when affected by ice. Rating curve fairly well defined below 2,000 second-feet. Gage read to quarter-tenths twice daily, except from December 20 to March 24 when it was read once a day. Daily discharge ascertained by applying mean daily gage height to rating table and making correction for effect of ice during the winter. Record good.

*Discharge measurements of Passumpsic River at Pierce's mills, near St. Johnsbury, Vt., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 10 | M. R. Stackpole | 2.40 | 396 | Mar. 28 | M. R. Stackpole | [b]2.87 | 407 |
| Dec. 14 | do | [b]2.30 | 210 | Apr. 10 | do | 4.09 | 1,050 |
| Jan. 28 | do | [b]2.60 | 134 | 10 | do | 4.10 | 1,050 |
| Mar. 4 | do | [b]3.00 | 223 | July 23 | C. H. Pierce | 1.54 | 138 |

[a] Pierce's mills not in operation during the summer of 1918.
[b] Stage-discharge relation affected by ice.

*Daily discharge in second-feet, of Passumpsic River at Pierce's mills, near St. Johnsbury, Vt., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 390 | 1,080 | 260 | 110 | 130 | 460 | 2,120 | 1,310 | 640 | 245 | 176 | 202 |
| 2 | 340 | 790 | 230 | 110 | 130 | 360 | 2,600 | 1,260 | 640 | 500 | 130 | 420 |
| 3 | 260 | 670 | 245 | 110 | 130 | 260 | 2,480 | 1,000 | 390 | 275 | 130 | 202 |
| 4 | 460 | 600 | 260 | 90 | 130 | 215 | 1,460 | 790 | 290 | 230 | 122 | 105 |
| 5 | 640 | 530 | 230 | 90 | 130 | 215 | 1,080 | 750 | 260 | 202 | 202 | 117 |
| 6 | 830 | 530 | 230 | 100 | 130 | 200 | 1,040 | 600 | 245 | 189 | 360 | 120 |
| 7 | 530 | 530 | 260 | 110 | 130 | 200 | 1,260 | 640 | 870 | 152 | 202 | 202 |
| 8 | 375 | 420 | 260 | 120 | 110 | 200 | 1,410 | 560 | 600 | 275 | 202 | 126 |
| 9 | 530 | 420 | 200 | 150 | 130 | 175 | 1,760 | 530 | 420 | 460 | 1,000 | 120 |
| 10 | 375 | 460 | 260 | 120 | 130 | 175 | 1,120 | 500 | 340 | 375 | 460 | 126 |
| 11 | 320 | 420 | 260 | 110 | 130 | 175 | 1,040 | 1,000 | 290 | 260 | 260 | 109 |
| 12 | 290 | 460 | 275 | 130 | 130 | 190 | 950 | 640 | 500 | 245 | 216 | 93 |
| 13 | 600 | 360 | 290 | 130 | 140 | 200 | 1,080 | 870 | 830 | 340 | 189 | 152 |
| 14 | 405 | 290 | 215 | 130 | 150 | 230 | 830 | 2,000 | 530 | 390 | 176 | 216 |
| 15 | 390 | 290 | 200 | 130 | 175 | 230 | 1,220 | 1,120 | 390 | 360 | 230 | 164 |
| 16 | 600 | 360 | 215 | 130 | 175 | 230 | 1,510 | 790 | 360 | 260 | 164 | 130 |
| 17 | 405 | 340 | 230 | 130 | 175 | 260 | 1,360 | 560 | 320 | 320 | 130 | 164 |
| 18 | 340 | 305 | 230 | 130 | 150 | 320 | 1,260 | 460 | 360 | 360 | 120 | 360 |
| 19 | 305 | 460 | 200 | 130 | 150 | 320 | 870 | 420 | 290 | 230 | 122 | 460 |
| 20 | 670 | 360 | 230 | 130 | 175 | 390 | 790 | 390 | 245 | 176 | 111 | 275 |
| 21 | 500 | 320 | 165 | 130 | 230 | 420 | 830 | 390 | 216 | 164 | 105 | 910 |
| 22 | 375 | 320 | 200 | 110 | 175 | 500 | 1,310 | 375 | 530 | 152 | 101 | 500 |
| 23 | 320 | 405 | 175 | 130 | 175 | 530 | 1,410 | 600 | 640 | 141 | 109 | 305 |
| 24 | 320 | 390 | 215 | 130 | 150 | 560 | 1,260 | 460 | 560 | 130 | 91 | 530 |
| 25 | 790 | 230 | 175 | 150 | 150 | 600 | 870 | 340 | 375 | 141 | 82 | 530 |
| 26 | 500 | 275 | 175 | 130 | 260 | 600 | 790 | 305 | 290 | 126 | 78 | 910 |
| 27 | 390 | 305 | 150 | 130 | 670 | 530 | 830 | 530 | 230 | 122 | 82 | 1,880 |
| 28 | 670 | 260 | 150 | 130 | 600 | 670 | 870 | 600 | 176 | 117 | 91 | 910 |
| 29 | 530 | 230 | 150 | 150 | ..... | 750 | 1,120 | 420 | 245 | 120 | 89 | 560 |
| 30 | 1,510 | 260 | 140 | 150 | ..... | 950 | 1,360 | 560 | 460 | 260 | 91 | 420 |
| 31 | 2,300 | ..... | 130 | 150 | ..... | 1,560 | ..... | 500 | ..... | 260 | 75 | ..... |

NOTE.—Stage-discharge relation affected by ice Nov. 27 to Mar. 29; daily discharge during this period determined from gage heights corrected for effect of ice by means of four discharge measurements, observer's notes, and weather records.

*Monthly discharge of Passumpsic River at Pierce's mills, near St. Johnsbury, Vt., for the year ending Sept. 30, 1918.*

[Drainage area, 237 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 2,300 | 260 | 557 | 2.35 | 2.71 |
| November | 1,080 | 230 | 422 | 1.78 | 1.99 |
| December | 290 | 130 | 213 | .899 | 1.04 |
| January | 150 | 90 | 125 | .527 | .61 |
| February | 670 | 110 | 187 | .790 | .82 |
| March | 1,560 | 175 | 409 | 1.73 | 1.99 |
| April | 2,600 | 790 | 1,260 | 5.32 | 5.94 |
| May | 2,000 | 305 | 686 | 2.89 | 3.33 |
| June | 870 | 176 | 418 | 1.76 | 1.96 |
| July | 500 | 117 | 244 | 1.03 | 1.19 |
| August | 1,000 | 75 | 184 | .776 | .89 |
| September | 1,880 | 93 | 377 | 1.59 | 1.77 |
| The year | 2,600 | 75 | 424 | 1.79 | 24.24 |

### WHITE RIVER AT WEST HARTFORD, VT.

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

DRAINAGE AREA.—687 square miles.

RECORDS AVAILABLE.—June 9, 1915, to September 30, 1918.

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

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.0 feet at 5 p. m. October 30 (discharge, by extension of rating curve, about 10,000 second-feet); minimum stage recorded 2.22 feet at 7 p. m. August 4 (discharge, by extension of rating curve, about 35 second-feet).

1915–1918: Maximum stage recorded, 11.1 feet at 6 p. m. June 12, 1917 (discharge, by extension of rating curve, about 11,700 second-feet); minimum stage recorded, 2.33 feet at 6 a. m. August 29, 1916 (discharge, by extension of rating curve, about 26 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 not determined).

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

REGULATION.—There are several power plants on the main stream and tributaries above the station, the nearest being that of the Sharon Power Co. at Sharon; when this plant is in operation it causes some diurnal fluctuation in discharge at low stages; this plant was operated only a short time, if at all, during the year. The effect of power plants farther upstream is eliminated by the large amount of pondage at Sharon.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve fairly well defined between 150 and 5,000 second-feet. Staff gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, and making correction for effect of ice during the winter. Records good.

*Discharge measurements of White River at West Hartford, Vt., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 19 | M. R. Stackpole | [a] 3.83 | 428 | Apr. 13 | M. R. Stackpole | 6.31 | 2,780 |
| Jan. 22 | do | [a] 4.15 | 303 | July 28 | H. W. Fear | 2.96 | 165 |
| Feb. 27 | do | [a] 7.98 | 2,820 | Aug. 27 | J. W. Moulton | 3.00 | 171 |
| Mar. 21 | do | [a] 7.36 | 2,430 | | | | |

[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, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 170 | 2,570 | 320 | 370 | 190 | 1,200 | 6,300 | 3,300 | 718 | 472 | 158 | 67 |
| 2 | 215 | 1,860 | 370 | 230 | 175 | 880 | 9,580 | 2,700 | 785 | 530 | 146 | 230 |
| 3 | 200 | 1,550 | 400 | 210 | 160 | 1,050 | 8,740 | 2,200 | 590 | 420 | 138 | 188 |
| 4 | 200 | 1,200 | 280 | 190 | 230 | 820 | 5,500 | 1,860 | 445 | 325 | 64 | 230 |
| 5 | 248 | 1,040 | 420 | 190 | 190 | 880 | 4,000 | 1,650 | 345 | 305 | 124 | 165 |
| 6 | 620 | 1,040 | 370 | 130 | 200 | 880 | 3,300 | 1,460 | 305 | 305 | 138 | 162 |
| 7 | 530 | 925 | 280 | 190 | 175 | 820 | 3,470 | 1,550 | 472 | 325 | 200 | 160 |
| 8 | 395 | 855 | 280 | 190 | 230 | 750 | 3,640 | 1,460 | 925 | 325 | 175 | 155 |
| 9 | 345 | 785 | 210 | 200 | 175 | 680 | 5,700 | 1,370 | 560 | 345 | 590 | 146 |
| 10 | 345 | 750 | 320 | 230 | 150 | 620 | 4,540 | 1,280 | 652 | 325 | 820 | 170 |
| 11 | 285 | 685 | 320 | 250 | 175 | 500 | 3,470 | 2,200 | 685 | 370 | 395 | 165 |
| 12 | 248 | 652 | 320 | 280 | 260 | 560 | 2,990 | 1,550 | 652 | 370 | 370 | 200 |
| 13 | 445 | 620 | 340 | 200 | 230 | 620 | 2,700 | 1,860 | 1,040 | 500 | 370 | 175 |
| 14 | 620 | 590 | 340 | 175 | 260 | 750 | 2,990 | 3,470 | 820 | 785 | 345 | 175 |
| 15 | 445 | 590 | 370 | 320 | 750 | 620 | 3,300 | 2,320 | 685 | 685 | 285 | 132 |
| 16 | 560 | 445 | 320 | 370 | 680 | 500 | 3,640 | 1,750 | 472 | 472 | 325 | 126 |
| 17 | 590 | 530 | 370 | 320 | 820 | 680 | 4,000 | 1,550 | 472 | 395 | 265 | 170 |
| 18 | 445 | 500 | 420 | 210 | 620 | 820 | 4,730 | 1,370 | 445 | 395 | 248 | 148 |
| 19 | 370 | 472 | 370 | 280 | 400 | 880 | 3,300 | 1,120 | 395 | 370 | 200 | 500 |
| 20 | 345 | 420 | 400 | 260 | 620 | 1,100 | 2,840 | 1,200 | 370 | 285 | 200 | 472 |
| 21 | 620 | 445 | 400 | 280 | 2,400 | 2,200 | 2,840 | 1,200 | 345 | 285 | 200 | 750 |
| 22 | 530 | 530 | 420 | 280 | 1,100 | 2,800 | 5,110 | 1,120 | 420 | 248 | 188 | 820 |
| 23 | 420 | 560 | 420 | 280 | 920 | 4,700 | 3,640 | 1,040 | 820 | 200 | 155 | 445 |
| 24 | 370 | 590 | 370 | 280 | 880 | 3,500 | 3,640 | 925 | 890 | 200 | 248 | 445 |
| 25 | 1,280 | 395 | 420 | 280 | 880 | 3,300 | 2,700 | 960 | 750 | 175 | 200 | 500 |
| 26 | 1,200 | 400 | 440 | 320 | 880 | 3,300 | 2,320 | 1,080 | 590 | 215 | 175 | 1,370 |
| 27 | 855 | 370 | 300 | 210 | 3,000 | 2,800 | 2,200 | 890 | 445 | 215 | 175 | 6,500 |
| 28 | 1,200 | 250 | 260 | 210 | 1,650 | 1,650 | 2,200 | 1,120 | 395 | 188 | 175 | 2,200 |
| 29 | 1,280 | 190 | 370 | 250 | ..... | 2,200 | 2,320 | 1,040 | 445 | 144 | 152 | 1,370 |
| 30 | 4,730 | 280 | 250 | 250 | ..... | 5,900 | 2,990 | 750 | 445 | 130 | 118 | 1,120 |
| 31 | 5,900 | ..... | 280 | 260 | ..... | 4,540 | ..... | 652 | ..... | 160 | 67 | ..... |

NOTE.—Stage-discharge relation affected by ice from Nov. 26 to Mar. 29; daily discharge for this period determined from gage heights corrected for effect of ice by means of four discharge measurements, observer's notes, and weather records. Stage-discharge relation affected by backwater from logs May 24–29; correction estimated.

*Monthly discharge of White River at West Hartford, Vt., for the year ending Sept. 30, 1918.*

[Drainage area, 687 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 5,900 | 170 | 839 | 1.22 | 1.41 |
| November | 2,570 | 190 | 736 | 1.07 | 1.19 |
| December | 440 | 210 | 347 | .505 | .58 |
| January | 370 | 130 | 248 | .361 | .42 |
| February | 3,000 | 150 | 657 | .956 | 1.00 |
| March | 5,900 | 500 | 1,690 | 2.46 | 2.84 |
| April | 9,580 | 2,200 | 3,960 | 5.76 | 6.43 |
| May | 3,470 | 652 | 1,550 | 2.26 | 2.61 |
| June | 1,040 | 305 | 579 | .843 | .94 |
| July | 785 | 130 | 338 | .492 | .57 |
| August | 820 | 64 | 239 | .348 | .40 |
| September | 6,500 | 67 | 649 | .945 | 1.05 |
| The year | 9,580 | 64 | 983 | 1.43 | 19.44 |

### ASHUELOT RIVER AT HINSDALE, N. H.

LOCATION.—At lower steel highway bridge, a quarter of a mile below dam of Fisk Paper Co. and 1½ miles above mouth.

DRAINAGE AREA.—440 square miles.

RECORDS AVAILABLE.—February 22, 1907, to December 31, 1909, and July 11, 1914, to September 30, 1918.

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

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed 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, 6.80 feet at 4 p. m. April 3 (discharge, from extension of rating curve, about 4,150 second-feet); minimum stage recorded, 2.18 feet at 4 p. m. August 11 (discharge, from extension of rating curve, about 20 second-feet).

1914-1918: Maximum stage recorded, 7.5 feet at 5 p. m. February 26, 1915 (discharge, from extension of rating curve, about 5,190 second-feet); minimum stage recorded, 2.0 feet at 4 p. m. October 4, 1914 (discharge, from extension of rating curve, about 10 second-feet).

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

REGULATION.—The mills immediately above station are operated continuously except for Sundays and holidays, but cause little fluctuation in stage. Several reservoirs and ponds on the river and tributaries have some effect on the 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 mean daily gage height to rating table and making correction for effect of ice during the winter. Records good.

*Discharge measurements of Ashuelot River at Hinsdale, N. H., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 4 | M. R. Stackpole | [a] 4.45 | 130 | Mar. 20 | M. R. Stackpole | 4.40 | 999 |
| Feb. 13 | do | [a] 3.14 | 106 | June 8 | O. W. Hartwell | 3.53 | 349 |

[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, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 115 | 161 | 185 | 76 | 140 | 720 | 2,300 | 520 | 340 | 206 | 90 | 106 |
| 2 | 115 | 161 | 170 | 86 | 105 | 1,000 | 3,280 | 520 | 350 | 223 | 106 | 120 |
| 3 | 122 | 161 | 300 | 86 | 130 | 1,200 | 4,010 | 460 | 350 | 173 | 115 | 94 |
| 4 | 161 | 235 | 260 | 105 | 140 | 600 | 3,720 | 400 | 231 | 185 | 24 | 79 |
| 5 | 134 | 375 | 300 | 140 | 130 | 350 | 3,720 | 350 | 345 | 215 | 82 | 98 |
| 6 | 120 | 1,160 | 140 | 155 | 120 | 350 | 2,860 | 810 | 315 | 239 | 94 | 104 |
| 7 | 111 | 2,170 | 130 | 155 | 120 | 430 | 2,170 | 660 | 375 | 260 | 82 | 45 |
| 8 | 111 | 1,910 | 280 | 155 | 120 | 400 | 1,550 | 555 | 310 | 167 | 86 | 73 |
| 9 | 122 | 1,550 | 120 | 155 | 140 | 320 | 2,440 | 350 | 215 | 167 | 98 | 132 |
| 10 | 161 | 350 | 240 | 155 | 140 | 350 | 2,300 | 400 | 247 | 209 | 90 | 86 |
| 11 | 134 | 310 | 300 | 140 | 140 | 320 | 2,170 | 460 | 223 | 185 | 25 | 58 |
| 12 | 134 | 223 | 280 | 105 | 140 | 239 | 2,580 | 520 | 375 | 243 | 161 | 106 |
| 13 | 115 | 264 | 220 | 120 | 155 | 268 | 2,860 | 590 | 330 | 139 | 170 | 215 |
| 14 | 122 | 335 | 185 | 130 | 220 | 350 | 2,300 | 770 | 375 | 124 | 191 | 65 |
| 15 | 115 | 215 | 170 | 130 | 155 | 282 | 1,550 | 900 | 350 | 231 | 223 | 106 |
| 16 | 167 | 176 | 130 | 130 | 240 | 400 | 2,040 | 1,210 | 235 | 282 | 255 | 82 |
| 17 | 161 | 173 | 130 | 105 | 260 | 260 | 2,300 | 1,380 | 282 | 215 | 155 | 84 |
| 18 | 161 | 106 | 170 | 130 | 300 | 247 | 1,610 | 1,100 | 264 | 315 | 115 | 134 |
| 19 | 150 | 215 | 185 | 120 | 400 | 330 | 1,160 | 950 | 231 | 255 | 134 | 137 |
| 20 | 161 | 197 | 200 | 140 | 460 | 1,000 | 2,170 | 695 | 209 | 215 | 137 | 273 |
| 21 | 161 | 176 | 185 | 130 | 350 | 1,670 | 2,720 | 490 | 235 | 120 | 139 | 460 |
| 22 | 161 | 206 | 130 | 155 | 260 | 2,040 | 2,860 | 430 | 282 | 167 | 134 | 660 |
| 23 | 139 | 335 | 86 | 120 | 300 | 2,580 | 2,040 | 231 | 430 | 161 | 111 | 460 |
| 24 | 134 | 400 | 130 | 120 | 460 | 2,720 | 1,100 | 194 | 855 | 145 | 120 | 291 |
| 25 | 134 | 278 | 155 | 105 | 700 | 2,440 | 810 | 264 | 520 | 115 | 52 | 223 |
| 26 | 147 | 185 | 140 | 140 | 520 | 2,580 | 1,210 | 300 | 490 | 139 | 134 | 855 |
| 27 | 147 | 200 | 140 | 130 | 460 | 2,440 | 900 | 264 | 375 | 98 | 139 | 1,790 |
| 28 | 243 | 155 | 140 | 120 | 520 | 1,910 | 625 | 209 | 350 | 68 | 111 | 2,170 |
| 29 | 206 | 185 | 130 | 105 | ..... | 1,790 | 325 | 320 | 375 | 106 | 137 | 2,040 |
| 30 | 161 | 105 | 105 | 120 | ..... | 1,910 | 375 | 350 | 282 | 102 | 139 | 1,910 |
| 31 | 206 | ..... | 96 | 120 | ..... | 2,440 | ..... | 350 | ..... | 102 | 134 | ..... |

NOTE.—Stage-discharge relation affected by ice Nov. 26 to Mar. 11; daily discharge for this period determined from gage heights corrected for effect of ice by means of two discharge measurements, observer's notes, and weather records.

*Monthly discharge of Ashuelot River at Hinsdale, N. H., for the year ending Sept, 30, 1918.*

[Drainage area, 440 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 243 | 111 | 146 | 0.332 | 0.38 |
| November | 2,170 | 105 | 422 | .959 | 1.07 |
| December | 300 | 86 | 178 | .405 | .47 |
| January | 155 | 76 | 125 | .284 | .33 |
| February | 700 | 105 | 262 | .595 | .62 |
| March | 2,720 | 239 | 1,090 | 2.48 | 2.86 |
| April | 4,010 | 325 | 2,070 | 4.70 | 5.24 |
| May | 1,380 | 194 | 549 | 1.25 | 1.44 |
| June | 855 | 209 | 338 | .768 | .86 |
| July | 315 | 68 | 180 | .409 | .47 |
| August | 255 | 24 | 122 | .277 | .32 |
| September | 2,170 | 45 | 435 | .989 | 1.10 |
| The year | 4,010 | 24 | 492 | 1.12 | 15.16 |

### 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, 1918.

GAGES.—Stevens continuous water-stage recorder on right bank below highway bridge installed July 4, 1917. Chain gage on downstream side of bridge installed June 5, 1916. Foxboro water-stage recorder used from June 5 to July 3, 1917; inspected by Franklin Epps.

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

CHANNEL AND CONTROL.—Bed covered with gravel and alluvial deposits. Control for low and medium stages is about 80 feet below gage. Clearly defined.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from water-stage recorder, 6.56 feet at 9.30 p. m. April 3 (discharge, 715 second-feet); a stage of 8.13 feet was recorded at 6 p. m. March 23, but the stage-discharge relation was affected by ice at the time; minimum stage during year, from water-stage recorder, 2.02 feet at 5 a. m. September 20 (discharge, practically zero; water held back by dams).

1916–1918: Maximum open-water stage recorded, 6.56 feet at 9.30 p. m. April 3, 1918 (discharge, 715 second-feet); minimum stage recorded September 20, 1918.

ICE.—Stage-discharge relation seriously affected by ice. Complete ice cover usually remains intact throughout the winter. Owing to large diurnal fluctuation caused by operation of power plants in the vicinity of Winchendon, water frequently overflows the ice.

REGULATION.—Distribution of flow 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 the gage. Two rating curves have been used, both well defined for periods covered. Operation of water-stage recorder satisfactory throughout the year except from December 29 to February 8, when clock frequently stopped on account of low temperatures. Daily discharge for open-water period ascertained by use of discharge integrator. Records good for open-water periods and when the water-stage recorder was in operation, but only fair for winter period.

*Discharge measurements of Millers River at Winchendon, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 9 | M. R. Stackpole | [a] 3.31 | 49.5 | Apr. 9 | H. W. Fear | 4.35 | 249 |
| Jan. 5 | do | [a] 4.70 | 79 | July 18 | do | 3.54 | 130 |
| Feb. 8 | do | [a] 5.25 | 39.7 | 18 | A. N. Weeks | 3.31 | 104 |
| Mar. 8 | H. W. Fear | [a] 6.82 | 223 | Aug. 20 | J. W. Moulton | 3.51 | 115 |
| Apr. 4 | do | 6.32 | 658 | 28 | H. W. Fear | 2.63 | 13.9 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Millers River near Winchendon, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56 | 305 | 145 | 18 | 62 | 330 | 540 | 255 | 73 | 79 | 49 | 22 |
| 2 | 56 | 220 | 45 | 45 | 50 | 300 | 590 | 270 | 18 | 80 | 54 | 15 |
| 3 | 56 | 126 | 85 | 50 | 15 | 260 | 620 | 225 | 71 | 66 | 62 | 44 |
| 4 | 54 | 57 | 95 | 50 | 50 | 300 | 590 | 152 | 77 | 50 | 28 | 50 |
| 5 | 45 | 80 | 85 | 78 | 62 | 240 | 495 | 122 | 76 | 65 | 35 | 62 |
| 6 | 39 | 66 | 78 | 18 | 55 | 195 | 395 | 112 | 68 | 65 | 50 | 55 |
| 7 | 28 | 68 | 78 | 45 | 45 | 220 | 290 | 142 | 95 | 50 | 60 | 40 |
| 8 | 42 | 64 | 70 | 30 | 40 | 230 | 380 | 128 | 93 | 70 | 70 | 14 |
| 9 | 40 | 62 | 50 | 35 | 40 | 220 | 325 | 112 | 22 | 73 | 86 | 42 |
| 10 | 48 | 59 | 85 | 30 | 18 | 230 | 330 | 114 | 57 | 75 | 67 | 54 |
| 11 | 57 | 32 | 70 | 35 | 30 | 220 | 300 | 79 | 99 | 74 | 22 | 40 |
| 12 | 59 | 70 | 78 | 30 | 40 | 205 | 290 | 37 | 99 | 75 | 62 | 46 |
| 13 | 46 | 79 | 85 | 13 | 45 | 195 | 235 | 102 | 92 | 65 | 71 | 54 |
| 14 | 13 | 74 | 78 | 62 | 50 | 220 | 190 | 122 | 96 | 40 | 79 | 30 |
| 15 | 56 | 55 | 62 | 55 | 50 | 205 | 345 | 144 | 95 | 50 | 69 | 11 |
| 16 | 50 | 55 | 35 | 70 | 45 | 205 | 345 | 134 | 50 | 50 | 58 | 42 |
| 17 | 58 | 48 | 62 | 62 | 25 | 160 | 340 | 122 | 78 | 88 | 45 | 39 |
| 18 | 60 | 25 | 62 | 55 | 50 | 220 | 360 | 104 | 79 | 108 | 17 | 53 |
| 19 | 36 | 83 | 62 | 45 | 105 | 260 | 295 | 41 | 73 | 70 | 53 | 46 |
| 20 | 50 | 59 | 50 | 15 | 170 | 315 | 240 | 85 | 72 | 71 | 72 | 49 |
| 21 | 14 | 67 | 50 | 55 | 330 | 375 | 215 | 97 | 61 | 16 | 66 | 77 |
| 22 | 40 | 61 | 45 | 62 | 300 | 475 | 490 | 102 | 134 | 59 | 71 | 41 |
| 23 | 44 | 125 | 15 | 55 | 270 | 555 | 460 | 94 | 210 | 67 | 66 | 75 |
| 24 | 52 | 105 | 50 | 50 | 220 | 535 | 390 | 92 | 290 | 58 | 58 | 85 |
| 25 | 61 | 36 | 18 | 45 | 280 | 555 | 350 | 90 | 170 | 54 | 14 | 66 |
| 26 | 102 | 90 | 78 | 45 | 345 | 515 | 245 | 40 | 136 | 55 | 61 | 116 |
| 27 | 84 | 160 | 50 | 18 | 330 | 495 | 200 | 104 | 136 | 53 | 55 | 365 |
| 28 | 24 | 116 | 45 | 45 | 345 | 475 | 154 | 104 | 134 | 27 | 54 | 355 |
| 29 | 142 | 38 | 40 | 50 | ..... | 425 | 190 | 104 | 90 | 53 | 58 | 220 |
| 30 | 250 | 92 | 15 | 55 | ..... | 455 | 164 | 46 | 60 | 71 | 55 | 180 |
| 31 | 400 | ..... | 78 | 55 | ..... | 495 | ..... | 84 | ..... | 62 | 52 | ..... |

NOTE.—Stage-discharge relation affected by ice, Dec. 1 to Mar. 31; daily discharge for this period determined from gage heights corrected for effect of ice by means of four discharge measurements, observer's notes, and weather records, and comparison with record of flow of Millers River at Erving. Discharge estimated Oct. 15–21, May 25–26; June 15–16, July 5–8, 12–15, and Aug. 6–8, 30, by hydrograph comparison with records at other stations.

*Monthly discharge of Millers River near Winchendon, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 80.0 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 400 | 13 | 69.7 | 0.871 | 1.00 |
| November | 305 | 25 | 85.9 | 1.07 | 1.19 |
| December | 145 | 15 | 62.7 | .784 | .90 |
| January | 78 | 13 | 44.4 | .555 | .64 |
| February | 345 | 15 | 124 | 1.55 | 1.61 |
| March | 555 | 160 | 325 | 4.06 | 4.68 |
| April | 620 | 154 | 345 | 4.31 | 4.81 |
| May | 270 | 37 | 115 | 1.44 | 1.66 |
| June | 290 | 18 | 96.8 | 1.21 | 1.35 |
| July | 108 | 16 | 62.5 | .781 | .90 |
| August | 86 | 14 | 55.5 | .694 | .80 |
| September | 365 | 11 | 79.6 | .995 | 1.11 |
| The year | 620 | 11 | 122 | 1.52 | 20.65 |

### MILLERS RIVER AT ERVING, MASS.

LOCATION.—A quarter of a 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, 1918.

GAGES.—Vertical staff attached to downstream end of factory; read by Arthur Lemire. Water-stage recorder installed in gage house on right bank July 1, 1915; gage heights referred to gage datum by a hook gage inside the well.

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

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

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from water-stage recorder, 4.63 feet at 7 a. m. April 3 (discharge, 3,090 second-feet); a stage of 5.97 feet was recorded at 8.30 a. m. February 27, but the stage-discharge relation was affected by ice; minimum stage, from water-stage recorder, 1.0 foot at 10 a. m. August 4 (discharge, 9 second-feet).

1914–1918: Maximum open-water stage recorded, 5.6 feet at 4 p. m. February 25, 1915 (discharge, 5,160 second-feet); see also preceding paragraph; minimum discharge, practically zero at various times during 1915, and at 3.30 p. m. October 29, 1916, when water was held back by dams above the gage.

ICE.—River freezes over below the gage at various times during the winter; ice considerably broken by rising and falling stages due to operation of power plants; stage-discharge relation 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 except when affected by ice. Rating curve well defined below 4,000 second-feet. Staff gage read to hundredths twice daily. Daily discharge ascertained by use of discharge integrator, except for periods when continuous gage-height record was not obtained, and then the staff-gage records were used with corrections as determined by various comparisons with the water-stage recorder. Records good, except for times of ice effect, for which they are fair.

*Discharge measurements of Millers River at Erving, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 8 | M. R. Stackpole | [a] 3.37 | 766 | Mar. 19 | M. R. Stackpole | [a] 3.70 | 1,230 |
| Jan. 8 | do | [a] 4.00 | 243 | June 17 | H. W. Fear | 2.86 | 657 |
| Feb. 10 | do | [a] 3.84 | 200 | July 17 | A. N. Weeks | 2.42 | 437 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Millers River at Erving, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 260 | 1,610 | 280 | 165 | 260 | 1,550 | 2,240 | 900 | 370 | 265 | 180 | 88 |
| 2 | 70 | 1,220 | 120 | 150 | 220 | 1,550 | 2,510 | 1,200 | 250 | 200 | 150 | 31 |
| 3 | 225 | 790 | 350 | 180 | 55 | 820 | 2,810 | 1,100 | 350 | 255 | 110 | 35 |
| 4 | 215 | 580 | 400 | 220 | 220 | 1,150 | 2,610 | 960 | 260 | 148 | 14 | 148 |
| 5 | 210 | 620 | 450 | 260 | 260 | 780 | 2,150 | 720 | 210 | 200 | 270 | 132 |
| 6 | 215 | 495 | 420 | 40 | 220 | 630 | 1,830 | 820 | 170 | 215 | 136 | 132 |
| 7 | 140 | 470 | 400 | 180 | 180 | 780 | 1,500 | 700 | 280 | 100 | 132 | 100 |
| 8 | 290 | 460 | 400 | 95 | 200 | 740 | 1,450 | 650 | 420 | 270 | 140 | 31 |
| 9 | 140 | 440 | 120 | 135 | 220 | 660 | 1,500 | 610 | 360 | 225 | 124 | 138 |
| 10 | 190 | 340 | 350 | 120 | 200 | 1,150 | 1,450 | 590 | 300 | 200 | 180 | 135 |
| 11 | 235 | 290 | 400 | 150 | 180 | 1,050 | 1,400 | 570 | 410 | 220 | 126 | 124 |
| 12 | 280 | 480 | 350 | 120 | 200 | 1,000 | 1,300 | 630 | 530 | 235 | 188 | 128 |
| 13 | 255 | 240 | 170 | 70 | 180 | 950 | 1 250 | 550 | 540 | 250 | 160 | 130 |
| 14 | 150 | 390 | 300 | 260 | 200 | 950 | 1,050 | 580 | 590 | 160 | 175 | 125 |
| 15 | 275 | 405 | 260 | 180 | 220 | 900 | 1,500 | 800 | 500 | 330 | 185 | 40 |
| 16 | 255 | 335 | 75 | 300 | 350 | 860 | 1,650 | 770 | 340 | 225 | 230 | 146 |
| 17 | 290 | 345 | 260 | 220 | 220 | 570 | 1,600 | 640 | 400 | 305 | 240 | 146 |
| 18 | 315 | 120 | 240 | 260 | 280 | 950 | 1,500 | 560 | 375 | 350 | 42 | 130 |
| 19 | 215 | 340 | 260 | 95 | 350 | 950 | 1,500 | 330 | 290 | 370 | 190 | 124 |
| 20 | 280 | 280 | 220 | 120 | 570 | 1,260 | 1,300 | 360 | 270 | 385 | 170 | 230 |
| 21 | 145 | 310 | 200 | 220 | 950 | 1,490 | 1,100 | 400 | 295 | 185 | 138 | 450 |
| 22 | 225 | 370 | 180 | 260 | 1,500 | 1,910 | 1,600 | 520 | 640 | 265 | 134 | 330 |
| 23 | 235 | 445 | 20 | 220 | 1,560 | 2,420 | 1,800 | 450 | 950 | 210 | 172 | 320 |
| 24 | 260 | 510 | 220 | 220 | 950 | 2,610 | 1,700 | 390 | 1,100 | 205 | 152 | 265 |
| 25 | 275 | 440 | 55 | 180 | 1,000 | 2,510 | 1,450 | 430 | 960 | 200 | 50 | 295 |
| 26 | 430 | 370 | 220 | 150 | 1,150 | 2,510 | 1,250 | 350 | 590 | 182 | 114 | 385 |
| 27 | 270 | 300 | 200 | 55 | 1,620 | 2,240 | 1,050 | 410 | 540 | 132 | 116 | 1,180 |
| 28 | 355 | 285 | 200 | 180 | 1,370 | 1,910 | 900 | 350 | 465 | 31 | 130 | 1,340 |
| 29 | 475 | 270 | 180 | 220 | ..... | 1,830 | 840 | 370 | 385 | 152 | 143 | 1,080 |
| 30 | 800 | 285 | 55 | 240 | ..... | 1,830 | 860 | 420 | 180 | 230 | 145 | 850 |
| 31 | 1,730 | ..... | 220 | 240 | ..... | 1,910 | ..... | 270 | ..... | 176 | 205 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 1 to Mar. 19; daily discharge for this period determined from gage heights corrected for effect of ice by means of four discharge measurements, observer's notes, and weather records. Discharge estimated May 8–13, 26–28, June 4–10, and July 7, by comparison with records at other stations in the Millers River basin.

*Monthly discharge of Millers River at Erving, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 372 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 1,730 | 70 | 313 | 0.841 | 0.97 |
| November | 1,610 | 120 | 461 | 1.24 | 1.38 |
| December | 450 | 20 | 244 | .656 | .76 |
| January | 300 | 40 | 178 | .478 | .55 |
| February | 1,620 | 55 | 532 | 1.43 | 1.49 |
| March | 2,610 | 570 | 1,370 | 3.68 | 4.24 |
| April | 2,810 | 840 | 1,550 | 4.17 | 4.65 |
| May | 1,200 | 270 | 594 | 1.60 | 1.84 |
| June | 1,140 | 170 | 444 | 1.19 | 1.33 |
| July | 385 | 31 | 222 | .597 | .69 |
| August | 270 | 14 | 150 | .403 | .47 |
| September | 1,340 | 31 | 293 | .788 | .88 |
| The year | 2,810 | 14 | 528 | 1.42 | 19.24 |

### SIP POND BROOK NEAR WINCHENDON, MASS.

LOCATION.—About 500 feet above highway bridge a quarter of a 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, 1918.

GAGES.—Gurley 7-day water-stage recorder installed June 26, 1917, and vertical staff gage installed June 9, 1917, on left bank, 500 feet above highway bridge. Inclined staff gage on right bank 50 feet above highway bridge, used May 29 to June 29, and December 13, 1916, to June 26, 1917. Stevens 8-day water-stage recorder at same site and datum used June 30 to December 12, 1916. Gages read by W. G. Greenall and Hazel Greenall. All gages at same datum, but owing to slope of stream and different control section, present gage reads higher than those previously used.

DISCHARGE MEASUREMENTS.—Made from footbridge 15 feet below vertical staff gage or by wading.

CHANNEL AND CONTROL.—Bed rough, covered with boulders. Control clearly defined. Considerable aquatic vegetation in channel below inclined staff gage during summer.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 221 second-feet, occurred at noon April 3; minimum discharge, 4 second feet, occurred at 2 p. m. August 25.

1916–1918: Maximum discharge during period, about 294 second-feet, occurred at 6 p. m., March 28, 1917; minimum discharge, August 25, 1918.

REGULATION.—The distribution of flow is considerably affected by operation of mills at State Line, N. H., and by storage in Pearly Pond and Sip Pond.

ACCURACY.—Stage-discharge relation practically permanent for present site. Rating curve well defined below 200 second-feet. Operation of water-stage recorder satisfactory, except during winter, when it was affected by ice in gage well. Daily discharge determined by use of discharge integrator, except during winter. Open-water records excellent; winter records fair.

*Discharge measurements of Sip Pond Brook near Winchendon, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 10 | M. R. Stackpole | [a] 5.68 | 14.5 | Apr. 4 | H. W. Fear | 8.07 | 188 |
| Jan. 5 | do | [a] 6.04 | 18.8 | 9 | do | 7.14 | 96 |
| Feb. 7 | do | [a] 5.44 | 8.4 | July 18 | do | 5.77 | 20.3 |
| Mar. 8 | H. W. Fear | [a] 6.67 | 44.1 | Aug. 21 | J. W. Moulton | 5.06 | 6.0 |

[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, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 13 | 85 | 27 | 19 | 10 | 53 | 156 | 42 | 19 | 14 | 12 | 12 |
| 2 | 13 | 60 | 14 | 19 | 10 | 50 | 180 | 55 | 14 | 21 | 11 | 9.4 |
| 3 | 13 | 51 | 30 | 19 | 7 | 48 | 205 | 55 | 16 | 20 | 11 | 9.4 |
| 4 | 13 | 43 | 26 | 19 | 10 | 56 | 188 | 45 | 16 | 12 | 7.1 | 8.6 |
| 5 | 13 | 38 | 27 | 19 | 9 | 50 | 152 | 32 | 16 | 16 | 11 | 9.4 |
| 6 | 13 | 31 | 29 | 11 | 8 | 48 | 122 | 36 | 14 | 16 | 12 | 8.9 |
| 7 | 10 | 26 | 29 | 18 | 8 | 45 | 102 | 28 | 19 | 9.2 | 12 | 9.5 |
| 8 | 13 | 25 | 21 | 24 | 8 | 42 | 99 | 26 | 18 | 14 | 11 | 5.8 |
| 9 | 13 | 23 | 11 | 18 | 8 | 42 | 92 | 24 | 10 | 14 | 8.2 | 9.5 |
| 10 | 13 | 23 | 19 | 15 | 6 | 32 | 90 | 21 | 17 | 13 | 9.2 | 8.0 |
| 11 | 14 | 16 | 19 | 15 | 8 | 30 | 80 | 21 | 17 | 13 | 7.5 | 7.6 |
| 12 | 13 | 20 | 18 | 15 | 9 | 35 | 68 | 14 | 19 | 13 | 10 | 7.2 |
| 13 | 13 | 22 | 15 | 11 | 10 | 38 | 66 | 21 | 20 | 16 | 10 | 8.1 |
| 14 | 10 | 19 | 16 | 12 | 10 | 40 | 62 | 25 | 21 | 10 | 7.7 | 6.5 |
| 15 | 16 | 15 | 19 | 13 | 13 | 42 | 78 | 33 | 24 | 13 | 11 | 6.2 |
| 16 | 18 | 17 | 12 | 13 | 14 | 47 | 82 | 35 | 13 | 13 | 10 | 5.7 |
| 17 | 14 | 17 | 16 | 13 | 10 | 53 | 80 | 29 | 19 | 13 | 9.0 | 8.6 |
| 18 | 12 | 11 | 18 | 12 | 13 | 64 | 85 | 24 | 17 | 14 | 6.7 | 11 |
| 19 | 11 | 19 | 18 | 12 | 19 | 65 | 81 | 16 | 10 | 14 | 8.5 | 12 |
| 20 | 12 | 20 | 18 | 10 | 22 | 65 | 70 | 23 | 16 | 12 | 9.1 | 19 |
| 21 | 11 | 20 | 18 | 11 | 24 | 67 | 63 | 21 | 18 | 9.0 | 9.0 | 22 |
| 22 | 14 | 21 | 16 | 11 | 22 | 116 | 99 | 24 | 32 | 14 | 9.6 | 18 |
| 23 | 14 | 22 | 11 | 10 | 20 | 140 | 100 | 25 | 75 | 12 | 9.5 | 22 |
| 24 | 14 | 22 | 19 | 10 | 16 | 134 | 88 | 26 | 74 | 12 | 9.1 | 22 |
| 25 | 19 | 16 | 10 | 10 | 40 | 138 | 75 | 24 | 53 | 12 | 4.2 | 18 |
| 26 | 18 | 28 | 18 | 10 | 69 | 134 | 65 | 20 | 35 | 13 | 10 | 34 |
| 27 | 17 | 30 | 18 | 8 | 80 | 120 | 56 | 24 | 28 | 11 | 9.7 | 110 |
| 28 | 15 | 23 | 16 | 10 | 62 | 104 | 48 | 24 | 24 | 7.1 | 8.8 | 120 |
| 29 | 21 | 17 | 16 | 10 | ..... | 93 | 47 | 21 | 21 | 10 | 10 | 77 |
| 30 | 33 | 19 | 10 | 10 | ..... | 108 | 42 | 21 | 14 | 11 | 8.2 | 63 |
| 31 | 72 | ..... | 18 | 10 | ..... | 130 | ..... | 21 | ..... | 11 | 9.0 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 10 to Mar. 14, and extreme cold also affected operation of water-stage recorder for short periods; daily discharge during this period determined from gage heights corrected for effect of ice by means of four discharge measurements, observer's notes, and weather records.

*Monthly discharge of Sip Pond Brook near Winchendon, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 18.8 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 72 | 10 | 16.4 | 0.872 | 1.01 |
| November | 85 | 11 | 26.6 | 1.41 | 1.57 |
| December | 30 | 10 | 18.5 | .984 | 1.13 |
| January | 24 | 8 | 13.5 | .718 | .83 |
| February | 80 | 6 | 19.5 | 1.04 | 1.08 |
| March | 140 | 30 | 71.9 | 3.82 | 4.40 |
| April | 205 | 42 | 94.0 | 5.00 | 5.58 |
| May | 55 | 14 | 27.6 | 1.47 | 1.70 |
| June | 75 | 10 | 23.6 | 1.26 | 1.41 |
| July | 20 | 7.1 | 13.0 | .691 | .80 |
| August | 12 | 4.2 | 9.39 | .499 | 58 |
| September | 120 | 5.7 | 22.9 | 1.22 | 1.36 |
| The year | 205 | 4.2 | 29.7 | 1.58 | 21.45 |

### PRIEST BROOK NEAR WINCHENDON, MASS.

LOCATION.—At highway bridge 3 miles above confluence of Priest Brook with 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 to September 30, 1918.

GAGE.—Sloping staff on left bank 200 feet below highway bridge; read by R. D. Hutchinson.

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 formed by the foundation of an old dam 30 feet below the gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the period covered by records, 4.88 feet at 7 a. m. March 28 and 29, 1917 (discharge, 306 second-feet); minimum stage recorded during periods, 2.11 feet at 7 a. m. August 26, 1918 (discharge, 1.3 second-feet).

REGULATION.—Flow not appreciably affected by regulation.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 200 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 Priest Brook near Winchendon, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 13 | M. R. Stackpole | 2.91 | 15.4 | Aug. 20 | J. W. Moulton | 2.18 | 1.6 |
| July 18 | A. N. Weeks | 2.84 | 15.3 | | | | |

*Daily discharge, in second-feet, of Priest Brook near Winchendon, Mass., for the year ending Sept. 30, 1918.*

| Day. | July. | Aug. | Sept. | Day. | July. | Aug. | Sept. | Day. | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 2.5 | 2.4 | 11 | | 2.5 | 1.6 | 21 | 4.0 | 1.5 | 35 |
| 2 | | 2.1 | 2.4 | 12 | | 2.5 | 1.5 | 22 | 3.4 | 1.5 | 25 |
| 3 | | 2.0 | 2.0 | 13 | | 2.0 | 3.6 | 23 | 3.2 | 1.4 | 20 |
| 4 | | 1.9 | 1.8 | 14 | | 2.2 | 2.6 | 24 | 2.8 | 1.4 | 20 |
| 5 | | 2.0 | 1.6 | 15 | | 4.8 | 2.0 | 25 | 2.8 | 1.4 | 21 |
| 6 | | 4.6 | 1.5 | 16 | | 2.7 | 2.0 | 26 | 3.2 | 1.3 | 31 |
| 7 | | 1.9 | 1.3 | 17 | | 2.0 | 2.0 | 27 | 2.5 | 1.5 | 165 |
| 8 | | 3.2 | 1.4 | 18 | 13 | 1.7 | 2.6 | 28 | 2.2 | 1.5 | 123 |
| 9 | | 2.1 | 1.8 | 19 | 7.3 | 1.7 | 7.9 | 29 | 40 | 1.8 | 78 |
| 10 | | 2.2 | 1.8 | 20 | 4.6 | 1.6 | 20 | 30 | 16 | 2.0 | 60 |
| | | | | | | | | 31 | 2.8 | 1.9 | |

*Monthly discharge of Priest Brook near Winchendon, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 18.8 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| July 18–31 | 40 | 2.2 | 7.70 | 0.410 | 0.21 |
| August | 4.8 | 1.3 | 2.11 | .112 | .13 |
| September | 165 | 1.3 | 21.4 | 1.14 | 1.27 |

### 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, 1918.

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; about 200 feet below the gage channel is divided by an island, and the control sections are formed by rocks and boulders in the two channels, probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 3.35 feet at 7 a. m. April 3 (discharge, 588 second-feet); minimum stage recorded, 0.24 foot at 7 a. m. August 29 (discharge, 2.5 second-feet).

1916–1918: Maximum stage recorded, 3.76 feet at 1 p. m. March 28, 1917 (discharge, 780 second-feet); minimum stage recorded, August 29, 1918.

ICE.—River freezes slightly along banks, and stage-discharge relation is affected for short periods.

DIVERSIONS.—About half a mile below the station water is diverted through a canal into Packard Pond. A discharge measurement July 19, 1918, showed a flow of 10.5 second-feet diverted through the canal. On August 28, canal was dry.

REGULATION.—Flow not seriously affected by regulation.

ACCURACY.—Stage-discharge relation practically permanent, except for short periods when affected by ice. Rating curve well defined below 300 second-feet. Gage read to hundredths twice daily, except from December 9 to March 31, when it was read once daily. Daily discharge ascertained by applying mean daily gage height to rating table and making corrections for effect of ice during winter. Records good.

*Discharge measurements of East Branch of Tully River near Athol, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 7 | M. R. Stackpole | [a] 1.12 | 24.1 | July 19 | C. H. Pierce | 1.31 | 44.3 |
| Feb. 9 | ....do | [a] .96 | 18.3 | Aug. 28 | H. W. Fear | .26 | 2.9 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of East Branch of Tully River near Athol, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14 | 365 | 39 | 23 | 24 | 197 | 421 | 149 | 36 | 35 | 9.5 | 10 |
| 2 | 14 | 251 | 45 | 23 | 25 | 183 | 485 | 172 | 33 | 31 | 8.2 | 10 |
| 3 | 14 | 197 | 48 | 24 | 20 | 170 | 565 | 172 | 27 | 25 | 6.7 | 9.5 |
| 4 | 13 | 157 | 46 | 25 | 24 | 145 | 505 | 149 | 22 | 20 | 5.8 | 9.2 |
| 5 | 13 | 128 | 45 | 26 | 20 | 149 | 389 | 127 | 19 | 17 | 4.9 | 8.2 |
| 6 | 19 | 112 | 43 | 26 | 20 | 127 | 316 | 110 | 18 | 16 | 4.9 | 5.2 |
| 7 | 26 | 96 | 42 | 24 | 23 | 145 | 282 | 96 | 21 | 15 | 4.4 | 3.8 |
| 8 | 24 | 83 | 35 | 24 | 24 | 149 | 276 | 93 | 46 | 16 | 3.8 | 4.4 |
| 9 | 24 | 72 | 34 | 22 | 18 | 130 | 248 | 89 | 37 | 15 | 4.9 | 6.7 |
| 10 | 22 | 65 | 34 | 21 | 19 | 120 | 263 | 73 | 37 | 14 | 6.1 | 4.9 |
| 11 | 20 | 61 | 33 | 21 | 19 | 113 | 246 | 70 | 35 | 14 | 8.2 | 4.1 |
| 12 | 20 | 60 | 33 | 28 | 18 | 104 | 218 | 72 | 41 | 14 | 9.8 | 3.8 |
| 13 | 34 | 55 | 33 | 28 | 18 | 99 | 197 | 66 | 77 | 22 | 9.2 | 7.3 |
| 14 | 45 | 49 | 35 | 31 | 21 | 99 | 193 | 101 | 76 | 23 | 9.5 | 9.5 |
| 15 | 40 | 45 | 33 | 34 | 24 | 90 | 260 | 149 | 62 | 25 | 18 | 12 |
| 16 | 42 | 45 | 32 | 34 | 31 | 93 | 269 | 125 | 46 | 20 | 18 | 11 |
| 17 | 39 | 43 | 31 | 31 | 34 | 88 | 254 | 97 | 36 | 19 | 16 | 10 |
| 18 | 34 | 41 | 32 | 29 | 37 | 104 | 248 | 79 | 29 | 43 | 12 | 12 |
| 19 | 28 | 41 | 34 | 27 | 40 | 123 | 243 | 66 | 23 | 50 | 8.5 | 27 |
| 20 | 31 | 39 | 35 | 27 | 76 | 161 | 207 | 58 | 19 | 38 | 7.0 | 49 |
| 21 | 42 | 38 | 37 | 29 | 96 | 207 | 190 | 50 | 16 | 29 | 6.4 | 103 |
| 22 | 38 | 42 | 39 | 24 | 134 | 309 | 289 | 56 | 86 | 23 | 4.4 | 107 |
| 23 | 33 | 71 | 40 | 26 | 149 | 429 | 298 | 56 | 232 | 18 | 3.6 | 80 |
| 24 | 32 | 76 | 39 | 23 | 165 | 437 | 269 | 48 | 200 | 14 | 3.1 | 63 |
| 25 | 64 | 76 | 36 | 24 | 149 | 429 | 226 | 42 | 145 | 12 | 3.4 | 53 |
| 26 | 70 | 57 | 34 | 22 | 174 | 437 | 193 | 45 | 103 | 9.8 | 2.9 | 72 |
| 27 | 59 | 45 | 32 | 24 | 202 | 421 | 165 | 45 | 79 | 8.8 | 3.1 | 320 |
| 28 | 76 | 40 | 28 | 22 | 202 | 437 | 147 | 40 | 60 | 7.6 | 2.9 | 309 |
| 29 | 94 | 35 | 26 | 25 | ..... | 429 | 132 | 35 | 49 | 6.4 | 3.1 | 215 |
| 30 | 117 | 32 | 24 | 25 | ..... | 337 | 125 | 36 | 42 | 6.7 | 5.2 | 163 |
| 31 | 425 | ..... | 23 | 25 | ..... | 302 | ..... | 37 | ..... | 11 | 4.9 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 9–20, and Dec. 26 to Feb. 19; daily discharge during these periods determined from gage heights corrected for effect of ice by means of two discharge measurements, observer's notes, and weather records.

*Monthly discharge of East Branch of Tully River near Athol, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 50.2 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 425 | 13 | 50.5 | 1.00 | 1.15 |
| November | 365 | 32 | 83.9 | 1.67 | 1.86 |
| December | 48 | 23 | 35.5 | .707 | .82 |
| January | 34 | 21 | 25.7 | .512 | .59 |
| February | 202 | 18 | 64.5 | 1.28 | 1.33 |
| March | 437 | 88 | 218 | 4.34 | 5.00 |
| April | 565 | 125 | 271 | 5.40 | 6.02 |
| May | 172 | 35 | 84.0 | 1.67 | 1.92 |
| June | 232 | 16 | 58.4 | 1.16 | 1.29 |
| July | 50 | 6.4 | 19.9 | .396 | .46 |
| August | 18 | 2.9 | 7.05 | .140 | .16 |
| September | 320 | 3.8 | 56.8 | 1.13 | 1.26 |
| The year | 565 | 2.9 | 81.0 | 1.61 | 21.86 |

### MOSS BROOK AT WENDELL DEPOT, MASS.

LOCATION.—A quarter of a mile above confluence with Millers River and a quarter of a mile from Wendell Depot, Franklin County.

DRAINAGE AREA.—12.2 square miles.

RECORDS AVAILABLE.—June 7, 1916, to September 30, 1918. From June 4 to October 16, 1909, records were obtained at a station near the mouth of the stream, and from April 25 to August 27, 1910, at a weir a short distance below the present location.

GAGE.—Sloping staff on left bank; read by C. M. Porter.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed principally of ledge rock and boulders. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 2.87 feet at 9 a. m. March 24 (discharge, 106 second-feet); minimum stage recorded, 0.85 foot at 9 a. m. August 26 (discharge, 0.9 second-foot).

1916–1918: Maximum stage recorded, 3.52 feet at 12.45 p. m. March 28, 1917 (discharge, by extension of rating curve, about 187 second-feet); minimum stage recorded, 0.85 foot at 9 a. m. August 26, 1918 (discharge, 0.9 second-foot).

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

REGULATION.—Flow not affected by regulation.

ACCURACY.—Stage-discharge relation changed by ice action, February 12–13; two rating curves used during the year, well defined below 60 second-feet. Gage read to hundredths twice daily, except from December 13 to April 8, when it was read once daily. Daily discharge ascertained by applying mean daily gage height to rating table, and making corrections for effect of ice during the winter. Records good.

*Discharge measurements of Moss Brook at Wendell Depot, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 8 | M. R. Stackpole | [a]1.33 | 6.7 | Feb. 9 | M. R. Stackpole | [a]1.34 | 6.2 |
| Jan. 8 | do | [a]1.32 | 4.8 | Aug. 28 | H. W. Fear | .87 | 1.0 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Moss Brook at Wendell Depot, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.1 | 53 | 5.5 | 4.5 | 4.5 | 46 | 92 | 47 | 8.2 | 4.8 | 2.2 | 3.4 |
| 2 | 2.0 | 25 | 9.5 | 4.5 | 4.5 | 44 | 101 | 47 | 6.8 | 5.5 | 1.6 | 2.0 |
| 3 | 2.0 | 19 | 10 | 4.5 | 5 | 42 | 98 | 35 | 5.1 | 4.4 | 1.4 | 1.7 |
| 4 | 1.9 | 16 | 9.5 | 4.5 | 4.5 | 40 | 78 | 30 | 4.4 | 3.5 | 1.4 | 1.3 |
| 5 | 2.7 | 13 | 9 | 4.5 | 4.5 | 38 | 66 | 27 | 4.1 | 3.1 | 1.5 | 1.2 |
| 6 | 7.8 | 12 | 8.5 | 4.5 | 4.5 | 37 | 55 | 22 | 6.8 | 2.8 | 1.4 | 1.3 |
| 7 | 4.5 | 12 | 7.5 | 5 | 4 | 34 | 51 | 20 | 12 | 2.6 | 1.3 | 1.3 |
| 8 | 3.6 | 11 | 6.5 | 4.5 | 4.5 | 32 | 48 | 17 | 16 | 2.4 | 1.2 | 1.3 |
| 9 | 3.3 | 10 | 7 | 4 | 6 | 30 | 47 | 16 | 9.7 | 2.3 | 1.6 | 2.0 |
| 10 | 2.9 | 10 | 6.5 | 4 | 4.5 | 28 | 52 | 19 | 7.6 | 2.2 | 2.3 | 1.4 |
| 11 | 2.7 | 9.4 | 6.5 | 4 | 5 | 26 | 45 | 21 | 6 | 2.2 | 1.7 | 1.2 |
| 12 | 2.6 | 8.9 | 6 | 8.5 | 6 | 25 | 41 | 17 | 15 | 2.2 | 1.4 | 1.1 |
| 13 | 11 | 9.4 | 5.5 | 8 | 6.8 | 21 | 40 | 16 | 17 | 3.1 | 1.4 | 6 |
| 14 | 7.8 | 9.4 | 5 | 7 | 7.9 | 20 | 44 | 53 | 11 | 5.5 | 1.6 | 3.2 |
| 15 | 6.3 | 8.4 | 5.5 | 6.5 | 9.7 | 23 | 65 | 42 | 8.2 | 4.3 | 2.1 | 1.8 |
| 16 | 7.5 | 8.4 | 5 | 6 | 9.7 | 23 | 63 | 30 | 6 | 3.4 | 1.7 | 1.6 |
| 17 | 5.7 | 7.8 | 5 | 6 | 9.3 | 22 | 54 | 21 | 4.1 | 4.8 | 1.4 | 1.6 |
| 18 | 4.6 | 7.3 | 7 | 6 | 9.7 | 28 | 52 | 17 | 2.7 | 11 | 1.3 | 2.1 |
| 19 | 4.3 | 7.8 | 8 | 6 | 14 | 37 | 47 | 14 | 2.3 | 5.7 | 1.2 | 2.4 |
| 20 | 6.1 | 7.3 | 8 | 5.5 | 34 | 55 | 39 | 12 | 2.1 | 3.4 | 1.1 | 5.7 |
| 21 | 6.1 | 7.5 | 9 | 5 | 32 | 62 | 52 | 14 | 1.9 | 2.3 | 1.0 | 15 |
| 22 | 5.0 | 8.9 | 10 | 5 | 30 | 73 | 68 | 14 | 46 | 2.3 | 1.0 | 9 |
| 23 | 4.3 | 15 | 8 | 5 | 30 | 89 | 62 | 13 | 28 | 2.2 | 1.0 | 5.3 |
| 24 | 5.0 | 13 | 8 | 5 | 28 | 106 | 49 | 10 | 20 | 2.0 | 1.0 | 4.6 |
| 25 | 12 | 12 | 7.5 | 5 | 34 | 80 | 42 | 9 | 13 | 1.8 | 1.0 | 3.8 |
| 26 | 9.4 | 10 | 7 | 5 | 66 | 84 | 34 | 13 | 9 | 1.8 | 1.1 | 27 |
| 27 | 6.8 | 8.5 | 6.5 | 5 | 68 | 63 | 30 | 10 | 7.1 | 1.7 | 1.7 | 46 |
| 28 | 21 | 7 | 6 | 5 | 57 | 52 | 28 | 9 | 5.3 | 1.6 | 1.0 | 29 |
| 29 | 20 | 5.5 | 5 | 4.5 | ..... | 59 | 25 | 8.2 | 5.1 | 1.4 | 2.7 | 14 |
| 30 | 39 | 5 | 4 | 4.5 | ..... | 69 | 27 | 9.3 | 3.9 | 1.8 | 1.3 | 10 |
| 31 | 91 | ..... | 4 | 4.5 | ..... | 84 | ..... | 8.8 | ..... | 3.2 | 1.3 | ..... |

NOTE.—Stage-discharge relation affected by ice Nov. 26 to Feb. 12, and Mar. 7–11; daily discharge during these periods determined from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records.

*Monthly discharge of Moss Brook at Wendell Depot, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 12.2 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 91 | 1.9 | 10.0 | 0.820 | 0.95 |
| November | 53 | 5 | 11.9 | .976 | 1.09 |
| December | 10 | 4 | 6.97 | .571 | .66 |
| January | 8.5 | 4 | 5.21 | .427 | .49 |
| February | 68 | 4 | 18 | 1.48 | 1.54 |
| March | 106 | 20 | 47.5 | 3.89 | 4.48 |
| April | 101 | 25 | 53.2 | 4.36 | 4.86 |
| May | 53 | 8.2 | 20.7 | 1.70 | 1.96 |
| June | 46 | 1.9 | 9.81 | .804 | .90 |
| July | 11 | 1.4 | 3.27 | .265 | .31 |
| August | 2.7 | 1.0 | 1.45 | .118 | .14 |
| September | 46 | 1.1 | 6.91 | .566 | .63 |
| The year | 106 | 1.0 | 16.2 | 1.33 | 18.01 |

### DEERFIELD RIVER AT CHARLEMONT, MASS.

LOCATION.—About 1 mile below village of Charlemont, Franklin County.

DRAINAGE AREA.—362 square miles.

RECORDS AVAILABLE.—June 19, 1913, to September 30, 1918.

GAGES.—Friez water-stage recorder on left bank, referred to gage datum by a hook gage inside the well; an inclined staff gage is used for auxiliary readings.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed covered with coarse gravel and boulders. Section fairly uniform. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from water-stage recorder, 9.25 feet at 9 a. m. March 22 (discharge, 15,300 second-feet); a stage of 11.75 feet was recorded at noon March 21, but the water was held back by an ice jam; minimum stage during year, from water-stage recorder, 1.40 feet at 7 a. m. July 7 (discharge, 32 second-feet).

1913–1918: Maximum stage recorded, 15.7 feet on July 8, 1915 (discharge, by extension of rating curve, about 45,000 second-feet); minimum stage recorded, 1.35 feet September 21 and November 3, 1914 (discharge, 23 second-feet).

ICE.—River usually frozen over during the greater part of the winter; ice jams occasionally form below the gage, causing several feet of backwater.

REGULATION.—Flow during low and medium stages largely regulated by a storage reservoir at Somerset, Vt. Several power plants above the station cause diurnal fluctuation.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined. Operation of water-stage recorder satisfactory, except for short periods as shown in the footnote to the daily-discharge table. Daily discharge ascertained by use of discharge integrator. Records good.

*Discharge measurements of Deerfield River at Charlemont, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 11 | M. R. Stackpole | [a] 4.56 | 430 | July 16 | A. N. Weeks | 2.38 | 426 |
| Feb. 12 | do | [a] 4.54 | 309 | Sept. 6 | H. W. Fear | 1.90 | 169 |
| Mar. 18 | do | [a] 5.23 | 868 | | | | |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Deerfield River at Charlemont, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 420 | 1,420 | 460 | 280 | 370 | 1,250 | 4,800 | 2,400 | 410 | 170 | 370 | 180 |
| 2 | 360 | 980 | 265 | 280 | 310 | 1,050 | 6,500 | 1,840 | 200 | 360 | 355 | 140 |
| 3 | 360 | 640 | 640 | 400 | 75 | 780 | 5,400 | 1,200 | 325 | 225 | 250 | 320 |
| 4 | 340 | 500 | 560 | 400 | 135 | 780 | 3,150 | 970 | 230 | 91 | 126 | 270 |
| 5 | 320 | 580 | 560 | 370 | 310 | 720 | 2,150 | 610 | 174 | 170 | 450 | 225 |
| 6 | 375 | 480 | 440 | 60 | 500 | 960 | 1,540 | 740 | 180 | 114 | 480 | 210 |
| 7 | 460 | 440 | 440 | 400 | 370 | 1,350 | 1,900 | 600 | 440 | 46 | 440 | 190 |
| 8 | 255 | 350 | 260 | 540 | 370 | 1,050 | 2,200 | 530 | 770 | 174 | 400 | 61 |
| 9 | 220 | 420 | 100 | 460 | 370 | 720 | 3,000 | 540 | 325 | 205 | 1,000 | 200 |
| 10 | 260 | 220 | 440 | 440 | 220 | 640 | 3,000 | 560 | 405 | 260 | 350 | 225 |
| 11 | 340 | 205 | 560 | 460 | 50 | 720 | 1,740 | 1,460 | 340 | 290 | 142 | 255 |
| 12 | 180 | 510 | 640 | 400 | 135 | 640 | 1,300 | 980 | 405 | 250 | 240 | 275 |
| 13 | 460 | 460 | 720 | 75 | 310 | 720 | 1,040 | 830 | 750 | 335 | 186 | 340 |
| 14 | 420 | 405 | 880 | 310 | 260 | 720 | 1,000 | 2,950 | 590 | 140 | 186 | 270 |
| 15 | 345 | 430 | 500 | 560 | 370 | 640 | 1,700 | 1,740 | 410 | 425 | 300 | 100 |
| 16 | 620 | 470 | 440 | 720 | 310 | 540 | 2,200 | 1,140 | 168 | 340 | 250 | 205 |
| 17 | 420 | 300 | 500 | 640 | 220 | 500 | 2,700 | 820 | 260 | 275 | 240 | 190 |
| 18 | 325 | 85 | 560 | 440 | 310 | 780 | 3,300 | 700 | 240 | 325 | 225 | 172 |
| 19 | 245 | 270 | 640 | 135 | 370 | 880 | 2,300 | 430 | 220 | 225 | 180 | 300 |
| 20 | 225 | 305 | 720 | 260 | 4,200 | 1,250 | 1,720 | 570 | 215 | 190 | 240 | 315 |
| 21 | 310 | 290 | 640 | 260 | 3,600 | 3,000 | 2,300 | 650 | 230 | 60 | 255 | 600 |
| 22 | 235 | 410 | 310 | 310 | 1,850 | 4,450 | 4,850 | 590 | 1,360 | 178 | 295 | 700 |
| 23 | 285 | 480 | 75 | 640 | 1,250 | 3,950 | 3,350 | 580 | 1,200 | 240 | 275 | 290 |
| 24 | 465 | 380 | 310 | 640 | 960 | 2,750 | 2,800 | 540 | 830 | 230 | 260 | 255 |
| 25 | 1,960 | 215 | 135 | 560 | 960 | 2,750 | 1,800 | 360 | 550 | 245 | 138 | 340 |
| 26 | 940 | 410 | 340 | 440 | 1,600 | 2,450 | 1,400 | 310 | 365 | 280 | 455 | 3,500 |
| 27 | 580 | 450 | 310 | 75 | 1,600 | 1,700 | 1,200 | 650 | 220 | 210 | 320 | 1,100 |
| 28 | 640 | 450 | 340 | 100 | 1,250 | 1,320 | 1,200 | 590 | 165 | 79 | 300 | 650 |
| 29 | 810 | 250 | 340 | 370 | ..... | 1,500 | 1,450 | 520 | 140 | 270 | 280 | 475 |
| 30 | 5,400 | 480 | 50 | 440 | ..... | 2,250 | 2,000 | 405 | 86 | 250 | 270 | 420 |
| 31 | 3,950 | ..... | 240 | 440 | ..... | 3,150 | ..... | 630 | ..... | 330 | 200 | ..... |

NOTE.—Stage-discharge relation affected by ice from Dec. 3 to Mar. 21; daily discharge for this period determined from gage heights corrected for effect of ice by three discharge measurements, observer's notes and weather records, and comparison with records at New England Power Co.'s plant No. 4 at Shelburne Falls. Water-stage recorder not in operation Apr. 28 to May 1; Aug. 8–10, 28; and Sept. 27–28; discharge for these periods estimated by comparison with records at other stations.

*Monthly discharge of Deerfield River at Charlemont, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 362 square miles.]

| | Observed discharge (second-feet). | | | Gain or loss in storage at Somerset, Vt. (millions of cubic feet). | Discharge corrected for storage (second-feet). | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | | Mean. | Per square mile. | |
| October | 5,400 | 180 | 727 | +103 | 765 | 2.11 | 2.43 |
| November | 1,420 | 85 | 443 | −166 | 379 | 1.05 | 1.17 |
| December | 880 | 50 | 433 | −508 | 243 | .671 | .77 |
| January | 720 | 60 | 384 | −446 | 217 | .599 | .69 |
| February | 4,200 | 50 | 808 | − 55 | 785 | 2.17 | 2.26 |
| March | 4,450 | 500 | 1,480 | +269 | 1,580 | 4.36 | 5.03 |
| April | 6,500 | 1,000 | 2,500 | +620 | 2,740 | 7.57 | 8.45 |
| May | 2,950 | 310 | 885 | +387 | 1,030 | 2.85 | 3.29 |
| June | 1,360 | 86 | 407 | +176 | 475 | 1.31 | 1.46 |
| July | 425 | 46 | 225 | −299 | 113 | .312 | .36 |
| August | 1,000 | 126 | 305 | −536 | 105 | .290 | .33 |
| September | 3,500 | 61 | 426 | 0 | 426 | 1.18 | 1.32 |
| The year | 6,500 | 46 | 749 | −455 | 735 | 2.03 | 27.56 |

NOTE.—The increase (+) or decrease (−) of water held in storage at Somerset, Vt., during the month has been 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, three-quarters of a mile above mouth of Beaver Brook and 3 miles below Ware, Hampshire County.

DRAINAGE AREA.—201 square miles.

RECORDS AVAILABLE.—August 20, 1912, to September 30, 1918.

GAGES.—Barrett & Lawrence water-stage recorder on the right bank referred to gage datum by a hook gage inside of well; an inclined staff gage is used for auxiliary readings.

DISCHARGE MEASUREMENTS.—Made from the electric railway bridge or by wading.

CHANNEL AND CONTROL.—Bed 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 the gage; shifts occasionally; at high stages the control is probably at the dam at Thorndike, 4 miles below the gage.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from water-stage recorder, 3.84 feet at 12 noon March 23 (discharge, 1,260 second-feet); a stage of 8.85 feet was recorded at 10 a. m. February 27, but the water was held back by an ice jam; minimum stage during year, from water-stage recorder, 1.38 feet at 4 a. m. July 29 (discharge, 21 second-feet).

1912–1918: Maximum open-water stage recorded, 5.9 feet on March 2, 1914 (discharge, 2,770 second-feet); minimum stage recorded, 1.20 feet on October 26, 1914 (discharge, 5 second-feet).

ICE.—River freezes over, and the stage-discharge relation is seriously affected by the ice; the large diurnal fluctuation in flow breaks up the ice and causes a variable backwater effect.

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.—Slight changes in the stage-discharge relation occurred during the year. Rating curve fairly well defined. The operation of water-stage recorder was satisfactory, except for short periods as shown in footnote to daily-discharge table. Daily discharge ascertained by use of discharge integrator. Records good.

*Discharge measurements of Ware River at Gibbs Crossing, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Nov. 8 | H. W. Fear | 2.42 | 206 | Mar. 15 | M. R. Stackpole | 3.10 | 528 |
| 27 | do | 2.24 | 196 | June 6 | A. N. Weeks | 2.22 | 168 |
| Dec. 19 | do | [a] 3.55 | 198 | July 6 | do | 1.70 | 51 |
| Jan. 29 | do | [a] 3.61 | 142 | 7 | do | 1.47 | 29.4 |
| Feb. 27 | do | [a] 8.80 | 1,320 | | | | |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Ware River at Gibbs Crossing, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56 | 455 | 184 | 29 | 76 | 890 | 720 | 560 | 122 | 156 | 82 | 22 |
| 2 | 61 | 310 | 83 | 66 | 52 | 700 | 710 | 670 | 104 | 128 | 74 | 32 |
| 3 | 60 | 240 | 245 | 86 | 40 | 480 | 780 | 580 | 178 | 128 | 87 | 60 |
| 4 | 55 | 225 | 280 | 96 | 64 | 380 | 780 | 480 | 110 | 43 | 21 | 46 |
| 5 | 53 | 215 | 205 | 110 | 80 | 540 | 720 | 400 | 148 | 136 | 112 | 70 |
| 6 | 51 | 200 | 198 | 39 | 100 | 980 | 610 | 415 | 124 | 84 | 70 | 120 |
| 7 | 32 | 190 | 210 | 70 | 90 | 1,000 | 500 | 380 | 164 | 37 | 83 | 72 |
| 8 | 56 | 174 | 164 | 105 | 90 | 800 | 510 | 375 | 148 | 156 | 65 | 23 |
| 9 | 90 | 156 | 100 | 80 | 48 | 650 | 490 | 345 | 168 | 82 | 70 | 64 |
| 10 | 100 | 120 | 170 | 86 | 37 | 600 | 470 | 325 | 205 | 61 | 52 | 64 |
| 11 | 82 | 96 | 200 | 155 | 88 | 540 | 440 | 275 | 190 | 110 | 60 | 75 |
| 12 | 74 | 178 | 210 | 155 | 140 | 510 | 440 | 245 | 210 | 132 | 162 | 80 |
| 13 | 55 | 150 | 190 | 105 | 210 | 670 | 440 | 280 | 205 | 80 | 96 | 73 |
| 14 | 35 | 156 | 180 | 260 | 110 | 620 | 425 | 295 | 190 | 26 | 88 | 67 |
| 15 | 52 | 172 | 125 | 260 | 175 | 550 | 680 | 295 | 160 | 138 | 64 | 30 |
| 16 | 172 | 148 | 82 | 195 | 280 | 480 | 630 | 290 | 150 | 91 | 132 | 63 |
| 17 | 130 | 112 | 190 | 165 | 230 | 530 | 580 | 265 | 188 | 140 | 83 | 100 |
| 18 | 90 | 54 | 145 | 37 | 215 | 800 | 545 | 180 | 130 | 120 | 21 | 124 |
| 19 | 70 | 100 | 135 | 45 | 190 | 790 | 550 | 170 | 140 | 142 | 102 | 118 |
| 20 | 55 | 126 | 94 | 56 | 380 | 720 | 480 | 235 | 136 | 92 | 94 | 110 |
| 21 | 34 | 134 | 115 | 76 | 1,000 | 850 | 470 | 230 | 79 | 29 | 60 | 480 |
| 22 | 80 | 132 | 88 | 165 | 790 | 990 | 790 | 205 | 300 | 124 | 60 | 370 |
| 23 | 94 | 158 | 52 | 220 | 540 | 1,100 | 760 | 205 | 490 | 57 | 67 | 275 |
| 24 | 124 | 164 | 135 | 115 | 380 | 1,120 | 700 | 170 | 400 | 66 | 50 | 260 |
| 25 | 140 | 130 | 41 | 120 | 300 | 1,080 | 600 | 128 | 280 | 90 | 18 | 180 |
| 26 | 170 | 198 | 56 | 50 | 790 | 1,000 | 490 | 108 | 250 | 61 | 35 | 200 |
| 27 | 162 | 152 | 86 | 37 | 1,110 | 880 | 445 | 205 | 200 | 41 | 39 | 790 |
| 28 | 156 | 122 | 120 | 80 | 540 | 760 | 385 | 178 | 170 | 16 | 39 | 830 |
| 29 | 230 | 67 | 94 | 120 | ..... | 700 | 430 | 184 | 112 | 60 | 68 | 445 |
| 30 | 310 | 116 | 35 | 135 | ..... | 670 | 405 | 87 | 89 | 64 | 50 | 360 |
| 31 | 420 | ..... | 115 | 76 | ..... | 660 | ..... | 210 | ..... | 160 | 40 | ..... |

NOTE.—Stage-discharge relation affected by ice from Dec. 10 to Mar. 5; discharge for this period determined from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records. Daily discharge Oct. 19–20, Nov. 5–7, and Dec. 1–2, estimated by means of hydrograph comparisons with records in adjacent drainage basins.

*Monthly discharge of Ware River at Gibbs Crossing, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 201 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 420 | 32 | 108 | 0.537 | 0.62 |
| November | 455 | 54 | 165 | .821 | .92 |
| December | 280 | 35 | 140 | .697 | .80 |
| January | 260 | 29 | 109 | .542 | .62 |
| February | 1,110 | 37 | 291 | 1.45 | 1.51 |
| March | 1,120 | 380 | 743 | 3.70 | 4.27 |
| April | 790 | 385 | 566 | 2.82 | 3.15 |
| May | 670 | 87 | 289 | 1.44 | 1.66 |
| June | 490 | 79 | 185 | .920 | 1.03 |
| July | 160 | 16 | 91.9 | .457 | .53 |
| August | 162 | 18 | 69.2 | .344 | .40 |
| September | 830 | 22 | 187 | .930 | 1.04 |
| The year | 1,120 | 16 | 245 | 1.22 | 16.55 |

### SWIFT RIVER AT WEST WARE, MASS.

LOCATION.—About 1,000 feet below old wooden dam opposite West Ware station of Boston & Albany Railroad, 6 miles downstream from Enfield, Franklin County, 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, 1918.

GAGES.—Barrett & Lawrence water-stage recorder on left bank, referred to gage datum by means of a hook gage inside the well; an inclined staff gage is used for auxiliary readings. Prior to August 25, 1912, a chain gage on footbridge 600 feet upstream from the present station was used.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel and alluvial deposits; some aquatic vegetation in channel during summer. Control subject to slight changes at high-water periods; at high stages the control is probably at the dam at Bondsville, 4 miles below the gage.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from water-stage recorder, 5.86 feet at noon March 25 (discharge, 1,100 second-feet); a stage of 7.2 feet was recorded at 8 a. m. March 2, but the water was held back by an ice jam; minimum stage during year, from water-stage recorder, 1.73 feet at 8 p. m. August 27 (discharge, 53 second-feet).

1910–1918: Maximum stage recorded, 9.1 feet on February 26, 1915 (discharge, by extension of rating curve, 2,240 second-feet); minimum stage recorded, 1.36 feet on September 22, 1914 (discharge, 22 second-feet).

ICE.—River usually freezes over, and the stage-discharge relation is somewhat affected by the ice.

REGULATION.—Operation of mills at Enfield, 6 miles above the station, affects distribution of flow at low and medium stages, but has only a slight effect when the mean daily discharge is over 200 second-feet.

ACCURACY.—Stage-discharge relation unchanged during the year except when affected by ice. Rating curve fairly well defined below 1,200 second-feet. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records only fair during the period affected by ice, but are good for rest of year.

*Discharge measurements of Swift River at West Ware, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 21 | H. W. Fear | [a] 2.26 | 98 | May 9 | H. W. Fear | 3.22 | 325 |
| Jan. 31 | do | [a] 3.42 | 101 | June 5 | A. N. Weeks | 2.35 | 138 |
| Mar. 6 | do | [a] 6.17 | 638 | July 5 | O. W. Hartwell | 2.36 | 139 |

[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, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 97 | 478 | 146 | 70 | 100 | 790 | 715 | 491 | 124 | 134 | 80 | 60 |
| 2 | 97 | 491 | 184 | 70 | 90 | 820 | 745 | 491 | 123 | 120 | 84 | 70 |
| 3 | 91 | 440 | 205 | 70 | 86 | 760 | 790 | 504 | 148 | 118 | 76 | 67 |
| 4 | 88 | 385 | 219 | 78 | 84 | 700 | 825 | 478 | 135 | 84 | 69 | 64 |
| 5 | 84 | 281 | 200 | 84 | 84 | 670 | 790 | 416 | 139 | 113 | 87 | 64 |
| 6 | 84 | 234 | 174 | 78 | 84 | 640 | 745 | 380 | 130 | 120 | 90 | 68 |
| 7 | 83 | 198 | 174 | 84 | 90 | 640 | 685 | 358 | 153 | 113 | 79 | 70 |
| 8 | 76 | 174 | 174 | 94 | 90 | 610 | 640 | 349 | 168 | 139 | 77 | 65 |
| 9 | 91 | 154 | 137 | 98 | 90 | 580 | 612 | 312 | 146 | 123 | 81 | 80 |
| 10 | 94 | 146 | 150 | 110 | 98 | 570 | 584 | 237 | 156 | 103 | 81 | 80 |
| 11 | 90 | 137 | 155 | 110 | 98 | 560 | 570 | 272 | 158 | 92 | 68 | 81 |
| 12 | 90 | 137 | 160 | 115 | 90 | 560 | 556 | 270 | 174 | 104 | 92 | 71 |
| 13 | 110 | 132 | 120 | 130 | 84 | 570 | 556 | 261 | 192 | 92 | 94 | 79 |
| 14 | 98 | 139 | 110 | 150 | 105 | 580 | 543 | 256 | 200 | 79 | 79 | 75 |
| 15 | 98 | 130 | 125 | 135 | 145 | 600 | 543 | 270 | 198 | 97 | 83 | 69 |
| 16 | 104 | 129 | 130 | 140 | 240 | 610 | 584 | 277 | 178 | 97 | 83 | 77 |
| 17 | 106 | 124 | 140 | 130 | 230 | 610 | 612 | 274 | 158 | 101 | 74 | 81 |
| 18 | 121 | 115 | 130 | 130 | 200 | 626 | 626 | 256 | 147 | 103 | 75 | 77 |
| 19 | 113 | 127 | 115 | 120 | 260 | 626 | 612 | 241 | 146 | 103 | 76 | 84 |
| 20 | 109 | 116 | 120 | 120 | 340 | 670 | 598 | 223 | 137 | 100 | 79 | 97 |
| 21 | 113 | 123 | 120 | 120 | 430 | 730 | 570 | 209 | 124 | 90 | 74 | 115 |
| 22 | 116 | 129 | 125 | 130 | 530 | 825 | 584 | 202 | 205 | 101 | 71 | 95 |
| 23 | 115 | 154 | 130 | 135 | 560 | 965 | 640 | 198 | 358 | 88 | 71 | 123 |
| 24 | 112 | 174 | 130 | 130 | 580 | 1,080 | 670 | 188 | 428 | 87 | 71 | 116 |
| 25 | 129 | 202 | 115 | 120 | 580 | 1,080 | 670 | 178 | 392 | 83 | 63 | 118 |
| 26 | 142 | 200 | 115 | 120 | 500 | 1,040 | 612 | 174 | 320 | 81 | 59 | 151 |
| 27 | 140 | 190 | 130 | 110 | 730 | 1,000 | 556 | 174 | 243 | 75 | 55 | 351 |
| 28 | 156 | 188 | 115 | 110 | 760 | 860 | 517 | 154 | 188 | 70 | 60 | 478 |
| 29 | 174 | 174 | 105 | 100 | ..... | 760 | 491 | 154 | 160 | 75 | 70 | 428 |
| 30 | 200 | 151 | 90 | 100 | ..... | 670 | 491 | 144 | 146 | 80 | 70 | 347 |
| 31 | 336 | ..... | 78 | 100 | ..... | 600 | ..... | 134 | ..... | 81 | 65 | ..... |

NOTE.—Stage-discharge relation affected by ice from Dec. 10 to Mar. 10; discharge for this period determined from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records. Pipe to gage well partly clogged Apr. 23 to June 2; gage heights determined by comparison with readings on inclined staff. Daily discharge June 26, July 6, 27–30, Aug. 28–31, and Sept. 1, 7–8, estimated by hydrograph comparisons with records in adjacent drainage basins.

*Monthly discharge of Swift River at West Ware, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 186 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 336 | 76 | 118 | 0.634 | 0.73 |
| November | 491 | 115 | 198 | 1.06 | 1.18 |
| December | 219 | 78 | 139 | .747 | .86 |
| January | 150 | 70 | 109 | .586 | .68 |
| February | 760 | 84 | 263 | 1.41 | 1.47 |
| March | 1,080 | 560 | 723 | 3.89 | 4.48 |
| April | 825 | 491 | 624 | 3.35 | 3.74 |
| May | 504 | 134 | 275 | 1.48 | 1.71 |
| June | 428 | 123 | 189 | 1.02 | 1.14 |
| July | 139 | 70 | 98.3 | .528 | .61 |
| August | 94 | 55 | 75.4 | .405 | .47 |
| September | 478 | 60 | 127 | .683 | .76 |
| The year | 1,080 | 55 | 244 | 1.31 | 17.83 |

### QUABOAG RIVER AT WEST BRIMFIELD, MASS.

LOCATION.—At two-span highway bridge in Hampden County near West Brimfield station of Boston & Albany Railroad, one-third of a mile above mouth of Blodgett Mill Brook.

DRAINAGE AREA.—150 square miles.

RECORDS AVAILABLE.—August 23, 1909, to September 30, 1918.

GAGES.—Stevens continuous water-stage recorder at downstream end of center pier of bridge, referred to gage datum by means of a hook gage inside of well; a vertical staff is used for auxiliary readings. Prior to August 19, 1912, a vertical staff on upstream side of right abutment of bridge, at same datum as present gage, was used.

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

CHANNEL AND CONTROL.—Stream bed covered with boulders, gravel, and alluvial deposits. Slight shifts in control have occurred at infrequent intervals.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from water-stage recorder, 3.59 feet at 11.30 a. m. March 14 and 10 a. m. March 22 (discharge, 756 second-feet); a stage of 6.07 feet was recorded at 9 a. m. March 1, but the water was held back by an ice jam; minimum stage during year from water-stage recorder, 1.51 feet at 11.15 a. m. September 15 (discharge, 5.5 second-feet).

1909–1918: Maximum stage recorded, 4.9 feet on March 1, 1910 (discharge, 1,660 second-feet); minimum stage recorded, 1.40 feet on September 17 and 18, 1910 (discharge, 2.5 second-feet).

ICE.—River freezes over and the stage-discharge relation is affected by the ice; the diurnal fluctuation in flow breaks up the ice and causes a variable backwater effect.

REGULATION.—Flow affected by operation of power plants at West Warren, 3 miles above station, 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.—A slight change in stage-discharge relation occurred during the year. Rating curves well defined. Operation of water-stage recorder satisfactory except for short periods as shown in the footnote to daily-discharge table. Daily discharge ascertained by discharge integrator. Records good, except for periods affected by ice, for which they are fair.

*Discharge measurements of Quaboag River at West Brimfield, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Nov. 9 | H. W. Fear | 2.28 | 129 | Mar. 15 | M. R. Stackpole | 3.26 | 555 |
| Dec. 20 | do | [a] 3.12 | 166 | June 6 | A. N. Weeks | [b] 2.46 | 143 |
| Jan. 8 | do | [a] 3.36 | 70 | July 7 | do | 2.17 | 86 |
| 30 | do | [a] 3.70 | 91 | Sept. 10 | H. W. Fear | 2.19 | 90 |
| Feb. 26 | do | [a] 5.73 | 975 | | | | |

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

*Daily discharge, in second-feet, of Quaboag River at West Brimfield, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 73 | 210 | 75 | 50 | 55 | 830 | 540 | 370 | 100 | 102 | 87 | 45 |
| 2 | 58 | 200 | 110 | 55 | 55 | 560 | 520 | 380 | 98 | 87 | 79 | 50 |
| 3 | 56 | 186 | 135 | 55 | 50 | 345 | 500 | 375 | 104 | 90 | 63 | 48 |
| 4 | 60 | 166 | 165 | 65 | 55 | 275 | 510 | 355 | 77 | 84 | 74 | 46 |
| 5 | 58 | 160 | 135 | 55 | 65 | 590 | 470 | 340 | 76 | 100 | 90 | 46 |
| 6 | 50 | 160 | 110 | 50 | 65 | 830 | 460 | 305 | 91 | 105 | 75 | 48 |
| 7 | 50 | 150 | 110 | 55 | 55 | 930 | 450 | 285 | 102 | 90 | 75 | 52 |
| 8 | 77 | 132 | 85 | 55 | 50 | 790 | 400 | 270 | 100 | 97 | 73 | 50 |
| 9 | 67 | 144 | 65 | 50 | 75 | 690 | 390 | 255 | 102 | 76 | 70 | 55 |
| 10 | 62 | 114 | 85 | 50 | 75 | 630 | 385 | 250 | 114 | 73 | 53 | 55 |
| 11 | 62 | 120 | 95 | 50 | 55 | 590 | 380 | 225 | 110 | 72 | 66 | 45 |
| 12 | 59 | 128 | 110 | 110 | 55 | 560 | 405 | 225 | 136 | 70 | 91 | 47 |
| 13 | 64 | 118 | 95 | 110 | 50 | 720 | 380 | 210 | 182 | 54 | 72 | 55 |
| 14 | 69 | 116 | 65 | 150 | 65 | 650 | 370 | 150 | 172 | 64 | 74 | 44 |
| 15 | 92 | 120 | 55 | 120 | 95 | 550 | 355 | 150 | 160 | 91 | 90 | 20 |
| 16 | 80 | 114 | 65 | 135 | 235 | 430 | 345 | 170 | 154 | 71 | 72 | 61 |
| 17 | 72 | 96 | 75 | 165 | 165 | 540 | 335 | 180 | 148 | 64 | 62 | 46 |
| 18 | 70 | 85 | 85 | 135 | 150 | 560 | 355 | 130 | 128 | 90 | 61 | 53 |
| 19 | 80 | 104 | 85 | 135 | 150 | 580 | 330 | 150 | 114 | 96 | 72 | 60 |
| 20 | 66 | 100 | 75 | 120 | 420 | 580 | 320 | 140 | 100 | 86 | 57 | 70 |
| 21 | 56 | 110 | 75 | 150 | 660 | 610 | 345 | 120 | 100 | 66 | 50 | 85 |
| 22 | 90 | 114 | 55 | 120 | 530 | 630 | 415 | 134 | 225 | 94 | 48 | 70 |
| 23 | 72 | 146 | 50 | 95 | 365 | 620 | 395 | 150 | 220 | 73 | 47 | 83 |
| 24 | 90 | 122 | 85 | 75 | 275 | 620 | 385 | 130 | 182 | 88 | 45 | 90 |
| 25 | 144 | 100 | 50 | 75 | 235 | 630 | 365 | 116 | 154 | 91 | 42 | 84 |
| 26 | 126 | 100 | 75 | 65 | 530 | 620 | 355 | 130 | 144 | 85 | 52 | 114 |
| 27 | 91 | 100 | 95 | 50 | 760 | 580 | 340 | 140 | 130 | 65 | 45 | 198 |
| 28 | 120 | 85 | 75 | 65 | 500 | 590 | 325 | 130 | 118 | 65 | 48 | 152 |
| 29 | 116 | 80 | 85 | 65 | ..... | 570 | 300 | 114 | 110 | 81 | 52 | 140 |
| 30 | 190 | 75 | 75 | 55 | ..... | 550 | 290 | 132 | 106 | 66 | 52 | 142 |
| 31 | 250 | ..... | 65 | 55 | ..... | 550 | ..... | 136 | ..... | 75 | 47 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 11 to Mar. 6; daily discharge for this period determined from gage heights corrected for effect of ice by means of four discharge measurements, observer's notes, and weather records. Stage-discharge relation slightly affected by débris from about June 1 to July 7; correction estimated from results of one discharge measurement. Daily discharge Nov. 26 to Dec. 10, Aug. 22–31, and Sept. 1–10, 19–22, estimated by hydrograph comparisons with records in adjacent drainage basins.

*Monthly discharge of Quaboag River at West Brimfield, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 150 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 250 | 50 | 86.1 | 0.574 | 0.66 |
| November | 210 | 75 | 125 | .833 | .93 |
| December | 165 | 50 | 86.0 | .573 | .66 |
| January | 165 | 50 | 85.2 | .568 | .65 |
| February | 760 | 50 | 211 | 1.41 | 1.47 |
| March | 930 | 275 | 606 | 4.04 | 4.66 |
| April | 540 | 290 | 390 | 2.60 | 2.90 |
| May | 380 | 114 | 205 | 1.37 | 1.58 |
| June | 225 | 76 | 129 | .860 | .96 |
| July | 105 | 54 | 81.0 | .540 | .62 |
| August | 91 | 42 | 64.0 | .427 | .49 |
| September | 198 | 20 | 71.8 | .479 | .53 |
| The year | 930 | 20 | 178 | 1.19 | 16.11 |

### WESTFIELD RIVER AT KNIGHTVILLE, MASS.

LOCATION.—At single-span steel highway bridge known locally as Pitcher Bridget in Knightville, 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, 1918.

GAGE.—Chain attached to downstream side of highway bridge; read by J. A. Burr.

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

CHANNEL AND CONTROL.—Bed consists of boulders and ledge rock; control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum open-water stage recorded during yeare 4.61 feet at 6 p. m. April 2 (discharge, 1,880 second-feet); a stage of 6.5 feet was recorded at 4.30 p. m. February 20, but the water was held back by an ice jam; minimum stage recorded, 0.70 foot at 7 a. m. August 26 (discharge, 15 second-feet).

1909–1918: Maximum open-water stage recorded, 8.9 feet on March 27, 1913 (discharge, by extension of rating curve, about 5,100 second-feet); a gage height of 9.4 feet was recorded at 9.15 a. m. January 22, 1910, but channel was probably obstructed by ice at that time; 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 seriously affects the stage-discharge relation.

REGULATION.—Flow not seriously affected by regulation.

ACCURACY.—The stage-discharge relation changed slightly during high water of April 1–3; individual discharge measurements have at times appeared erratic, the rough and irregular channel causing difficulty in securing accurate discharge measurements. Rating curve fairly well defined below 2,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying daily gage height to rating table and making corrections for effect of ice during winter. Records good.

*Discharge measurements of Westfield River at Knightville, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 22 | H. W. Fear | [a] 2.35 | 83 | Mar 16 | M. R. Stackpole | [a] 3.60 | 369 |
| Feb. 2 | do | [a] 2.65 | 52 | July 11[b] | A. N. Weeks | 1.16 | 50 |
| Mar. 1 | do | [a] 5.90 | 984 | | | | |

[a] Stage-discharge relation affected by ice. [b] Results uncertain.

*Daily discharge, in second-feet, of Westfield River at Knightville, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 21 | 435 | 113 | 56 | 56 | 600 | 1,440 | 512 | 153 | 52 | 31 | 49 |
| 2 | 21 | 285 | 150 | 56 | 45 | 540 | 1,780 | 655 | 130 | 115 | 28 | 52 |
| 3 | 21 | 215 | 157 | 64 | 45 | 540 | 1,440 | 485 | 113 | 84 | 25 | 36 |
| 4 | 20 | 167 | 143 | 64 | 40 | 440 | 1,200 | 350 | 92 | 68 | 25 | 28 |
| 5 | 21 | 152 | 134 | 64 | 35 | 490 | 910 | 310 | 82 | 55 | 29 | 24 |
| 6 | 57 | 143 | 125 | 50 | 27 | 660 | 715 | 292 | 84 | 49 | 28 | 21 |
| 7 | 63 | 123 | 105 | 70 | 31 | 600 | 715 | 275 | 130 | 60 | 28 | 20 |
| 8 | 38 | 119 | 86 | 70 | 27 | 540 | 655 | 240 | 156 | 50 | 29 | 20 |
| 9 | 35 | 117 | 86 | 80 | 27 | 540 | 780 | 225 | 108 | 44 | 29 | 28 |
| 10 | 33 | 113 | 96 | 70 | 27 | 600 | 655 | 202 | 97 | 100 | 28 | 24 |
| 11 | 29 | 109 | 84 | 70 | 35 | 540 | 595 | 370 | 87 | 45 | 51 | 23 |
| 12 | 30 | 105 | 64 | 145 | 27 | 490 | 512 | 310 | 163 | 50 | 49 | 23 |
| 13 | 92 | 96 | 60 | 170 | 86 | 490 | 485 | 225 | 210 | 61 | 37 | 27 |
| 14 | 98 | 91 | 105 | 170 | 145 | 390 | 540 | 1,050 | 141 | 85 | 34 | 35 |
| 15 | 77 | 87 | 105 | 170 | 145 | 350 | 780 | 485 | 93 | 139 | 42 | 35 |
| 16 | 71 | 94 | 96 | 170 | 170 | 300 | 655 | 350 | 77 | 92 | 31 | 34 |
| 17 | 68 | 94 | 86 | 145 | 145 | 520 | 625 | 275 | 68 | 67 | 27 | 25 |
| 18 | 58 | 92 | 86 | 145 | 170 | 1,050 | 780 | 225 | 64 | 106 | 23 | 29 |
| 19 | 55 | 85 | 80 | 125 | 145 | 1,200 | 568 | 205 | 63 | 79 | 21 | 64 |
| 20 | 50 | 81 | 80 | 125 | 900 | 1,350 | 460 | 173 | 56 | 67 | 20 | 82 |
| 21 | 47 | 91 | 86 | 145 | 1,350 | 1,690 | 568 | 153 | 48 | 59 | 19 | 175 |
| 22 | 45 | 172 | 80 | 125 | 980 | 1,690 | 1,360 | 183 | 540 | 49 | 19 | 146 |
| 23 | 45 | 345 | 80 | 125 | 660 | 1,600 | 845 | 199 | 460 | 40 | 19 | 92 |
| 24 | 105 | 200 | 86 | 145 | 540 | 1,280 | 780 | 163 | 188 | 38 | 19 | 67 |
| 25 | 845 | 115 | 80 | 125 | 350 | 1,280 | 540 | 148 | 136 | 34 | 17 | 59 |
| 26 | 265 | 94 | 70 | 105 | 660 | 1,120 | 435 | 210 | 109 | 32 | 16 | 512 |
| 27 | 129 | 94 | 56 | 105 | 1,100 | 845 | 390 | 275 | 84 | 27 | 18 | 910 |
| 28 | 125 | 94 | 56 | 105 | 660 | 780 | 350 | 188 | 68 | 25 | 17 | 258 |
| 29 | 192 | 87 | 70 | 86 | ..... | 845 | 330 | 130 | 48 | 28 | 22 | 158 |
| 30 | 910 | 87 | 80 | 64 | ..... | 980 | 485 | 136 | 39 | 42 | 42 | 113 |
| 31 | 1,200 | ..... | 64 | 64 | ..... | 1,200 | ..... | 163 | ..... | 49 | 34 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 7 to Mar. 20; discharge for this period determined from gage heights corrected for effect of ice by means of four discharge measurements, observer's notes, and weather records.

*Monthly discharge of Westfield River at Knightville, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 162 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 1,200 | 20 | 157 | 0.969 | 1.12 |
| November | 435 | 81 | 139 | .858 | .96 |
| December | 157 | 56 | 91.9 | .567 | .65 |
| January | 170 | 50 | 106 | .654 | .75 |
| February | 1,350 | 27 | 308 | 1.90 | 1.98 |
| March | 1,690 | 300 | 824 | 5.09 | 5.87 |
| April | 1,780 | 330 | 746 | 4.60 | 5.13 |
| May | 1,050 | 130 | 296 | 1.83 | 2.11 |
| June | 540 | 39 | 130 | .802 | .90 |
| July | 139 | 27 | 61.0 | .377 | .43 |
| August | 51 | 16 | 27.6 | .170 | .20 |
| September | 910 | 20 | 106 | .654 | .73 |
| The year | 1,780 | 16 | 248 | 1.53 | 20.83 |

### WESTFIELD RIVER NEAR WESTFIELD, MASS.

LOCATION.—At Trap Rock crossing, 3 miles east of Westfield, Hampden County, 1 mile below mouth of Big Brook, and 2 miles below mouth of Westfield Little River.

DRAINAGE AREA.—496 square miles.

RECORDS AVAILABLE.—June 27, 1914, to September 30, 1918.

GAGES.—Stevens continuous water-stage recorder on right bank, referred to gage datum by means of a hook gage inside the well; an inclined staff gage is used for auxiliary readings.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed covered with gravel and alluvial deposits. Riffle of boulders about 200 feet below gage forms control at low and medium stages; at high stages control is probably formed by crest of storage dam at Mittineaugue 3 miles below the station.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 11.10 feet at 11 p. m. October 30 (discharge, 7,900 second-feet); minimum stage during year, from water-stage recorder, 3.18 feet at 9 p. m. August 24 (discharge, 88 second-feet).

1914–1918: Maximum stage recorded, 17.4 feet on August 4, 1915 (discharge, by extension of rating curve, about 17,400 second-feet); minimum stage recorded, 3.02 feet on September 24, 1914 (discharge, 46 second-feet).

ICE.—Stage-discharge relation affected by ice for short periods during the winter.

DIVERSIONS.—Water is diverted from Westfield Little River and carried to Springfield for municipal use.

REGULATION.—Operating of several power plants above the station causes some diurnal fluctuation of flow; the nearest dam is at Westfield.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined below 7,500 second-feet. Operation of water-stage recorder satisfactory except for short periods as shown in the footnote to the daily-discharge table. Daily discharge ascertained by discharge integrator. Records good.

*Discharge measurements of Westfield River near Westfield, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Nov. 9 | H. W. Fear | 4.18 | 461 | Feb. 28 | H. W. Fear | 6.22 | 1,900 |
| Dec. 20 | do | 3.75 | 285 | July 9 | O. W. Hartwell | 3.80 | 288 |
| Jan. 7 | do | [a] 3.51 | 153 | 10 | do | 3.53 | 190 |
| Feb. 1 | do | 3.72 | 275 | | | | |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Westfield River near Westfield, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 168 | 1,480 | 410 | 210 | 250 | 2,750 | 3,850 | 1,500 | 450 | 200 | 160 | 192 |
| 2 | 136 | 970 | 430 | 210 | 290 | 2,800 | 4,900 | 1,800 | 340 | 235 | 150 | 148 |
| 3 | 132 | 820 | 330 | 220 | 280 | 2,100 | 3,750 | 1,350 | 390 | 315 | 145 | 174 |
| 4 | 150 | 610 | 385 | 225 | 250 | 1,600 | 3,100 | 1,000 | 340 | 290 | 140 | 205 |
| 5 | 140 | 590 | 385 | 225 | 270 | 1,500 | 2,400 | 880 | 230 | 205 | 166 | 184 |
| 6 | 188 | 500 | 305 | 220 | 270 | 1,900 | 2,000 | 870 | 280 | 275 | 200 | 180 |
| 7 | 205 | 465 | 310 | 210 | 250 | 2,300 | 1,750 | 860 | 340 | 250 | 205 | 180 |
| 8 | 245 | 400 | 220 | 210 | 250 | 2,050 | 1 500 | 850 | 610 | 180 | 176 | 164 |
| 9 | 285 | 415 | 315 | 230 | 250 | 1,700 | 1,500 | 780 | 385 | 260 | 160 | 192 |
| 10 | 210 | 440 | 250 | 175 | 230 | 1,740 | 1,900 | 670 | 370 | 250 | 160 | 160 |
| 11 | 195 | 310 | 290 | 230 | 230 | 1,480 | 1,480 | 790 | 300 | 220 | 230 | 150 |
| 12 | 210 | 340 | 250 | 430 | 325 | 1,280 | 1,280 | 760 | 330 | 215 | 215 | 158 |
| 13 | 260 | 370 | 250 | 400 | 265 | 1,460 | 1,200 | 720 | 660 | 240 | 186 | 168 |
| 14 | 290 | 360 | 250 | 580 | 280 | 1,700 | 1,260 | 1,910 | 530 | 280 | 200 | 160 |
| 15 | 335 | 400 | 315 | 560 | 450 | 1,480 | 2,050 | 1,760 | 395 | 345 | 220 | 150 |
| 16 | 360 | 370 | 250 | 530 | 560 | 1,360 | 1,700 | 1,120 | 300 | 415 | 170 | 158 |
| 17 | 220 | 290 | 230 | 500 | 590 | 1,300 | 1,520 | 870 | 255 | 365 | 200 | 200 |
| 18 | 235 | 300 | 290 | 480 | 620 | 1,980 | 1,540 | 730 | 245 | 385 | 210 | 215 |
| 19 | 265 | 350 | 290 | 450 | 560 | 2,150 | 1,520 | 610 | 225 | 340 | 190 | 210 |
| 20 | 250 | 360 | 290 | 430 | 2,350 | 3,000 | 1,240 | 620 | 225 | 325 | 132 | 285 |
| 21 | 200 | 245 | 300 | 430 | 4,050 | 3,800 | 1,240 | 530 | 170 | 360 | 126 | 550 |
| 22 | 170 | 385 | 300 | 440 | 2,700 | 4,650 | 3,500 | 570 | 690 | 220 | 122 | 620 |
| 23 | 205 | 565 | 270 | 420 | 2,350 | 4,450 | 2,350 | 600 | 1,220 | 250 | 120 | 475 |
| 24 | 470 | 600 | 270 | 430 | 1,640 | 3,100 | 1,880 | 550 | 660 | 192 | 110 | 345 |
| 25 | 1,920 | 445 | 290 | 420 | 1,300 | 3,000 | 1,500 | 450 | 490 | 176 | 130 | 300 |
| 26 | 900 | 400 | 335 | 400 | 2,350 | 2,900 | 1,250 | 470 | 395 | 190 | 130 | 1,350 |
| 27 | 530 | 345 | 330 | 360 | 2,900 | 2,150 | 1,100 | 900 | 320 | 142 | 130 | 1,700 |
| 28 | 770 | 260 | 300 | 350 | 1,900 | 1,850 | 1,020 | 600 | 285 | 140 | 124 | 900 |
| 29 | 755 | 225 | 250 | 330 | ..... | 2,150 | 960 | 420 | 240 | 155 | 134 | 600 |
| 30 | 2,550 | 275 | 250 | 310 | ..... | 2,500 | 1,300 | 440 | 230 | 195 | 156 | 440 |
| 31 | 3,600 | ..... | 230 | 290 | ..... | 3,100 | ..... | 480 | ..... | 240 | 132 | ..... |

NOTE.—Stage-discharge relation affected by ice Jan. 7–14 and Feb. 5–7; corrections for these periods based on one discharge measurement and comparison with records at Knightville. Water-stage recorder not operating satisfactorily Dec. 28–31; Jan. 1–5, 16–31; Mar. 15–16, 28–30; Apr. 2–6, 29–30; May 1–6, 27–31; June 1; July 29–31; Aug. 1–3; Sept. 26–30; and discharge estimated by hydrograph comparison with records at Knightville.

*Monthly discharge of Westfield River near Westfield, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 496 square miles.]

| Month. | Observed discharge (second-feet). | | | Diversion from Westfield Little River (millions of gallons). | Total discharge (second-feet). | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | | Mean. | Per square mile. | |
| October | 3,600 | 132 | 534 | 397.9 | 554 | 1.12 | 1.29 |
| November | 1,480 | 225 | 463 | 393.3 | 483 | .974 | 1.09 |
| December | 430 | 220 | 296 | 398.2 | 316 | .637 | .73 |
| January | 580 | 175 | 352 | 449.8 | 374 | .754 | .87 |
| February | 4,050 | 230 | 1,000 | 411.6 | 1,020 | 2.06 | 2.14 |
| March | 4,650 | 1,280 | 2,300 | 436.8 | 2,320 | 4.68 | 5.40 |
| April | 4,900 | 960 | 1,920 | 400.8 | 1,940 | 3.91 | 4.36 |
| May | 1,910 | 420 | 854 | 431.7 | 876 | 1.77 | 2.04 |
| June | 1,220 | 170 | 397 | 423.0 | 419 | .845 | .94 |
| July | 415 | 140 | 253 | 429.9 | 274 | .552 | .64 |
| August | 230 | 110 | 162 | 429.1 | 183 | .369 | .43 |
| September | 1,700 | 148 | 364 | 395.3 | 384 | .774 | .86 |
| The year | 4,900 | 110 | 738 | 4,997.4 | 759 | 1.53 | 20.79 |

NOTE.—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, 1½ miles above village of Huntington and half a mile above confluence of Middle and North branches of Westfield River.

DRAINAGE AREA.—53 square miles.

RECORDS AVAILABLE.—July 14, 1910, to September 30, 1918.

GAGES.—Gurley 7-day water-stage recorder on upstream side of bridge abutment on right bank, referred to gage datum by means of a hook gage inside of well; an inclined staff is used for auxiliary readings. Prior to September 8, 1912, a chain gage on upstream side of bridge was used.

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

CHANNEL AND CONTROL.—Bed covered with coarse gravel and boulders. A shift in control has occurred at various times.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from water-stage recorder, 3.65 feet at 9 p. m. March 22 (discharge, 1,220 second-feet); a stage of 5.54 feet was recorded at 7 p. m. March 6, but the water was held back by an ice jam; minimum stage during year, from water-stage recorder, 0.76 foot at 2 a. m. August 18 (discharge, 4.8 second-feet).

1910–1918: Maximum open-water stage recorded, 7.33 feet at 9 a. m., July 8, 1915 (discharge, by extension of rating curve, 4,500 second-feet); a gage height of 7.7 feet was recorded February 26, 1916, but channel was obstructed by ice at that time; minimum stage recorded 0.70 foot on October 26–27, 1914 (discharge practically zero flow).

ICE.—River usually frozen over during the greater part of the winter; ice jams occasionally form below the gage, causing several feet of backwater.

REGULATION.—Flow somewhat affected at times by operation of small power plant about 2 miles above station.

ACCURACY.—Stage-discharge relation unchanged during the year except when affected by ice (December to March). Rating curve fairly well defined below 1,000 second-feet. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, except for periods as noted in footnote to daily-discharge table. Open-water records good; winter records fair.

*Discharge measurements of Middle Branch of Westfield River at Goss Heights, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Nov. 28 | H. W. Fear | [a]1.09 | 19.6 | Mar. 16 | M. R. Stackpole | [a]3.19 | 169 |
| Dec. 22 | .....do | [a]1.80 | 27.4 | Apr. 16 | O. W. Hartwell | 1.81 | 193 |
| Feb. 2 | .....do | [a]2.24 | 18.4 | July 10 | A. N. Weeks | .89 | 11.7 |

[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, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.5 | 81 | 26 | 7 | 19 | 400 | 592 | 231 | 33 | 17 | 12 | 9.0 |
| 2 | 7.0 | 48 | 30 | 6 | 18 | 305 | 705 | 186 | 26 | 24 | 11 | 12 |
| 3 | 7.0 | 38 | 28 | 8 | 18 | 180 | 510 | 126 | 20 | 22 | 10 | 7.0 |
| 4 | 7.0 | 34 | 26 | 8 | 14 | 180 | 350 | 112 | 18 | 18 | 10 | 6.0 |
| 5 | 7.0 | 26 | 23 | 8 | 11 | 115 | 231 | 90 | 17 | 20 | 10 | 6.0 |
| 6 | 9.5 | 24 | 20 | 7 | 8 | 240 | 175 | 86 | 17 | 18 | 12 | 6.5 |
| 7 | 12 | 22 | 16 | 11 | 11 | 240 | 175 | 95 | 29 | 20 | 11 | 6.5 |
| 8 | 9.0 | 20 | 18 | 11 | 8 | 165 | 165 | 79 | 32 | 17 | 11 | 6.5 |
| 9 | 8.5 | 19 | 20 | 16 | 6 | 150 | 200 | 68 | 23 | 14 | 11 | 7.5 |
| 10 | 7.0 | 20 | 20 | 12 | 8 | 150 | 219 | 60 | 19 | 13 | 11 | 7.0 |
| 11 | 6.5 | 20 | 21 | 14 | 11 | 150 | 132 | 104 | 17 | 10 | 11 | 6.5 |
| 12 | 8.5 | 18 | 12 | 26 | 6 | 135 | 109 | 84 | 35 | 11 | 11 | 7.0 |
| 13 | 18 | 18 | 14 | 40 | 18 | 135 | 95 | 68 | 44 | 17 | 10 | 6.5 |
| 14 | 12 | 19 | 18 | 44 | 37 | 135 | 165 | 400 | 27 | 20 | 10 | 8.0 |
| 15 | 9.5 | 18 | 20 | 44 | 50 | 86 | 240 | 182 | 20 | 28 | 16 | 8.5 |
| 16 | 10 | 16 | 26 | 44 | 68 | 165 | 189 | 101 | 17 | 20 | 10 | 8.0 |
| 17 | 10 | 17 | 24 | 35 | 50 | 240 | 165 | 72 | 14 | 20 | 6.0 | 7.0 |
| 18 | 10 | 17 | 21 | 34 | 68 | 400 | 193 | 61 | 13 | 22 | 5.0 | 8.0 |
| 19 | 9 | 16 | 23 | 32 | 50 | 693 | 148 | 54 | 12 | 20 | 5.5 | 12 |
| 20 | 8 | 14 | 24 | 28 | 260 | 765 | 112 | 44 | 10 | 18 | 5.5 | 22 |
| 21 | 7 | 14 | 23 | 35 | 620 | 885 | 482 | 38 | 10 | 16 | 6.0 | 56 |
| 22 | 7 | 20 | 24 | 32 | 300 | 855 | 450 | 45 | 132 | 14 | 6.5 | 28 |
| 23 | 6 | 35 | 18 | 32 | 180 | 658 | 256 | 47 | 70 | 13 | 7.0 | 16 |
| 24 | 21 | 32 | 20 | 35 | 130 | 455 | 189 | 37 | 40 | 11 | 8.5 | 12 |
| 25 | 160 | 28 | 24 | 28 | 80 | 455 | 139 | 33 | 26 | 11 | 8.5 | 11 |
| 26 | 28 | 24 | 14 | 25 | 220 | 360 | 112 | 45 | 20 | 11 | 8.0 | 145 |
| 27 | 20 | 19 | 16 | 25 | 480 | 240 | 98 | 47 | 17 | 11 | 7.0 | 219 |
| 28 | 43 | 19 | 14 | 25 | 180 | 200 | 95 | 41 | 15 | 11 | 6.5 | 63 |
| 29 | 28 | 19 | 11 | 22 | ..... | 260 | 90 | 32 | 16 | 11 | 6.0 | 37 |
| 30 | 296 | 18 | 9 | 20 | ..... | 375 | 114 | 33 | 16 | 14 | 6.0 | 25 |
| 31 | 278 | ..... | 8 | 20 | ..... | 455 | ..... | 34 | ..... | 16 | 6.0 | ..... |

NOTE.—Stage-discharge relation affected by ice from Nov. 26 to Mar. 18; discharge for this period determined from gage heights corrected for effect of ice by means of four discharge measurements, observer's notes, and weather records. Operation of water-stage recorder not satisfactory Oct. 19–25, May 12–13, and July 19–23; daily discharge for these periods estimated by comparison with records at Knightville.

*Monthly discharge of Middle Branch of Westfield River at Goss Heights, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 53 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 296 | 6 | 34.7 | 0.655 | 0.76 |
| November | 81 | 14 | 24.4 | .460 | .51 |
| December | 30 | 8 | 19.7 | .372 | .43 |
| January | 44 | 6 | 23.7 | .447 | .52 |
| February | 620 | 6 | 105 | 1.98 | 2.06 |
| March | 885 | 86 | 330 | 6.23 | 7.18 |
| April | 705 | 90 | 230 | 4.34 | 4.84 |
| May | 400 | 32 | 88.2 | 1.66 | 1.91 |
| June | 132 | 10 | 26.8 | .506 | .56 |
| July | 28 | 10 | 16.4 | .309 | .35 |
| August | 16 | 5 | 8.87 | .167 | .19 |
| September | 219 | 6 | 26.0 | .491 | .55 |
| The year | 885 | 5 | 77.6 | 1.46 | 19.87 |

### WESTFIELD LITTLE RIVER NEAR WESTFIELD, MASS.

LOCATION.—At diversion dam of Springfield waterworks, in the town of Russell, Hampden County, 3 miles below the confluence of Pebble and Borden brooks) and about 3 miles west of Westfield. Originally (July, 1905, to December, 1909, a short distance below Borden Brook near Cobble Mountain.

DRAINAGE AREA.—43 square miles at original site; 48 square miles at present site.

RECORDS AVAILABLE.—July 13, 1905, to September 30, 1918.

DETERMINATION OF DISCHARGE.—At the original site below Borden Brook (used 1905–1909) the discharge was determined by methods commonly employed at current-meter gaging stations. From August, 1906, to September, 1907, a 30-foot weir was maintained a short distance below the gage.[1] Since March 1, 1910, high-water flow determined from continuous record of head on concrete diversion dam (crest length, 155.4 feet), for which coefficients have been deduced from experiments at Cornell University; low-water flow—less than 163 second-feet—determined from continuous record of head on a 12-foot sharp-crested weir without end contractions, the crest being 2.55 feet below that of the dam. Water diverted to city of Springfield is measured by a 54-inch Venturi meter, using continuous record chart. Daily record corrected for storage in a reservoir on Borden Brook about 5 miles above station, but owing to the time required for water to reach the dam and the natural storage along the stream the record as corrected does not represent exactly the natural flow of the stream at all times.

EXTREMES OF DISCHARGE.—Maximum discharge for 24 hours recorded during year. 641 second-feet, March 22; minimum discharge for 24 hours recorded, apparently zero from July 23 to 29, inclusive, when the water released from the reservoir was equal to or greater than the total flow at the diversion dam.

1909–1918: Maximum discharge for 24 hours, 1,490 second-feet, March 28, 1914; minimum discharge, apparently zero at various times when the water released from the reservoir was equal to or greater than the total flow at the diversion dam.

DIVERSIONS.—Record of water diverted at station for municipal supply of Springfield included in records as published.

COOPERATION.—Data collected and compiled under the direction of E. E. Lochridge, chief engineer, board of water commissioners, Springfield, Mass.

*Daily discharge, in second-feet, of Westfield Little River near Westfield, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.2 | 150 | 22.6 | 23.2 | 22.1 | 54.9 | 248 | 162 | 21.2 | 14.3 | 8.6 | 15.5 |
| 2 | 9 | 84.9 | 27 | 17.6 | 21 | 35.3 | 279 | 138 | 18 | 23.3 | 5.9 | 8.6 |
| 3 | 11.3 | 58.6 | 26.6 | 16.4 | 20.5 | 27.4 | 307 | 109 | 15.8 | 19.1 | 8.9 | 9.8 |
| 4 | 9.5 | 51.1 | 26 | 12.2 | 31.3 | 45.4 | 278 | 91.3 | 12.9 | 16.3 | 9.8 | 14.6 |
| 5 | 15.1 | 42.7 | 24.3 | 32.8 | 19.9 | 15.9 | 173 | 80.3 | 15.3 | 13.9 | 16.2 | 13.8 |
| 6 | 15.3 | 38.6 | 23 | 38 | 29.8 | 33 | 148 | 68.7 | 29.9 | 12.5 | 15.6 | 10.9 |
| 7 | 13.5 | 34.7 | 18.7 | 20.6 | 52.7 | 32 | 109 | 63.7 | 53.8 | 12.2 | 14.5 | 8.6 |
| 8 | 10.3 | 31.1 | 28.5 | 17.8 | 69.9 | 21 | 111 | 61 | 44.9 | 12.2 | 9.1 | 9.7 |
| 9 | 10.8 | 30.3 | 19.6 | 17.7 | 23.6 | 18.5 | 122 | 51 | 24.4 | 11.9 | 8.6 | 17.2 |
| 10 | 11 | 26.4 | 20.9 | 17.1 | 19.6 | 20.3 | 153 | 45.7 | 20.2 | 10.6 | 13.3 | 14.1 |
| 11 | 11.2 | 24.9 | 18.9 | 20.3 | 30.2 | 13.1 | 127 | 41.6 | 17.2 | 10.1 | 28.2 | 10.9 |
| 12 | 15.8 | 24.9 | 17 | 38.9 | 35.1 | 15.7 | 113 | 37 | 66.6 | 10 | 14.8 | 11.8 |
| 13 | 36.2 | 22.2 | 29 | 48.8 | 67.1 | 18.7 | 99.2 | 44.5 | 76.9 | 9.7 | 9.6 | 16.2 |
| 14 | 18 | 22.2 | 19.2 | 67.9 | 102 | 20.8 | 142 | 140 | 44.5 | 10 | 14.7 | 11.4 |
| 15 | 14.3 | 21.8 | 21 | 65.4 | 92.4 | 15.5 | 185 | 101 | 34.1 | 10.5 | 15.6 | 4 |
| 16 | 12.3 | 20.2 | 49.6 | 62.5 | 82.9 | 12.1 | 147 | 75.8 | 23.6 | 11 | 15.1 | 8.9 |
| 17 | 11.5 | 21.6 | 31.1 | 46.6 | 76.5 | 15.6 | 124 | 58.1 | 17.2 | 6.1 | 13.2 | 9.6 |
| 18 | 17.8 | 20.4 | 28.6 | 39.9 | 61.5 | 20.4 | 137 | 45.1 | 15.3 | 7.4 | 8 | 29.6 |
| 19 | 14.4 | 18.7 | 29.8 | 35.3 | 65.6 | 26.1 | 125 | 38.4 | 10.2 | 6.5 | 9.4 | 18 |
| 20 | 17.8 | 20.3 | 31 | 37.5 | 456 | 35 | 105 | 34.2 | 12.4 | 6.5 | 8.6 | 33.1 |
| 21 | 13.4 | 20.9 | 32.2 | 35.1 | 295 | 52.7 | 218 | 30.2 | 18.5 | 1.3 | 9 | 61.1 |
| 22 | 6.1 | 37 | 21.7 | 33.4 | 185 | 64.1 | 310 | 29.1 | 111 | 1.3 | 9.4 | 34.9 |
| 23 | 11.3 | 69.6 | 21.1 | 30.8 | 134 | 48.9 | 216 | 28.7 | 70.9 | ..... | 8.7 | 21.1 |
| 24 | 153 | 51.4 | 21.2 | 30.5 | 121 | 34.2 | 141 | 25.5 | 44.9 | ..... | 9.2 | 16.2 |
| 25 | 190 | 26.8 | 20.9 | 39 | 140 | 25.6 | 121 | 24.8 | 29.3 | ..... | 9.1 | 14.9 |
| 26 | 65.2 | 19.4 | 20.3 | 35.6 | 314 | 25.7 | 109 | 38.1 | 18.9 | ..... | 8.2 | 165 |
| 27 | 50.4 | 19 | 30.3 | 25.9 | 319 | 19 | 90.9 | 33 | 16.1 | ..... | 8.7 | 201 |
| 28 | 138 | 20.6 | 19.2 | 33 | 215 | 15.7 | 80.6 | 30.4 | 12.4 | ..... | 8.5 | 85.8 |
| 29 | 74.3 | 19.1 | 17.5 | 35.9 | ..... | 15.8 | 75.6 | 24.4 | 12.7 | ..... | 9.9 | 46.9 |
| 30 | 428 | 19.9 | 16.3 | 28.4 | ..... | 18.2 | 87 | 22.7 | 15.9 | 10.6 | 9.4 | 34.4 |
| 31 | 317 | ..... | 17.7 | 23 | ..... | 22.1 | ..... | 22.1 | ..... | 26.5 | 14.2 | ..... |

NOTE.—Discharge determined by subtracting from the total flow at the diversion dam the quantity of water apparently released from Borden Brook reservoir, or by adding the quantity of water apparently stored in the reservoir, as indicated by elevation of water surface in reservoir. As no allowance has been made for evaporation and seepage from the reservoir, the results show the natural flow at the diversion dam only approximately. For days when no discharge records are given, the apparent storage release was equal to or greater than the total flow at the diversion dam.

[1] Results obtained by weir and current-meter methods are compared in U. S. Geol. Survey Water-Supply Papers 201, pp. 105–110, and 241, pp. 164–168.

*Monthly discharge of Westfield Little River near Westfield, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 48.5 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 428 | 6.1 | 55.8 | 1.15 | 1.33 |
| November | 150 | 18.7 | 35.6 | .735 | .820 |
| December | 49.6 | 17.0 | 24.2 | .499 | .575 |
| January | 67.9 | 12.2 | 33.1 | .683 | .787 |
| February | 456 | 19.6 | 111 | 2.29 | 2.38 |
| March | 641 | 121 | 271 | 5.58 | 6.44 |
| April | 310 | 75.6 | 156 | 3.22 | 3.59 |
| May | 162 | 22.1 | 57.9 | 1.19 | 1.38 |
| June | 111 | 10.2 | 30.8 | .636 | .710 |
| July | 26.5 | (a) | 8.82 | .182 | .210 |
| August | 28.2 | 5.9 | 11.4 | .234 | .270 |
| September | 201 | 4.0 | 31.9 | .658 | .734 |
| The year | 641 | (a) | 68.7 | 1.42 | 19.23 |

a On certain days the apparent storage release from Borden Brook reservoir was equal to or greater than the total flow at the diversion dam.

### BORDEN BROOK NEAR WESTFIELD, MASS.

LOCATION.—At the outlet of Borden Brook reservoir in town of Granville, Hampden County, 2 miles above confluence of Borden and Pebble brooks, and 8 miles west of Westfield.

DRAINAGE AREA.—8 square miles.

RECORDS AVAILABLE.—January 1, 1910, to September 30, 1918.

DETERMINATION OF DISCHARGE.—Flow determined from a continuous record of the head on a 5-foot sharp-crested weir without end contractions. The results are then corrected for the apparent gain or loss in stored water in the reservoir, but no allowance is made for evaporation.

EXTREMES OF DISCHARGE.—Maximum 24-hour flow recorded during year, 309 second-feet on March 4; minimum apparent flow, 0.0 second-foot at various times when the apparent storage release was equal to or greater than the measured flow at the weir.

1912–1918: Maximum 24-hour flow recorded, 309 second-foot on March 4, 1918; minimum apparent flow, 0.0 second-foot.

COOPERATION.—Records furnished by the Board of Water Commissioners of Springfield through E. E. Lochridge, chief engineer.

*Daily discharge, in second-feet, of Borden Brook near Westfield, Mass., for the year ending Sept. 30, 1918.*

| Day. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. |
|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 23.1 | ..... | 116 | 43.9 | 16.2 | ..... | ..... |
| 2 | ..... | 17.6 | ..... | 65.0 | 44.6 | 17.9 | ..... | 1.9 |
| 3 | ..... | ..... | ..... | 54.2 | 45.4 | 16.2 | ..... | ..... |
| 4 | ..... | 3.0 | 10.8 | 309 | 31.1 | 15.0 | ..... | ..... |
| 5 | ..... | 17.5 | ..... | 20.6 | 20.4 | 13.9 | ..... | ..... |
| 6 | 1.2 | ..... | 29.7 | 46.3 | 31.0 | 12.2 | ..... | ..... |
| 7 | ..... | ..... | 8.1 | 40.2 | 6.4 | 11.6 | ..... | ..... |
| 8 | 9.3 | ..... | .7 | 29.5 | 12.8 | 11.6 | ..... | ..... |
| 9 | ..... | ..... | ..... | 46.5 | 12.8 | 11.6 | ..... | ..... |
| 10 | ..... | ..... | ..... | 41.5 | 15.0 | 11.0 | ..... | ..... |
| 11 | ..... | ..... | 10.8 | 28.0 | 16.2 | 11.5 | ..... | ..... |
| 12 | ..... | 1.4 | 9.3 | 28.9 | 15.0 | 10.5 | 17.2 | ..... |
| 13 | 10.8 | 9.3 | 10.8 | 13.6 | 13.9 | 8.6 | ..... | ..... |
| 14 | ..... | ..... | 20.1 | 33.5 | 16.3 | 7.6 | ..... | ..... |
| 15 | ..... | ..... | 20.1 | 24.9 | 20.4 | ..... | ..... | ..... |
| 16 | 29.4 | 10.8 | ..... | 12.3 | 19.8 | 8.8 | ..... | ..... |
| 17 | 10.8 | ..... | ..... | 32.8 | 17.9 | 7.6 | .2 | ..... |
| 18 | 9.3 | ..... | ..... | 28.9 | 17.9 | 5.8 | .2 | ..... |
| 19 | 9.3 | ..... | 9.3 | 46.6 | 17.9 | 5.0 | ..... | ..... |
| 20 | 10.8 | ..... | 10.8 | 60.7 | 16.7 | 3.6 | ..... | ..... |
| 21 | 10.8 | ..... | 9.3 | 82.9 | 51.4 | 1.7 | ..... | ..... |
| 22 | ..... | ..... | ..... | 101 | 38.6 | 1.1 | 19.4 | ..... |
| 23 | ..... | ..... | ..... | 72.2 | 38.9 | 1.1 | 8.0 | ..... |
| 24 | ..... | ..... | 10.8 | 49.9 | 31.0 | 1.1 | 8.0 | ..... |
| 25 | ..... | 10.8 | 29.4 | 20.7 | 14.5 | .9 | ..... | ..... |
| 26 | ..... | 9.3 | ..... | 40.9 | 17.3 | .7 | ..... | ..... |
| 27 | 9.3 | ..... | 41.8 | 21.7 | 16.2 | ..... | ..... | ..... |
| 28 | ..... | ..... | 30.9 | 20.6 | 13.9 | ..... | ..... | ..... |
| 29 | ..... | ..... | ..... | 18.6 | 12.2 | ..... | ..... | ..... |
| 30 | ..... | ..... | ..... | 21.6 | 12.8 | ..... | 5.0 | 1.4 |
| 31 | ..... | ..... | ..... | 32.0 | ..... | ..... | ..... | ..... |

NOTE.—Discharge determined by subtracting from the quantity of water passing over the weir the quantity apparently released from the reservoir, or by adding the quantity apparently stored in the reservoir, as indicated by elevation of water surface in reservoir. As no allowance has been made for evaporation and seepage from the reservoir, the results show the natural flow at the outlet of the reservoir only approximately. For days for which discharge is not given, the quantity apparently released from storage was equal to or greater than the quantity passing over the weir.

*Monthly discharge of Borden Brook near Westfield, Mass., for the year ending Sept. 30, 1918.*

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | ..... | ..... | 0.00 | 0.000 | 0.00 |
| November | ..... | ..... | .00 | .000 | .00 |
| December | 29.4 | ..... | 3.58 | .448 | .52 |
| January | 23.1 | ..... | 3.32 | .415 | .48 |
| February | 41.8 | ..... | 9.38 | 1.17 | 1.22 |
| March | 309 | 12.3 | 50.4 | 6.30 | 7.26 |
| April | 51.4 | 6.4 | 22.7 | 2.84 | 3.17 |
| May | 17.9 | ..... | 6.83 | .854 | .98 |
| June | 19.4 | ..... | 1.93 | .241 | .27 |
| July | 1.9 | ..... | .11 | .014 | .02 |
| August | ..... | ..... | .00 | .000 | .00 |
| September | ..... | ..... | .00 | .000 | .00 |
| The year | 309 | ..... | 8.20 | 1.02 | 13.92 |

### 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, 1918.

GAGES.—Barrett & Lawrence water-stage recorder on left bank, downstream side of bridge, referred to gage datum by a hook gage inside the well; a vertical staff on bridge abutment is used for auxiliary readings.

DISCHARGE MEASUREMENTS.—Made from a cable or by wading.

CHANNEL AND CONTROL.—Channel rocky and filled with boulders. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from water-stage recorder, 5.54 feet at 10 p. m. March 22 (discharge, 1,010 second-feet); a stage of 8.9 feet was recorded at 4 p. m. February 20, but the water was held back by an ice jam; minimum stage during year from water-stage recorder, 2.47 feet at 4 p. m. November 19 (discharge, 14 second-feet).

1913–1918: Maximum open-water stage from water-stage recorder, 7.64 feet on October 26, 1913 (discharge, by extension of rating curve, about 3,200 second-feet); minimum stage from water-stage recorder, 2.22 feet on August 27, 1913 (discharge, 4.4 second-feet).

ICE.—River frozen over during greater part of winter; stage-discharge relation seriously affected. Ice jams occasionally form below the gage causing several feet of backwater.

REGULATION.—Flow affected by storage in Otis reservoir, about five miles above New Boston, and by operation of a woodworking shop just above the 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 except for short periods as shown in footnote to the daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph and making corrections for effect of ice during winter. Open-water records good; winter records fair.

*Discharge measurements of Farmington River near New Boston, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 5 | H. W. Fear | a3.96 | 18.3 | Mar. 5 | H. W. Fear | a6.11 | 218 |
| Feb. 6 | do | a3.40 | 24.3 | July 12 | O. W. Hartwell | 3.24 | 84 |

aStage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Farmington River near New Boston, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 77 | 185 | 44 | 9 | 16 | 500 | 478 | 254 | 53 | 61 | 71 | 131 |
| 2 | 76 | 141 | 60 | 9 | 16 | 455 | 550 | 238 | 48 | 76 | 71 | 90 |
| 3 | 75 | 91 | 54 | 11 | 14 | 375 | 550 | 185 | 41 | 71 | 70 | 85 |
| 4 | 77 | 80 | 49 | 16 | 14 | 300 | 500 | 162 | 40 | 64 | 71 | 85 |
| 5 | 84 | 65 | 44 | 19 | 19 | 240 | 375 | 131 | 44 | 62 | 100 | 84 |
| 6 | 99 | 61 | 40 | 19 | 22 | 210 | 286 | 131 | 44 | 73 | 76 | 81 |
| 7 | 91 | 56 | 40 | 22 | 22 | 270 | 238 | 131 | 108 | 98 | 71 | 77 |
| 8 | 85 | 41 | 44 | 29 | 29 | 395 | 210 | 122 | 114 | 99 | 70 | 77 |
| 9 | 82 | 40 | 40 | 29 | 11 | 500 | 224 | 106 | 76 | 87 | 65 | 76 |
| 10 | 78 | 40 | 36 | 29 | 9 | 500 | 269 | 93 | 65 | 86 | 80 | 74 |
| 11 | 76 | 29 | 26 | 36 | 9 | 430 | 238 | 96 | 52 | 85 | 173 | 75 |
| 12 | 78 | 33 | 26 | 49 | 9 | 356 | 197 | 102 | 86 | 82 | 141 | 90 |
| 13 | 105 | 32 | 29 | 60 | 44 | 337 | 185 | 197 | 162 | 80 | 122 | 131 |
| 14 | 90 | 31 | 32 | 77 | 54 | 302 | 254 | 395 | 94 | 94 | 105 | 131 |
| 15 | 84 | 31 | 36 | 90 | 49 | 238 | 337 | 254 | 73 | 100 | 122 | 131 |
| 16 | 80 | 29 | 40 | 84 | 98 | 238 | 302 | 185 | 63 | 59 | 99 | 122 |
| 17 | 80 | 30 | 44 | 71 | 90 | 254 | 254 | 141 | 50 | 54 | 59 | 122 |
| 18 | 75 | 20 | 40 | 65 | 71 | 320 | 286 | 105 | 53 | 60 | 44 | 118 |
| 19 | 74 | 16 | 40 | 65 | 49 | 356 | 254 | 76 | 56 | 54 | 53 | 99 |
| 20 | 77 | 24 | 36 | 60 | 219 | 500 | 210 | 74 | 53 | 60 | 66 | 106 |
| 21 | 70 | 25 | 29 | 60 | 285 | 625 | 356 | 68 | 53 | 100 | 93 | 151 |
| 22 | 62 | 37 | 22 | 60 | 335 | 840 | 600 | 71 | 173 | 102 | 93 | 82 |
| 23 | 46 | 68 | 16 | 49 | 300 | 770 | 435 | 78 | 162 | 102 | 96 | 99 |
| 24 | 68 | 58 | 14 | 40 | 240 | 600 | 375 | 75 | 120 | 104 | 107 | 48 |
| 25 | 162 | 42 | 19 | 36 | 160 | 550 | 269 | 71 | 88 | 106 | 107 | 46 |
| 26 | 84 | 40 | 11 | 36 | 710 | 455 | 224 | 116 | 82 | 141 | 116 | 254 |
| 27 | 66 | 40 | 14 | 32 | 500 | 337 | 185 | 99 | 76 | 131 | 141 | 395 |
| 28 | 106 | 36 | 11 | 25 | 270 | 286 | 173 | 93 | 66 | 131 | 116 | 197 |
| 29 | 86 | 34 | 9 | 19 | ..... | 269 | 162 | 77 | 62 | 131 | 100 | 131 |
| 30 | 286 | 29 | 9 | 16 | ..... | 302 | 162 | 74 | 47 | 141 | 98 | 94 |
| 31 | 395 | ..... | 9 | 16 | ..... | 375 | ..... | 70 | ..... | 131 | 118 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 5 to Mar. 8: discharge for this period determined from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records. Operation of water-stage recorder unsatisfactory Mar. 11, May 5–7, 11–13, 21–22, and July 8–11; discharge estimated.

*Monthly discharge of Farmington River near New Boston, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 92.7 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 395 | 46 | 99.2 | 1.07 | 1.23 |
| November | 185 | 16 | 49.5 | .534 | .60 |
| December | 60 | 9 | 31.1 | .335 | .39 |
| January | 90 | 9 | 39.9 | .430 | .50 |
| February | 710 | 9 | 131 | 1.41 | 1.47 |
| March | 840 | 210 | 403 | 4.35 | 5.02 |
| April | 600 | 162 | 305 | 3.29 | 3.67 |
| May | 395 | 68 | 131 | 1.41 | 1.63 |
| June | 173 | 40 | 76.8 | .829 | .92 |
| July | 141 | 54 | 91.1 | .983 | 1.13 |
| August | 173 | 44 | 94.0 | 1.01 | 1.16 |
| September | 395 | 46 | 116 | 1.25 | 1.40 |
| The year | 840 | 9 | 131 | 1.41 | 19.12 |

## HOUSATONIC RIVER BASIN.

### HOUSATONIC RIVER NEAR GREAT BARRINGTON, MASS.

LOCATION.—At highway bridge, a quarter of a 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, 1918.

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 Martin Love.

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 at well-defined riffle a few hundred feet below the gage.

EXTREMES OF DISCHARGE.—Maximum open-water stage recorded during year, 5.22 feet at 8 a. m. March 23 (discharge, 2,670 second-feet); minimum stage recorded, 0.2 foot at 8 a. m. July 28 (discharge, 2 second-feet).

1913–1918: Maximum stage recorded, 8.0 feet on March 31, 1916 (discharge, by extension of rating curve about 5,300 second-feet). Zero flow recorded at various times caused by storage of water at dams above.

ICE.—Stage-discharge relation affected by ice for short periods during the winter.

REGULATION.—Storage above dam of a paper mill about a mile above station causes low flow on Sundays and holidays.

ACCURACY.—Stage-discharge relation practically permanent during the year, except as affected by ice for a few days in December and January. Rating curve well defined below 2,000 second-feet. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Discharge measurements of Housatonic River near Great Barrington, Mass., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 3 | H. W. Fear | [a] 1.69 | 183 | Mar. 2 | H. W. Fear | 3.48 | 1,220 |
| Feb. 4 | do | 1.10 | 67 | July 13 | A. N. Weeks | 1.34 | 107 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Housatonic River near Great Barrington, Mass., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 103 | 780 | 215 | 155 | 125 | 1,570 | 1,340 | 720 | 358 | 215 | 200 | 37 |
| 2 | 51 | 512 | 46 | 118 | 105 | 1,810 | 1,570 | 720 | 155 | 215 | 140 | 46 |
| 3 | 83 | 335 | 185 | 185 | 11 | 1,200 | 1,810 | 720 | 170 | 232 | 155 | 170 |
| 4 | 120 | 270 | 200 | 155 | 51 | 1,270 | 1,810 | 600 | 200 | 77 | 18 | 145 |
| 5 | 118 | 270 | 185 | 74 | 105 | 1,060 | 1,410 | 335 | 232 | 95 | 215 | 132 |
| 6 | 16 | 290 | 185 | 64 | 97 | 1,060 | 1,200 | 540 | 358 | 232 | 130 | 125 |
| 7 | 58 | 215 | 232 | 81 | 132 | 1,490 | 885 | 512 | 312 | 132 | 120 | 200 |
| 8 | 110 | 155 | 170 | 85 | 135 | 1,410 | 920 | 660 | 405 | 250 | 89 | 15 |
| 9 | 135 | 215 | 31 | 103 | 85 | 1,130 | 990 | 512 | 97 | 250 | 97 | 59 |
| 10 | 185 | 185 | 200 | 118 | 58 | 920 | 1,060 | 430 | 430 | 215 | 101 | 130 |
| 11 | 135 | 101 | 215 | 142 | 97 | 990 | 1,060 | 512 | 270 | 185 | 48 | 108 |
| 12 | 200 | 120 | 155 | 380 | 152 | 780 | 920 | 97 | 335 | 130 | 130 | 132 |
| 13 | 95 | 200 | 170 | 77 | 132 | 920 | 780 | 312 | 335 | 108 | 108 | 142 |
| 14 | 43 | 215 | 215 | 155 | 97 | 920 | 720 | 1,340 | 430 | 28 | 93 | 140 |
| 15 | 85 | 145 | 120 | 81 | 200 | 885 | 920 | 1,410 | 250 | 97 | 232 | 19 |
| 16 | 97 | 155 | 85 | 135 | 145 | 815 | 885 | 1,060 | 105 | 155 | 335 | 155 |
| 17 | 128 | 118 | 66 | 155 | 77 | 600 | 780 | 780 | 270 | 130 | 215 | 155 |
| 18 | 105 | 14 | 185 | 83 | 250 | 1,060 | 750 | 1,410 | 290 | 120 | 13 | 145 |
| 19 | 125 | 155 | 185 | 87 | 335 | 1,060 | 630 | 458 | 250 | 128 | 43 | 120 |
| 20 | 118 | 118 | 155 | 87 | 750 | 1,200 | 1,060 | 380 | 170 | 105 | 155 | 125 |
| 21 | 70 | 170 | 142 | 105 | 1,200 | 1,970 | 600 | 485 | 290 | 145 | 185 | 132 |
| 22 | 103 | 215 | 145 | 28 | 1,490 | 2,130 | 1,490 | 430 | 250 | 120 | 155 | 132 |
| 23 | 95 | 185 | 29 | 97 | 1,340 | 2,650 | 1,570 | 458 | 105 | 101 | 142 | 185 |
| 24 | 155 | 120 | 130 | 142 | 312 | 2,050 | 1,340 | 485 | 335 | 170 | 125 | 155 |
| 25 | 215 | 34 | 130 | 145 | 990 | 1,970 | 1,130 | 485 | 312 | 185 | 24 | 155 |
| 26 | 185 | 170 | 270 | 110 | 1,340 | 1,810 | 990 | 250 | 405 | 120 | 56 | 105 |
| 27 | 170 | 130 | 170 | 21 | 1,490 | 1,490 | 815 | 312 | 358 | 120 | 58 | 405 |
| 28 | 76 | 185 | 170 | 145 | 1,270 | 1,270 | 458 | 458 | 335 | 2.6 | 77 | 690 |
| 29 | 132 | 68 | 115 | 101 | ..... | 990 | 430 | 430 | 200 | 110 | 118 | 405 |
| 30 | 250 | 95 | 49 | 97 | ..... | 1,060 | 405 | 170 | 8 | 118 | 145 | 512 |
| 31 | 720 | ..... | 458 | 145 | ..... | 1,060 | ..... | 250 | ..... | 150 | 89 | ..... |

NOTE.—Stage-discharge relation affected by ice from Dec. 26 to Jan. 10. Discharge for this period determined from gage heights corrected for effect of ice by means of one discharge measurement, observer's notes, and weather records.

*Monthly discharge of Housatonic River near Great Barrington, Mass., for the year ending Sept. 30, 1918.*

[Drainage area, 280 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 720 | 16 | 138 | 0.493 | 0.57 |
| November | 780 | 14 | 198 | .707 | .79 |
| December | 458 | 29 | 162 | .579 | .67 |
| January | 380 | 21 | 118 | .421 | .49 |
| February | 1,490 | 11 | 449 | 1.60 | 1.67 |
| March | 2,650 | 600 | 1,310 | 4.68 | 5.40 |
| April | 1,810 | 405 | 1,020 | 3.64 | 4.06 |
| May | 1,410 | 97 | 572 | 2.04 | 2.35 |
| June | 430 | 8 | 267 | .954 | 1.06 |
| July | 250 | 2.6 | 143 | .511 | .59 |
| August | 335 | 13 | 123 | 439 | .51 |
| September | 690 | 15 | 173 | .618 | .69 |
| The year | 2,650 | 2.6 | 389 | 1.39 | 18.85 |

### HOUSATONIC RIVER AT FALLS VILLAGE, CONN.

LOCATION.—Half a mile below power plant of Connecticut Power Co. at Falls Village, Litchfield County, and 23 miles north of Gaylordsville.

DRAINAGE AREA.—644 square miles.

RECORDS AVAILABLE.—July 11, 1912, to September 30, 1918.

GAGES.—Stevens continuous water-stage recorder on left bank, referred to gage datum by hook gage inside the well; a vertical staff on river bank 25 feet upstream and chain gage 300 feet upstream are used for auxiliary readings.

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 times. Control not clearly defined except at low stages; probably permanent.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year, from water-stage recorder, 8.22 feet at 8 p. m. March 23 (discharge, 4,220 second-feet); a stage of 9.60 feet was recorded at 11 p. m. February 26, but the water was held back by an ice jam; minimum stage, from water-stage recorder, 0.56 foot at 7 a. m. September 11 (discharge, 21 second-feet).

1912–1918: Maximum stage recorded, 13.3 feet on March 29, 1914 (discharge, 8,830 second-feet); minimum stage recorded, zero flow at various times owing to storage of water above power plant.

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

REGULATION.—Flow at low water completely regulated by power plant at Falls Village.

ACCURACY.—Stage-discharge relation practically permanent, except when affected by ice. Rating curve well defined between 200 and 7,000 second-feet. Operation of the water-stage recorder satisfactory. Daily discharge ascertained by using discharge integrator, and making corrections for ice during the winter. Records good.

*Discharge measurements of Housatonic River at Falls Village, Conn., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 4 | H. W. Fear | [a] 3.02 | 465 | Mar. 4 | H. W. Fear | [a] 8.49 | 2,760 |
| Feb. 5 | do | [a] 2.83 | 336 | July 13 | A. N. Weeks | 2.43 | 599 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Housatonic River at Falls Village, Conn., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 240 | 1,780 | 610 | 60 | 270 | 3,100 | 1,940 | 1,540 | 880 | 300 | 210 | 285 |
| 2 | 182 | 1,320 | 540 | 140 | 320 | 3,400 | 2,150 | 1,640 | 375 | 310 | 230 | 350 |
| 3 | 182 | 1,100 | 670 | 220 | 180 | 3,200 | 2,400 | 1,660 | 690 | 325 | 116 | 200 |
| 4 | 184 | 395 | 560 | 230 | 290 | 2,600 | 2,550 | 1,340 | 590 | 215 | 57 | 192 |
| 5 | 200 | 710 | 455 | 170 | 230 | 2,000 | 2,500 | 1,220 | 415 | 390 | 215 | 260 |
| 6 | 198 | 630 | 415 | 25 | 250 | 1,950 | 2,150 | 1,340 | 440 | 420 | 215 | 196 |
| 7 | 150 | 470 | 340 | 240 | 240 | 2,300 | 1,720 | 1,160 | 660 | 57 | 215 | 230 |
| 8 | 230 | 340 | 310 | 220 | 260 | 2,200 | 1,600 | 1,100 | 790 | 410 | 255 | 29 |
| 9 | 200 | 400 | 285 | 210 | 360 | 2,600 | 1,480 | 1,000 | 460 | 570 | 192 | 166 |
| 10 | 170 | 550 | 400 | 200 | 170 | 3,300 | 1,480 | 990 | 710 | 420 | 178 | 162 |
| 11 | 210 | 210 | 400 | 190 | 150 | 3,100 | 1,640 | 820 | 540 | 325 | 46 | 160 |
| 12 | 315 | 315 | 340 | 360 | 300 | 2,650 | 1,560 | 480 | 510 | 320 | 230 | 225 |
| 13 | 290 | 295 | 340 | 160 | 540 | 2,450 | 1,300 | 960 | 810 | 250 | 230 | 196 |
| 14 | 178 | 300 | 460 | 320 | 460 | 2,650 | 1,280 | 1,300 | 850 | 51 | 240 | 142 |
| 15 | 275 | 295 | 380 | 310 | 800 | 2,600 | 1,660 | 2,250 | 500 | 235 | 240 | 186 |
| 16 | 215 | 305 | 360 | 450 | 1,150 | 2,300 | 1,700 | 2,150 | 350 | 280 | 245 | 198 |
| 17 | 260 | 350 | 360 | 440 | 700 | 2,000 | 1,680 | 1,700 | 810 | 315 | 470 | 192 |
| 18 | 192 | 112 | 360 | 390 | 1,050 | 2,150 | 1,600 | 1,300 | 600 | 260 | 59 | 220 |
| 19 | 220 | 305 | 340 | 230 | 850 | 2,300 | 1,700 | 1,060 | 460 | 265 | 200 | 275 |
| 20 | 265 | 300 | 350 | 100 | 1,600 | 2,600 | 1,420 | 1,220 | 405 | 210 | 200 | 405 |
| 21 | 75 | 290 | 290 | 370 | 2,700 | 3,150 | 1,540 | 890 | 300 | 80 | 160 | 870 |
| 22 | 210 | 330 | 270 | 180 | 2,600 | 3,800 | 2,500 | 850 | 310 | 240 | 160 | 290 |
| 23 | 230 | 375 | 190 | 250 | 2,000 | 4,100 | 2,850 | 860 | 480 | 225 | 162 | 425 |
| 24 | 290 | 485 | 320 | 250 | 1,550 | 3,900 | 2,800 | 890 | 810 | 270 | 110 | 495 |
| 25 | 600 | 230 | 140 | 210 | 1,600 | 3,500 | 2,500 | 890 | 510 | 270 | 59 | 370 |
| 26 | 370 | 275 | 260 | 340 | 2,900 | 3,100 | 2,140 | 510 | 580 | 320 | 176 | 680 |
| 27 | 350 | 340 | 250 | 200 | 3,500 | 2,750 | 1,780 | 1,140 | 540 | 265 | 190 | 1,580 |
| 28 | 250 | 285 | 260 | 330 | 3,200 | 2,350 | 1,480 | 1,000 | 580 | 96 | 172 | 1,780 |
| 29 | 570 | 56 | 260 | 330 | ..... | 2,000 | 1,350 | 940 | 480 | 184 | 176 | 1,280 |
| 30 | 700 | 365 | 50 | 260 | ..... | 1,900 | 1,280 | 510 | 210 | 240 | 200 | 1,080 |
| 31 | 570 | ..... | 190 | 300 | ..... | 1,850 | ..... | 1,020 | ..... | 240 | 240 | ..... |

NOTE.—Stage-discharge relation affected by ice Dec. 11 to Mar. 9; daily discharge for this period determined from gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, weather records, and study of power plant records at Falls Village.

*Monthly discharge of Housatonic River at Falls Village, Conn., for the year ending Sept. 30, 1918.*

[Drainage area, 644 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 700 | 75 | 277 | 0.430 | 0.50 |
| November | 1,780 | 56 | 450 | .700 | .78 |
| December | 670 | 50 | 347 | .539 | .62 |
| January | 450 | 25 | 248 | .385 | .44 |
| February | 3,500 | 150 | 1,080 | 1.68 | 1.75 |
| March | 4,100 | 1,850 | 2,700 | 4.19 | 4.83 |
| April | 2,850 | 1,280 | 1,860 | 2.89 | 3.22 |
| May | 2,250 | 480 | 1,150 | 1.79 | 2.06 |
| June | 880 | 210 | 555 | .862 | .96 |
| July | 570 | 51 | 270 | .419 | .48 |
| August | 470 | 46 | 189 | .293 | .34 |
| September | 1,780 | 29 | 437 | .679 | .76 |
| The year | 4,100 | 25 | 795 | 1.23 | 16.74 |

## HUDSON RIVER BASIN.

### HUDSON RIVER NEAR INDIAN LAKE, N. Y.

LOCATION.—About 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, 1918.

GAGE.—Gurley printing water-stage recorder on right bank; inspected by John A. Bolton.

DISCHARGE MEASUREMENTS.—Made from cable about 100 yards below gage or by wading.

CHANNEL AND CONTROL.—Solid ledge overlain with coarse gravel; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 8.08 feet at 6.30 a. m. May 19 (discharge, 8,960 second-feet); minimum stage, February 7 (discharge, 80 second-feet).

1916–1918: Maximum stage, from water-stage recorder, 9.87 feet at 11 a. m. June 12, 1917 (discharge, 13,500 second-feet); minimum stage from water-stage recorder 1.43 feet from 11 a. m. September 11 to 8 a. m. September 13, 1916 (discharge, 56 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Large diurnal fluctuation due to logging operations during the spring months. Seasonal distribution of flow slightly affected by storage.

ACCURACY.—Stage-discharge relation practically permanent; affected by logs during October and November and by ice from December to March. Rating curve fairly well defined between 75 and 600 second-feet and well defined between 600 and 6,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table except when fluctuation required mean of hourly discharge. Records good.

*Discharge measurements of Hudson River near Indian Lake, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 13[a] | E. D. Burchard | 2.52 | 175 | Apr. 29[c] | J. W. Moulton | 4.34 | 1,830 |
| Jan. 7[a] | J. W. Moulton | 2.90 | 111 | 30 | E. D. Burchard | 3.14 | 987 |
| 31[a] | E. D. Burchard | 3.07 | 133 | 30 | J. W. Moulton | 3.21 | 1,070 |
| Feb. 27[a] | J. W. Moulton | 4.84 | 851 | June 21 | do | 2.22 | 352 |
| Mar. 22[b] | do | 4.97 | 1,070 | 21 | do | 2.22 | 338 |
| Apr. 3[c] | do | 6.37 | 4,910 | July 14 | do | 2.78 | 696 |

[a] Measurement made through complete ice cover.
[b] Measurement made through partial ice cover.
[c] Log jam on the control.

*Daily discharge, in second-feet, of Hudson River near Indian Lake, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 309 | 3,630 | 260 | 130 | 100 | 900 | 3,000 | 4,730 | 295 | 313 | 216 | 195 |
| 2 | 416 | 2,820 | 280 | 130 | 95 | 850 | 3,800 | 2,920 | 1,350 | 524 | 229 | 224 |
| 3 | 379 | 1,990 | 280 | 130 | 120 | 800 | 5,000 | 4,050 | 686 | 482 | 234 | 336 |
| 4 | 319 | 1,420 | 280 | 120 | 140 | 750 | 4,800 | 3,170 | 1,320 | 562 | 211 | 290 |
| 5 | 366 | 1,200 | 260 | 120 | 120 | 700 | 4,400 | 2,030 | 445 | 595 | 195 | 252 |
| 6 | 565 | 990 | 240 | 120 | 90 | 650 | 3,430 | 1,450 | 1,140 | 500 | 187 | 247 |
| 7 | 595 | 990 | 240 | 110 | 80 | 650 | 3,000 | 1,810 | 884 | 428 | 171 | 379 |
| 8 | 595 | 838 | 220 | 140 | 85 | 600 | 2,800 | 2,930 | 1,190 | 383 | 167 | 434 |
| 9 | 565 | 568 | 200 | 120 | 90 | 600 | 2,800 | 2,400 | 1,530 | 351 | 175 | 372 |
| 10 | 506 | 429 | 200 | 150 | 100 | 600 | 2,660 | 2,850 | 3,730 | 356 | 238 | 305 |
| 11 | 449 | 595 | 200 | 180 | 120 | 650 | 2,280 | 2,210 | 1,280 | 405 | 440 | 247 |
| 12 | 368 | 924 | 190 | 180 | 150 | 650 | 1,920 | 2,870 | 1,270 | 530 | 440 | 211 |
| 13 | 477 | 595 | 170 | 200 | 200 | 1,000 | 1,750 | 1,520 | 1,540 | 665 | 367 | 203 |
| 14 | 535 | 355 | 170 | 220 | 200 | 1,000 | 1,640 | 2,280 | 1,540 | 735 | 315 | 211 |
| 15 | 595 | 291 | 170 | 220 | 240 | 1,000 | 1,390 | 2,370 | 1,640 | 735 | 252 | 199 |
| 16 | 660 | 582 | 160 | 280 | 240 | 900 | 2,040 | 1,890 | 1,400 | 595 | 238 | 224 |
| 17 | 800 | 683 | 160 | 280 | 240 | 900 | 2,600 | 1,550 | 890 | 530 | 183 | 280 |
| 18 | 730 | 506 | 160 | 280 | 280 | 900 | 3,400 | 530 | 665 | 500 | 157 | 361 |
| 19 | 628 | 506 | 150 | 280 | 300 | 900 | 3,200 | 2,750 | 506 | 446 | 146 | 688 |
| 20 | 695 | 595 | 150 | 280 | 340 | 900 | 2,400 | 440 | 405 | 399 | 142 | 772 |
| 21 | 875 | 389 | 150 | 280 | 380 | 950 | 1,900 | 1,350 | 372 | 356 | 135 | 735 |
| 22 | 912 | 344 | 150 | 260 | 440 | 1,100 | 2,200 | 341 | 356 | 315 | 128 | 810 |
| 23 | 800 | 320 | 150 | 260 | 500 | 1,400 | 4,600 | 1,260 | 341 | 276 | 132 | 772 |
| 24 | 730 | 280 | 150 | 260 | 550 | 1,900 | 2,600 | 280 | 351 | 247 | 125 | 700 |
| 25 | 875 | 280 | 150 | 240 | 550 | 2,200 | 1,600 | 1,240 | 378 | 229 | 122 | 770 |
| 26 | 950 | 260 | 150 | 220 | 600 | 2,400 | 1,600 | 346 | 367 | 211 | 115 | 735 |
| 27 | 912 | 240 | 140 | 200 | 850 | 2,400 | 850 | 1,130 | 315 | 191 | 109 | 1,060 |
| 28 | 1,030 | 240 | 140 | 170 | 900 | 2,200 | 1,200 | 522 | 295 | 171 | 102 | 1,290 |
| 29 | 1,110 | 260 | 130 | 170 | ..... | 2,200 | 2,800 | 1,410 | 285 | 160 | 102 | 1,290 |
| 30 | 2,290 | 260 | 130 | 170 | ..... | 2,200 | 2,100 | 367 | 285 | 203 | 102 | 1,240 |
| 31 | 4,710 | ..... | 130 | 130 | ..... | 2,800 | ..... | 1,420 | ..... | 247 | 105 | ..... |

NOTE.—Discharge Nov. 23 to Apr. 4 estimated, because of ice, and discharge Apr. 18-30 estimated, because of logs on the control, from discharge measurements, weather records, study of recorder graph, and comparison with similar studies for Hudson River at North Creek.

*Monthly discharge of Hudson River near Indian Lake, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 418 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 4,710 | 309 | 831 | 1.99 | 2.29 |
| November | 3,630 | 240 | 779 | 1.86 | 2.08 |
| December | 280 | 130 | 184 | .440 | .51 |
| January | 280 | 110 | 195 | .467 | .54 |
| February | 900 | 80 | 289 | .691 | .72 |
| March | 2,800 | 600 | 1,210 | 2.89 | 3.33 |
| April | 5,000 | 850 | 2,660 | 6.36 | 7.10 |
| May | 4,730 | 280 | 1,820 | 4.35 | 5.02 |
| June | 3,730 | 285 | 902 | 2.16 | 2.41 |
| July | 735 | 160 | 408 | .976 | 1.13 |
| August | 440 | 102 | 193 | .462 | .53 |
| September | 1,290 | 195 | 528 | 1.26 | 1.41 |
| The year | 5,000 | 80 | 834 | 2.00 | 27.07 |

### HUDSON RIVER AT NORTH CREEK, N. Y.

LOCATION.—At two-span steel highway bridge in village of North Creek, Warren County, immediately above mouth of North Creek.

DRAINAGE AREA.—804 square miles.

RECORDS AVAILABLE.—September 21, 1907, to September 30, 1918.

GAGE.—Chain at upstream side of left span of the bridge; read by William Alexander.

DISCHARGE MEASUREMENTS.—Made from the upstream side of the highway bridge.

CHANNEL AND CONTROL.—Heavy gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.65 feet at 6 p. m. April 3 (discharge, 11,100 second-feet); minimum stage, 2.25 feet at 8 a. m. July 24 (discharge, 302 second-feet).

1907–1918: Maximum stage recorded 12.0 feet during the evening of March 27, 1913 (discharge about 30,000 second-feet); minimum stage, 2.05 feet at 7.05 a. m. September 30, 1913 (discharge, 168 second-feet).

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; affected by ice from December to March, inclusive. Rating curve well defined between 250 and 6,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good; winter records fair.

*Discharge measurements of Hudson River at North Creek, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 12[a] | E. D. Burchard | 4.22 | 899 | Apr. 4 | J. W. Moulton | 6.22 | 6,880 |
| Jan. 5[a] | J. W. Moulton | 4.40 | 599 | May 2 | E. D. Burchard | 4.15 | 2,460 |
| Feb. 1[b] | E. D. Burchard | 4.64 | 626 | June 20 | J. W. Moulton | 2.66 | 588 |
| 28[b] | J. W. Moulton | 5.54 | 1,520 | July 13 | do | 3.76 | 1,770 |
| Mar. 24[b] | do | 7.10 | 2,710 | | | | |

[a] Measurement made through incomplete ice cover. [b] Measurement made through complete ice cover.

*Daily discharge, in second-feet, of Hudson River at North Creek, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 990 | 5,840 | 750 | 700 | 550 | 1,400 | 4,890 | 6,340 | 610 | 404 | 790 | 990 |
| 2 | 1,100 | 4,010 | 750 | 650 | 500 | 1,400 | 7,400 | 5,360 | 610 | 610 | 790 | 1,040 |
| 3 | 1,100 | 2,870 | 800 | 650 | 550 | 1,500 | 10,000 | 6,090 | 610 | 570 | 790 | 1,100 |
| 4 | 1,100 | 2,140 | 800 | 650 | 550 | 1,600 | 7,680 | 3,420 | 5,360 | 745 | 790 | 940 |
| 5 | 990 | 1,760 | 750 | 650 | 500 | 1,600 | 6,600 | 3,050 | 530 | 790 | 1,160 | 790 |
| 6 | 890 | 1,480 | 700 | 650 | 480 | 1,600 | 4,890 | 1,910 | 3,230 | 700 | 990 | 790 |
| 7 | 840 | 1,350 | 700 | 750 | 440 | 1,000 | 4,890 | 1,550 | 460 | 610 | 890 | 890 |
| 8 | 790 | 1,350 | 650 | 800 | 440 | 1,000 | 4,440 | 4,660 | 1,910 | 530 | 790 | 990 |
| 9 | 790 | 1,280 | 650 | 750 | 440 | 1,100 | 4,890 | 4,220 | 1,550 | 530 | 940 | 1,100 |
| 10 | 700 | 1,220 | 650 | 800 | 460 | 1,100 | 4,440 | 2,870 | 6,340 | 530 | 990 | 990 |
| 11 | 745 | 890 | 950 | 850 | 500 | 1,200 | 4,010 | 3,610 | 2,370 | 610 | 1,100 | 990 |
| 12 | 790 | 890 | 1,100 | 850 | 460 | 1,400 | 3,230 | 2,060 | 3,050 | 745 | 1,100 | 940 |
| 13 | 940 | 940 | 1,000 | 850 | 600 | 2,200 | 2,870 | 2,870 | 2,700 | 1,840 | 990 | 890 |
| 14 | 940 | 890 | 1,000 | 900 | 600 | 2,200 | 2,530 | 2,060 | 2,370 | 1,620 | 990 | 890 |
| 15 | 890 | 495 | 1,000 | 900 | 650 | 2,000 | 2,700 | 1,830 | 2,530 | 1,620 | 890 | 700 |
| 16 | 940 | 700 | 1,000 | 1,000 | 650 | 1,900 | 3,230 | 4,440 | 1,980 | 1,040 | 840 | 530 |
| 17 | 990 | 700 | 1,000 | 1,000 | 650 | 1,900 | 4,440 | 2,130 | 1,220 | 940 | 890 | 570 |
| 18 | 1,040 | 700 | 1,000 | 1,000 | 700 | 1,900 | 5,360 | 1,350 | 940 | 890 | 790 | 610 |
| 19 | 890 | 700 | 1,000 | 1,000 | 700 | 2,000 | 4,890 | 1,760 | 745 | 745 | 890 | 990 |
| 20 | 990 | 700 | 1,000 | 950 | 800 | 2,000 | 4,890 | 940 | 570 | 610 | 990 | 1,100 |
| 21 | 1,220 | 655 | 800 | 900 | 850 | 2,200 | 4,010 | 700 | 530 | 610 | 990 | 1,100 |
| 22 | 1,220 | 570 | 700 | 900 | 950 | 2,200 | 3,230 | 700 | 530 | 530 | 890 | 990 |
| 23 | 1,100 | 530 | 700 | 850 | 1,100 | 2,600 | 8,520 | 790 | 530 | 330 | 940 | 990 |
| 24 | 1,100 | 530 | 700 | 800 | 1,100 | 2,800 | 5,600 | 990 | 530 | 319 | 940 | 890 |
| 25 | 1,420 | 460 | 750 | 850 | 1,100 | 3,200 | 4,220 | 655 | 530 | 700 | 890 | 890 |
| 26 | 1,620 | 460 | 750 | 850 | 1,200 | 4,000 | 4,440 | 570 | 530 | 790 | 890 | 940 |
| 27 | 1,550 | 460 | 800 | 750 | 1,400 | 5,000 | 2,060 | 790 | 460 | 655 | 890 | 1,620 |
| 28 | 1,690 | 500 | 800 | 650 | 1,600 | 5,500 | 1,620 | 700 | 460 | 700 | 890 | 1,760 |
| 29 | 1,760 | 500 | 750 | 650 | ..... | 5,360 | 3,230 | 1,160 | 378 | 700 | 890 | 1,690 |
| 30 | 2,870 | 700 | 750 | 650 | ..... | 4,890 | 4,890 | 790 | 2,210 | 790 | 840 | 1,480 |
| 31 | 7,400 | ..... | 700 | 600 | ..... | 4,440 | ..... | 2,210 | ..... | 890 | 840 | ..... |

NOTE.—Discharge Nov. 26 to Mar. 28 estimated, because of ice, from discharge measurements, weather records, study of recorder graph and comparison with similar studies for Hudson River near Indian Lake.

*Monthly discharge of Hudson River at North Creek, N. Y., for year ending Sept. 30, 1918.*

[Drainage area, 804 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 7,400 | 700 | 1,340 | 1.67 | 1.91 |
| November | 5,840 | 460 | 1,210 | 1.50 | 1.67 |
| December | 1,100 | 650 | 821 | 1.02 | 1.18 |
| January | 1,000 | 600 | 800 | .995 | 1.14 |
| February | 1,600 | 440 | 734 | .913 | .95 |
| March | 5,500 | 1,000 | 2,390 | 2.97 | 3.42 |
| April | 10,000 | 1,620 | 4,670 | 5.81 | 6.48 |
| May | 6,340 | 570 | 2,340 | 2.91 | 3.36 |
| June | 6,340 | 378 | 1,550 | 1.92 | 2.14 |
| July | 1,840 | 319 | 764 | .950 | 1.10 |
| August | 1,160 | 790 | 912 | 1.13 | 1.30 |
| September | 1,760 | 530 | 1,010 | 1.26 | 1.41 |
| The year | 10,000 | 319 | 1,540 | 1.92 | 26.06 |

### HUDSON RIVER AT THURMAN, N. Y.

LOCATION.—At Delaware & Hudson Railroad bridge near Thurman railroad station, Warren County, half a mile below mouth of Schroon River, and 13 miles above mouth of Sacandaga River.

DRAINAGE AREA.—1,550 square miles.

RECORDS AVAILABLE.—September 1, 1907, to September 30, 1918.

GAGE.—Chain at upstream side near center of left span; read by S. H. Spencer.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Sand and gravel; fairly permanent. Logs occasionally lodge on a small island on the control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.28 feet in the afternoon, April 23 (discharge, 14,800 second-feet); minimum stage recorded, 2.4 feet in the morning, July 28 (discharge, 680 second-feet).

1907–1918: Maximum stage (determined by leveling from flood marks), 12.5 feet during the late evening of March 27, 1913 (discharge about 46,000 second-feet); minimum stage recorded, 2.12 feet at 8.55 a. m. and 6.20 p. m. September 30, 1913 (discharge about 290 second-feet).

ICE.—Stage-discharge relation seriously affected by ice. Discharge determined from records at North Creek and Riverbank.

REGULATION.—Discharge is regulated to some extent by the storage reservoirs at Indian Lake and Schroon Lake and the mills on Schroon River.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice during large part of the period from December to March, inclusive, and by logs during parts of June, July, and September. Rating curve well defined between 550 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; winter estimates fair.

COOPERATION.—Gage heights furnished by the International Paper Co.

*Discharge measurements of Hudson River at Thurman, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 16[a] | E. D. Burchard | 5.16 | 1,570 | June 20 | J. W. Moulton | 3.14 | 1,560 |
| May 3 | J. W. Moulton | 5.41 | 8,050 | July 12 | do | 2.82 | 985 |

[a] Measurement made through complete ice cover.

*Daily discharge, in second-feet, of Hudson River at Thurman, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,460 | 7,760 | 1,550 | 11,400 | 6,780 | 2,040 | 850 | 1,220 | 1,380 |
| 2 | 1,460 | 6,170 | 1,460 | 12,100 | 7,430 | 3,590 | 1,300 | 1,080 | 1,460 |
| 3 | 1,550 | 4,420 | 1,460 | 14,100 | 6,780 | 2,150 | 1,500 | 1,150 | 1,380 |
| 4 | 1,380 | 4,140 | 1,940 | 14,100 | 6,470 | 4,420 | 950 | 1,080 | 1,380 |
| 5 | 1,550 | 3,590 | 1,380 | 12,500 | 5,000 | 950 | 1,100 | 1,460 | 1,080 |
| 6 | 1,550 | 3,200 | 1,550 | 11,000 | 4,710 | 1,550 | 1,100 | 1,300 | 1,080 |
| 7 | 1,220 | 2,960 | 1,500 | 10,600 | 3,860 | 1,380 | 950 | 1,220 | 1,080 |
| 8 | 1,380 | 2,840 | 1,460 | 9,500 | 5,580 | 1,220 | 950 | 1,220 | 1,080 |
| 9 | 1,080 | 2,480 | 1,400 | 9,860 | 4,710 | 1,380 | 850 | 1,220 | 1,550 |
| 10 | 1,020 | 1,940 | 1,500 | 9,860 | 5,290 | 4,710 | 850 | 1,220 | 1,380 |
| 11 | 850 | 1,740 | 1,600 | 8,790 | 5,290 | 3,590 | 850 | 1,150 | 1,300 |
| 12 | 1,080 | 1,940 | 1,800 | 7,430 | 5,870 | 3,080 | 800 | 1,460 | 1,300 |
| 13 | 1,300 | 2,150 | 1,800 | 7,430 | 4,710 | 4,710 | 1,700 | 1,380 | 1,220 |
| 14 | 1,460 | 1,740 | 1,700 | 7,100 | 6,470 | 4,140 | 2,200 | 1,300 | 1,460 |
| 15 | 1,460 | 1,740 | 1,600 | 6,470 | 8,100 | 4,140 | 2,200 | 1,300 | 2,150 |
| 16 | 1,300 | 1,940 | 1,600 | 7,430 | 5,580 | 3,860 | 1,700 | 1,150 | 850 |
| 17 | 1,460 | 2,040 | 1,500 | 7,100 | 4,140 | 2,600 | 1,300 | 1,080 | 905 |
| 18 | 1,640 | 1,940 | 1,500 | 7,760 | 3,860 | 2,370 | 1,300 | 905 | 1,220 |
| 19 | 1,380 | 1,640 | 1,500 | 11,400 | 3,590 | 2,150 | 1,200 | 1,020 | 1,300 |
| 20 | 1,300 | 1,640 | 1,400 | 7,760 | 3,460 | 1,840 | 1,200 | 1,220 | 1,550 |
| 21 | 1,460 | 1,740 | 1,400 | 8,790 | 3,330 | 1,740 | 1,000 | 1,380 | 2,040 |
| 22 | 1,940 | 1,460 | 1,200 | 7,430 | 2,840 | 2,150 | 850 | 1,080 | 1,740 |
| 23 | 1,840 | 1,460 | 1,100 | 11,000 | 2,480 | 1,220 | 800 | 1,220 | 1,550 |
| 24 | 1,460 | 1,460 | 1,100 | 9,500 | 2,260 | 1,220 | 750 | 1,300 | 1,550 |
| 25 | 1,940 | 1,300 | 1,100 | 6,170 | 3,860 | 1,500 | 850 | 1,380 | 1,380 |
| 26 | 2,260 | 1,080 | 1,100 | 7,100 | 1,550 | 1,400 | 1,220 | 1,150 | 1,550 |
| 27 | 2,150 | 1,020 | 1,100 | 5,290 | 1,940 | 1,500 | 1,020 | 1,150 | 2,800 |
| 28 | 2,260 | 905 | 1,100 | 5,000 | 2,260 | 1,300 | 680 | 1,080 | 2,600 |
| 29 | 2,480 | 1,640 | 1,100 | 9,140 | 4,140 | 1,300 | 1,220 | 1,150 | 2,400 |
| 30 | 3,590 | 2,150 | 1,100 | 8,790 | 2,150 | 700 | 1,220 | 1,150 | 2,200 |
| 31 | 8,790 | ..... | 1,000 | ..... | 5,000 | ..... | 1,380 | 1,080 | ..... |

NOTE.—Discharge Dec. 9-31 estimated, because of ice, from one discharge measurement, weather records, and study of recorder graph. Determinations of discharge, June 25 to July 24, and Sept. 27-30, somewhat uncertain because of logs on the control.

*Monthly discharge of Hudson River at Thurman, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 1,550 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 8,790 | 850 | 1,840 | 1.19 | 1.37 |
| November | 7,760 | 905 | 2,410 | 1.55 | 1.73 |
| December | 1,940 | 1,000 | 1,410 | .910 | 1.05 |
| January | ..... | ..... | 1,160 | .748 | .86 |
| February | ..... | ..... | 940 | .606 | .63 |
| March | ..... | ..... | 3,620 | 2.34 | 2.70 |
| April | 14,100 | 5,000 | 9,060 | 5.85 | 6.53 |
| May | 8,100 | 1,550 | 4,500 | 2.90 | 3.34 |
| June | 4,710 | 805 | 2,330 | 1.50 | 1.67 |
| July | 2,200 | 680 | 1,160 | .748 | .86 |
| August | 1,460 | 905 | 1,200 | .774 | .89 |
| September | 2,800 | 850 | 1,530 | .987 | 1.10 |
| The year | 14,100 | ..... | 2,600 | 1.68 | 22.73 |

### 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 September, 30, 1918.

GAGE.—Gurley 2-day water-stage recorder in a brick shelter 5 feet square on the right bank about half a mile below the Spier Falls dam. Recorder inspected by T. F. Malone, chief operator of power plant.

DISCHARGE MEASUREMENTS.—Made from a cable about 1,000 feet downstream from the gage.

CHANNEL AND CONTROL.—Coarse gravel and boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 12.16 feet at 8 a. m. April 4 (discharge, 34,500 second-feet); minimum stage from water-stage recorder, 0.93 foot at 7 a. m. September 1 (discharge, 140 second-feet).

1912–1918: 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 not affected by ice, except for a short time during extremely cold periods.

REGULATION.—Large diurnal fluctuation in discharge due to the 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.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice February 2 to 16. Rating curve well defined for all stages except about 9 feet, where the rating curve may be 4 or 5 per cent large. Operation of the water-stage recorder satisfactory throughout the year. Daily discharge ascertained by averaging the results obtained by applying hourly gage heights to rating table. Records good.

COOPERATION.—Water-stage recorder inspected by an employee of the Adirondack Electric Power Corporation.

*Discharge measurements of Hudson River at Spier Falls, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* |
| Jan. 3[a] | J. W. Moulton | 2.84 | 1,150 |
| Feb. 2[b] | E. D. Burchard | 2.85 | 1,400 |
| June 18 | J. W. Moulton | 4.67 | 4,990 |

[a] Measurement made through complete ice cover. [b] Measurement made through incomplete ice cover.

*Daily discharge, in second-feet, of Hudson River at Spier Falls, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,930 | 17,700 | 3,160 | 1,390 | 1,330 | 5,780 | 21,500 | 13,500 | 5,200 | 1,810 | 1,480 | 906 |
| 2 | 1,780 | 15,200 | 1,020 | 1,820 | 2,000 | 5,350 | 22,900 | 13,800 | 3,800 | 1,700 | 1,540 | 1,940 |
| 3 | 1,470 | 12,600 | 2,720 | 1,480 | 1,240 | 5,100 | 31,400 | 12,600 | 4,570 | 2,780 | 1,120 | 2,350 |
| 4 | 1,860 | 10,200 | 1,960 | 1,480 | 1,380 | 4,860 | 32,300 | 13,200 | 3,750 | 1,590 | 1,390 | 1,790 |
| 5 | 1,940 | 8,350 | 2,220 | 1,770 | 1,620 | 4,750 | 27,900 | 11,400 | 3,870 | 1,260 | 1,530 | 1,690 |
| 6 | 2,680 | 6,950 | 2,090 | 727 | 1,730 | 4,900 | 24,200 | 8,780 | 2,840 | 1,510 | 1,490 | 1,650 |
| 7 | 1,510 | 5,840 | 2,310 | 1,760 | 1,460 | 4,340 | 21,700 | 7,830 | 3,400 | 1,510 | 1,670 | 1,580 |
| 8 | 1,860 | 5,160 | 2,110 | 1,540 | 1,350 | 3,770 | 20,100 | 8,320 | 3,470 | 1,910 | 1,430 | 922 |
| 9 | 1,810 | 4,560 | 610 | 1,330 | 1,650 | 3,130 | 21,800 | 9,600 | 4,010 | 1,480 | 1,590 | 1,980 |
| 10 | 1,600 | 3,600 | 1,530 | 1,300 | 661 | 3,090 | 22,200 | 10,200 | 6,500 | 1,250 | 1,060 | 2,060 |
| 11 | 1,640 | 3,370 | 1,580 | 1,430 | 1,460 | 3,860 | 21,100 | 10,200 | 6,570 | 1,410 | 1,600 | 1,700 |
| 12 | 1,630 | 4,140 | 1,780 | 1,440 | 1,160 | 2,850 | 18,900 | 8,660 | 4,900 | 1,850 | 1,710 | 1,430 |
| 13 | 2,030 | 3,350 | 2,130 | 1,700 | 1,430 | 2,770 | 16,700 | 9,190 | 6,700 | 2,080 | 1,880 | 1,770 |
| 14 | 1,940 | 2,980 | 2,490 | 1,460 | 1,380 | 3,660 | 14,800 | 12,800 | 6,990 | 2,690 | 1,680 | 1,850 |
| 15 | 3,250 | 2,880 | 2,060 | 1,310 | 1,730 | 4,140 | 14,000 | 15,100 | 6,460 | 3,690 | 1,570 | 725 |
| 16 | 2,920 | 3,040 | 2,110 | 1,920 | 1,660 | 3,560 | 14,300 | 13,400 | 5,720 | 2,880 | 1,840 | 1,970 |
| 17 | 2,990 | 2,910 | 2,030 | 1,840 | 1,490 | 3,230 | 15,200 | 11,700 | 4,680 | 2,470 | 1,050 | 1,360 |
| 18 | 3,020 | 2,160 | 2,450 | 1,780 | 1,850 | 4,230 | 17,200 | 9,730 | 3,930 | 2,410 | 1,230 | 1,410 |
| 19 | 2,630 | 3,280 | 2,180 | 1,690 | 1,790 | 4,750 | 20,100 | 8,280 | 3,550 | 2,730 | 1,810 | 1,950 |
| 20 | 2,760 | 2,520 | 2,170 | 1,050 | 2,400 | 5,620 | 19,000 | 8,440 | 3,170 | 2,240 | 1,450 | 2,410 |
| 21 | 2,280 | 2,450 | 2,480 | 1,890 | 2,900 | 7,030 | 17,200 | 6,360 | 2,840 | 1,400 | 1,380 | 3,390 |
| 22 | 4,080 | 2,260 | 2,580 | 1,790 | 3,150 | 9,230 | 18,200 | 6,210 | 2,420 | 1,690 | 1,430 | 1,600 |
| 23 | 3,270 | 3,270 | 1,170 | 1,730 | 3,810 | 12,500 | 19,400 | 4,860 | 1,830 | 1,480 | 1,440 | 2,310 |
| 24 | 2,770 | 3,470 | 1,990 | 1,660 | 4,140 | 13,500 | 20,100 | 5,100 | 2,970 | 1,310 | 606 | 2,340 |
| 25 | 3,240 | 2,670 | 1,820 | 1,660 | 4,220 | 15,200 | 16,300 | 3,870 | 2,530 | 1,330 | 1,410 | 2,230 |
| 26 | 4,020 | 2,990 | 1,870 | 2,150 | 4,480 | 16,200 | 16,100 | 4,310 | 2,390 | 1,440 | 1,690 | 2,620 |
| 27 | 4,280 | 2,010 | 2,290 | 740 | 5,490 | 15,700 | 12,600 | 4,040 | 2,100 | 1,480 | 1,400 | 5,410 |
| 28 | 4,130 | 2,490 | 1,980 | 2,170 | 6,150 | 14,800 | 11,800 | 4,610 | 2,030 | 1,290 | 1,440 | 6,100 |
| 29 | 5,070 | 1,130 | 2,070 | 1,690 | ..... | 15,100 | 10,800 | 4,230 | 1,720 | 1,420 | 1,350 | 5,350 |
| 30 | 10,200 | 2,510 | 1,140 | 1,820 | ..... | 16,700 | 13,400 | 4,440 | 1,490 | 1,590 | 1,200 | 4,650 |
| 31 | 17,200 | ..... | 3,060 | 1,480 | ..... | 18,300 | ..... | 5,200 | ..... | 1,530 | 1,520 | ..... |

NOTE.—Discharge Jan. 1 to Feb. 15 estimated, because of ice, by comparison with discharge computed from power-house records.

*Monthly discharge of Hudson River at Spier Falls, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 2,800 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 17,200 | 1,470 | 3,350 | 1.20 | 1.38 |
| November | 17,700 | 1,130 | 4,870 | 1.74 | 1.94 |
| December | 3,160 | 610 | 2,040 | .729 | .84 |
| January | 2,170 | 727 | 1,580 | .564 | .65 |
| February | 6,150 | 661 | 2,320 | .829 | .86 |
| March | 18,300 | 2,770 | 7,680 | 2.74 | 3.16 |
| April | 32,300 | 10,800 | 19,100 | 6.82 | 7.61 |
| May | 15,100 | 3,870 | 8,710 | 3.11 | 3.59 |
| June | 6,990 | 1,490 | 3,880 | 1.39 | 1.55 |
| July | 3,690 | 1,250 | 1,850 | .661 | .76 |
| August | 1,880 | 606 | 1,450 | .518 | .60 |
| September | 6,100 | 725 | 2,310 | .825 | .92 |
| The year | 32,300 | 606 | 4,920 | 1.76 | 23.86 |

### 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 19 miles above mouth of Mohawk River at Cohoes.

DRAINAGE AREA.—4,500 square miles.

RECORDS AVAILABLE.—1888 to 1918.

GAGE.—Water-stage recorder at the dam, installed in 1910; previous to that date staff gage.

COMPUTATIONS OF DISCHARGE.—Discharge over spillway determined from a rating curve based on United States Geological Survey coefficients 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.

EXTREMES OF DISCHARGE.—Maximum daily discharge during year, 35,500 second-feet April 3; minimum daily discharge, 576 second-feet, Sunday, January 20.

1888–1918: Maximum discharge recorded, 120,000 second-feet at 6 a. m. March 28, 1913.[1] The plant is occasionally shut down and the flow of the river stored in the pond so that the discharge below the station becomes practically zero.

DIVERSIONS.—Water diverted above this station into the Champlain canal. No correction made for this diversion. During 1915 a Barge canal lock, through the Duncan dam, was completed and put into operation. Water used at the lock is included in the record.

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.

*Daily discharge, in second-feet, of Hudson River at Mechanicville, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,190 | 19,800 | 3,720 | 1,870 | 1,620 | 8,370 | 25,800 | 15,000 | 7,070 | 2,330 | 1,640 | 631 |
| 2 | 1,430 | 16,800 | 4,170 | 1,870 | 1,060 | 7,430 | 30,600 | 17,800 | 5,510 | 2,650 | 1,350 | 1,050 |
| 3 | 1,750 | 14,300 | 3,000 | 1,830 | 638 | 8,050 | 35,500 | 14,800 | 5,960 | 2,460 | 1,740 | 2,600 |
| 4 | 2,120 | 11,300 | 3,840 | 1,810 | 685 | 6,840 | 35,200 | 15,000 | 4,540 | 1,460 | 587 | 2,520 |
| 5 | 2,010 | 10,200 | 3,250 | 1,810 | 638 | 6,040 | 30,800 | 13,400 | 4,750 | 3,020 | 1,220 | 2,140 |
| 6 | 2,020 | 8,600 | 3,180 | 1,160 | 584 | 6,980 | 26,500 | 11,200 | 4,280 | 2,290 | 1,670 | 2,170 |
| 7 | 1,640 | 7,580 | 3,040 | 1,610 | 1,340 | 6,510 | 23,200 | 9,700 | 4,060 | 1,430 | 1,650 | 1,790 |
| 8 | 2,440 | 6,460 | 2,840 | 1,600 | 1,850 | 5,390 | 22,500 | 9,500 | 5,050 | 1,990 | 1,520 | 1,190 |
| 9 | 1,940 | 6,120 | 2,500 | 1,610 | 1,780 | 5,680 | 24,300 | 10,600 | 5,720 | 2,990 | 1,410 | 1,120 |
| 10 | 1,980 | 5,270 | 2,250 | 1,620 | 587 | 6,150 | 25,200 | 11,400 | 5,660 | 2,580 | 1,420 | 1,740 |
| 11 | 1,600 | 2,800 | 1,900 | 1,540 | 614 | 5,940 | 23,900 | 11,100 | 7,320 | 2,090 | 1,160 | 2,140 |
| 12 | 1,530 | 4,910 | 1,880 | 1,500 | 1,050 | 5,250 | 21,200 | 10,700 | 6,060 | 1,820 | 1,200 | 1,890 |
| 13 | 1,980 | 4,750 | 1,950 | 795 | 749 | 5,820 | 9,200 | 11,300 | 6,670 | 2,250 | 2,040 | 2,040 |
| 14 | 1,570 | 4,520 | 2,040 | 1,400 | 2,520 | 6,640 | 17,800 | 15,200 | 7,140 | 1,710 | 2,010 | 1,580 |
| 15 | 2,740 | 4,020 | 2,480 | 1,220 | 4,080 | 6,190 | 16,900 | 16,900 | 6,590 | 3,930 | 1,940 | 1,030 |
| 16 | 3,490 | 3,760 | 2,670 | 1,420 | 4,210 | 5,740 | 16,000 | 15,800 | 5,490 | 4,140 | 1,710 | 1,360 |
| 17 | 3,280 | 3,720 | 2,830 | 1,130 | 1,200 | 8,150 | 17,200 | 13,700 | 5,320 | 3,640 | 1,680 | 2,180 |
| 18 | 3,390 | 3,160 | 2,480 | 606 | 3,570 | 9,920 | 18,800 | 11,700 | 5,130 | 3,790 | 988 | 2,090 |
| 19 | 3,440 | 3,710 | 2,520 | 606 | 5,840 | 11,700 | 20,500 | 9,450 | 4,770 | 3,400 | 1,190 | 1,780 |
| 20 | 3,340 | 3,870 | 2,710 | 576 | 22,400 | 14,200 | 20,900 | 11,200 | 4,020 | 3,120 | 1,670 | 1,780 |
| 21 | 2,310 | 3,580 | 2,810 | 741 | 9,610 | 16,400 | 19,500 | 8,430 | 3,300 | 1,830 | 1,670 | 3,360 |
| 22 | 3,320 | 3,760 | 2,850 | 1,760 | 7,230 | 18,600 | 23,200 | 8,070 | 4,070 | 2,240 | 1,650 | 3,290 |
| 23 | 4,300 | 3,920 | 2,080 | 1,940 | 6,960 | 20,900 | 22,400 | 6,710 | 3,380 | 2,160 | 1,630 | 2,700 |
| 24 | 3,590 | 5,440 | 3,120 | 2,050 | 6,350 | 21,100 | 24,200 | 6,710 | 3,940 | 1,770 | 1,600 | 3,120 |
| 25 | 3,770 | 4,450 | 2,220 | 2,010 | 7,830 | 22,700 | 19,600 | 5,480 | 4,790 | 1,350 | 788 | 2,690 |
| 26 | 4,440 | 4,680 | 2,700 | 1,720 | 16,000 | 22,500 | 17,500 | 5,560 | 4,130 | 1,260 | 1,040 | 5,230 |
| 27 | 4,650 | 4,090 | 2,360 | 1,140 | 11,300 | 20,600 | 15,600 | 6,200 | 3,980 | 1,230 | 1,300 | 12,100 |
| 28 | 4,790 | 2,940 | 2,170 | 1,250 | 9,950 | 19,100 | 14,100 | 6,450 | 3,100 | 810 | 1,470 | 9,740 |
| 29 | 5,310 | 2,700 | 2,000 | 1,900 | ..... | 19,000 | 12,700 | 5,990 | 2,820 | 1,720 | 1,520 | 8,970 |
| 30 | 12,000 | 2,600 | 1,350 | 1,480 | ..... | 20,600 | 14,400 | 5,750 | 1,600 | 2,170 | 1,630 | 7,800 |
| 31 | 20,100 | ..... | 1,790 | 1,110 | ..... | 22,400 | ..... | 6,090 | ..... | 1,920 | 1,460 | ..... |

[1] Highest known flood prior to this time occurred in April, 1869, calculated discharge, 70,000 second-feet. See U. S. Geological Survey Water-Supply Paper 65, p. 51, and report of U. S. Board of Engineers on Deep Waterways, Part I, pp. 377–388.

*Monthly discharge of Hudson River at Mechanicville, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 4,500 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 20,100 | 1,190 | 3,660 | 0.813 | 0.94 |
| November | 19,800 | 2,600 | 6,130 | 1.36 | 1.52 |
| December | 4,170 | 1,350 | 2,600 | .578 | .67 |
| January | 2,050 | 576 | 1,440 | .320 | .37 |
| February | 22,400 | 584 | 4,720 | 1.05 | 1.09 |
| March | 22,700 | 5,250 | 12,000 | 2.67 | 3.08 |
| April | 35,500 | 12,700 | 21,800 | 4.84 | 5.40 |
| May | 17,800 | 5,480 | 10,500 | 2.33 | 2.69 |
| June | 7,320 | 1,600 | 4,870 | 1.08 | 1.20 |
| July | 4,140 | 810 | 2,310 | .513 | .59 |
| August | 2,040 | 587 | 1,470 | .327 | .38 |
| September | 12,100 | 631 | 3,130 | .696 | .78 |
| The year | 35,500 | 576 | 6,210 | 1.38 | 18.71 |

### INDIAN LAKE RESERVOIR AT INDIAN LAKE, N. Y.

LOCATION.—At the masonry storage dam at outlet of Indian Lake, 2 miles south of Indian Lake village, Hamilton County and 7½ miles above confluence of Indian River with the Hudson.

DRAINAGE AREA.—131 square miles, including about 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, 1900, to September 30, 1918.

GAGES.—Elevation of water surface in reservoir is determined by chain gage on the crest of the dam near the gate house. Gage installed November 17, 1911, to replace staff gage previously maintained at the same point. 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 gate house. Gages read by Lester Savarie.

EXTREMES OF STAGE.—Maximum elevation of water surface in reservoir, 34.2 feet July 16, 17, and 18; minimum elevation, 5.15 feet February 25–26.

1900–1918: Maximum elevation recorded, 38.8 feet March 28, 1913; minimum elevation, 2.0 feet March 9 to 18, 1907, and January 3 to 17, 1910.

REGULATION.—At ordinary stages the discharge is completely regulated by the operation of the sluice gates. Water is held in storage until needed to supplement the flow of the upper Hudson during the low-water period. This storage capacity of about 4.7 billion cubic feet provides for a discharge of about 600 second-feet for a period of 90 days. For record of discharge see Indian River near Indian Lake, N. Y., pages 146–147.

*Daily gage height, in feet, of Indian Lake reservoir at Indian Lake, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 17.95 | 21.8 | 23.65 | 16.7 | 9.5 | 6.2 | 12.15 | 27.85 | 33.5 | 33.65 | 32.2 | 22.5 |
| 2 | 17.65 | 22.1 | 23.6 | 16.4 | 9.25 | 6.5 | 13.3 | 28.25 | 33.6 | 33.65 | 32.0 | 22.15 |
| 3 | 17.35 | 22.3 | 23.55 | 16.15 | 9.0 | 6.4 | 14.55 | 28.55 | 33.65 | 33.65 | 31.75 | 21.8 |
| 4 | 17.1 | 22.5 | 23.5 | 15.9 | 8.75 | 6.4 | 15.45 | 28.85 | 33.65 | 33.7 | 31.4 | 21.6 |
| 5 | 16.95 | 22.65 | 23.45 | 15.65 | 8.5 | 6.35 | 16.0 | 29.05 | 33.65 | 33.7 | 31.1 | 21.45 |
| 6 | 17.0 | 22.75 | 23.35 | 15.4 | 8.25 | 6.6 | 16.55 | 29.1 | 33.85 | 33.75 | 30.8 | 21.2 |
| 7 | 17.05 | 22.85 | 23.25 | 15.15 | 8.0 | 6.9 | 16.95 | 29.3 | 34.0 | 33.8 | 30.55 | 21.0 |
| 8 | 17.1 | 22.9 | 23.15 | 14.9 | 7.7 | 7.2 | 17.45 | 29.55 | 34.0 | 33.85 | 30.3 | 20.7 |
| 9 | 17.15 | 23.05 | 23.05 | 14.65 | 7.5 | 7.5 | 18.1 | 29.85 | 34.0 | 33.9 | 30.0 | 20.35 |
| 10 | 17.15 | 23.15 | 22.9 | 14.4 | 7.3 | 7.8 | 18.7 | 30.05 | 34.0 | 33.95 | 29.85 | 20.0 |
| 11 | 17.1 | 23.2 | 22.7 | 14.1 | 7.1 | 8.1 | 19.1 | 30.3 | 34.0 | 34.0 | 29.55 | 19.7 |
| 12 | 17.1 | 23.25 | 22.45 | 13.85 | 6.9 | 8.05 | 19.5 | 30.55 | 33.8 | 34.05 | 29.25 | 19.4 |
| 13 | 17.15 | 23.3 | 22.2 | 13.65 | 6.7 | 8.0 | 19.8 | 30.8 | 33.75 | 34.1 | 29.0 | 19.1 |
| 14 | 17.3 | 23.35 | 21.95 | 13.45 | 6.5 | 7.95 | 20.05 | 31.2 | 33.65 | 34.1 | 28.75 | 18.85 |
| 15 | 17.45 | 23.4 | 21.65 | 13.25 | 6.3 | 7.9 | 20.3 | 31.5 | 33.6 | 34.15 | 28.55 | 18.75 |
| 16 | 17.6 | 23.4 | 21.3 | 13.05 | 6.1 | 7.85 | 20.75 | 31.7 | 33.6 | 34.2 | 28.25 | 18.65 |
| 17 | 17.7 | 23.45 | 20.9 | 12.65 | 5.9 | 7.8 | 21.4 | 31.9 | 33.65 | 34.2 | 28.0 | 18.55 |
| 18 | 17.8 | 23.5 | 20.55 | 12.45 | 5.7 | 7.75 | 22.2 | 32.05 | 33.6 | 34.2 | 27.65 | 18.5 |
| 19 | 17.9 | 23.55 | 20.2 | 12.25 | 5.6 | 7.9 | 22.9 | 32.15 | 33.55 | 34.15 | 27.25 | 18.55 |
| 20 | 18.0 | 23.65 | 19.9 | 12.05 | 5.5 | 8.2 | 23.4 | 32.25 | 33.5 | 34.15 | 26.85 | 18.55 |
| 21 | 18.2 | 23.75 | 19.65 | 11.85 | 5.4 | 8.5 | 23.75 | 32.4 | 33.5 | 34.1 | 26.45 | 18.65 |
| 22 | 18.3 | 23.85 | 19.4 | 11.6 | 5.3 | 8.7 | 24.55 | 32.5 | 33.5 | 34.0 | 26.1 | 18.75 |
| 23 | 18.45 | 23.95 | 19.2 | 11.4 | 5.25 | 8.85 | 25.15 | 32.6 | 33.5 | 34.0 | 25.65 | 18.8 |
| 24 | 18.5 | 24.0 | 19.0 | 11.2 | 5.2 | 9.15 | 25.55 | 32.7 | 33.5 | 33.9 | 25.2 | 18.85 |
| 25 | 18.85 | 24.05 | 18.8 | 11.0 | 5.15 | 9.6 | 25.8 | 32.85 | 33.55 | 33.6 | 24.9 | 18.9 |
| 26 | 19.0 | 24.05 | 18.5 | 10.85 | 5.15 | 10.0 | 26.05 | 32.9 | 33.55 | 33.5 | 24.45 | 19.05 |
| 27 | 19.15 | 24.05 | 18.2 | 10.65 | 5.5 | 10.4 | 26.2 | 33.0 | 33.5 | 33.35 | 24.05 | 19.35 |
| 28 | 19.35 | 24.05 | 17.9 | 10.45 | 5.9 | 10.7 | 26.65 | 33.1 | 33.6 | 33.05 | 23.65 | 19.5 |
| 29 | 19.55 | 23.9 | 17.6 | 10.25 | ..... | 11.0 | 27.0 | 33.2 | 33.6 | 32.85 | 23.3 | 19.7 |
| 30 | 20.35 | 23.75 | 17.3 | 10.0 | ..... | 11.3 | 27.45 | 33.3 | 33.6 | 32.5 | 23.0 | 19.85 |
| 31 | 21.25 | ..... | 17.0 | 9.75 | ..... | 11.55 | ..... | 33.4 | ..... | 32.35 | 22.75 | ..... |

*Gate openings, in inches, at Indian Lake reservoir at Indian Lake for the year ending Sept. 30, 1918.*

| From— | | To— | | Sluice gate A open. | Sluice gate B open. |
|---|---|---|---|---|---|
| Date. | Hour. | Date. | Hour. | | |
| | | | | *Inches.* | *Inches.* |
| Sept. 12 | 6 a. m. | Oct. 5 | 6 a. m. | ..... | 48 |
| Sept. 15 | 5 p. m. | Oct. 6 | 4 p. m. | 60 | ..... |
| Oct. 10 | 5 p. m. | Oct. 13 | 3 p. m. | 60 | ..... |
| Nov. 28 | 6 p. m. | Dec. 21 | 6 a. m. | 60 | ..... |
| Dec. 11 | 6 a. m. | Feb. 27 | 7 a. m. | ..... | 48 |
| Dec. 25 | 6 a. m. | Feb. 27 | 7 a. m. | 30 | ..... |
| Mar. 3 | 7 a. m. | Mar. 5 | 6 p. m. | 30 | ..... |
| Mar. 3 | 7 a. m. | Mar. 5 | 6 p. m. | ..... | 48 |
| Mar. 11 | 5 p. m. | Mar. 19 | 1 p. m. | 60 | ..... |
| Mar. 11 | 5 p. m. | Mar. 19 | 1 p. m. | ..... | 48 |
| Apr. 20 | 1 p. m. | Apr. 20 | 9 p. m. | 60 | ..... |
| Apr. 20 | 9 p. m. | Apr. 21 | 7 a. m. | 30 | ..... |
| Apr. 21 | 7 a. m. | Apr. 21 | 1 p. m. | 60 | ..... |
| Apr. 23 | 3 p. m. | Apr. 23 | 11 p. m. | 60 | ..... |
| Apr. 24 | 10 p. m. | Apr. 26 | 5 a. m. | 60 | ..... |
| Apr. 26 | 1 p. m. | Apr. 27 | 11 a. m. | 60 | ..... |
| May 5 | 7 p. m. | May 6 | 7 p. m. | 60 | ..... |
| July 24 | 9 a. m. | July 25 | 6 p. m. | ..... | 54 |
| July 25 | 6 p. m. | July 27 | 5 p. m. | ..... | 30 |
| July 27 | 5 p. m. | Sept. 14 | 4 p. m. | ..... | 54 |
| Aug. 18 | 7 a. m. | Sept. 3 | 11 a. m. | 60 | ..... |
| Sept. 7 | 5 p. m. | Sept. 20 | 6 p. m. | 60 | ..... |

NOTE.—The main logway was open 15 feet during the following periods: June 10, 7 a. m. to 10 a. m.; June 12, 7 a. m. to 6 p. m.; June 13, 10 a. m. to 2 p. m.; June 14, 9 a. m. to 6 p. m.; June 15, 2 p. m. to 6 p. m. It was also open 1 foot in width from 7 p. m. Aug. 3 to 7 a. m. Aug. 18.

### INDIAN RIVER NEAR INDIAN LAKE, N. Y.

LOCATION.—Three-fourths of a mile below State dam at the outlet of Indian Lake, 1 miles south of Indian Lake village, Hamilton County, 1 mile above mouth of Big Brook, and 6½ miles above mouth.

DRAINAGE AREA.—132 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 1, 1912, to June 30, 1914; June 5, 1915, to September 30, 1918; also miscellaneous measurements in 1911.

GAGE.—Gurley repeating-hydrograph water-stage recorder; installed August 30, 1916, in a standard wooden shelter on the right bank about three-fourths mile below the dam, at same datum as staff gage previously used. The staff gage is still in place and is used for checking the recorder. Recorder inspected by Lester Savarie.

DISCHARGE MEASUREMENTS.—Made from cable or by wading at the head of the rapids about 150 feet below the gage.

EXTREMES OF DISCHARGE.—Maximum stage, from water-stage recorder, 4.85 feet at 4 a. m. June 12 (discharge, 1,450 second-feet); minimum stage, from water-stage recorder, 0.07 foot at 12 p. m. September 30 (discharge, about 0.7 second-foot).

1900–1918: Maximum stage recorded; 7.8 feet March 28, 1913 (discharge, 3,460 second-feet); minimum stage that of September 30, 1918.

CHANNEL AND CONTROL.—The gage is at the side of a pool about 500 feet wide, called the "lower frog pond." The reef of coarse gravel at the outlet of this pool forms the control and is permanent.

WINTER FLOW.—Stage-discharge relation not affected by ice.

REGULATION.—Discharge at this station is regulated by the operation of gates at the dam.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined between 15 and 1,500 second-feet. Daily discharge for days on which no changes were made in the sluice gate openings at Indian Lake dam ascertained by applying to rating table; mean daily gage height determined by inspecting recorder graph; discharge for days on which gate openings are changed is mean of 24 hourly determinations.

*Discharge measurements of Indian River at Indian Lake, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* |
| June 22[a] | J. W. Moulton | 1.51 | 85.8 |
| July 15[a] | do | 1.40 | 91.3 |

[a] Logs on the control.

*Daily discharge, in second-feet, of Indian River near Indian Lake, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 623 | 4 | 278 | 600 | 402 | 4 | 8 | 9 | 24 | 18 | 564 | 725 |
| 2 | 603 | 3 | 278 | 600 | 388 | 3 | 9 | 10 | 25 | 26 | 564 | 725 |
| 3 | 603 | 2 | 275 | 600 | 368 | 203 | 6 | 10 | 26 | 30 | 575 | 599 |
| 4 | 603 | 2 | 272 | 600 | 363 | 338 | 4 | 10 | 26 | 36 | 623 | 453 |
| 5 | 603 | 2 | 272 | 550 | 356 | 265 | 3 | 65 | 27 | 40 | 623 | 453 |
| 6 | 150 | 2 | 270 | 550 | 353 | 4 | 2 | 292 | 31 | 40 | 623 | 453 |
| 7 | 4 | 1 | 270 | 545 | 347 | 3 | 2 | 258 | 54 | 42 | 623 | 473 |
| 8 | 2 | 1 | 270 | 545 | 338 | 3 | 2 | 18 | 67 | 40 | 623 | 684 |
| 9 | 2 | 1 | 270 | 545 | 325 | 3 | 5 | 13 | 74 | 46 | 603 | 684 |
| 10 | 39 | 1 | 270 | 526 | 319 | 3 | 4 | 13 | 499 | 50 | 603 | 664 |
| 11 | 200 | 1 | 592 | 526 | 313 | 75 | 3 | 13 | 152 | 60 | 603 | 664 |
| 12 | 205 | 1 | 725 | 526 | 307 | 313 | 2 | 12 | 874 | 75 | 584 | 664 |
| 13 | 149 | 1 | 725 | 500 | 304 | 313 | 2 | 14 | 428 | 85 | 603 | 643 |
| 14 | 4 | 1 | 725 | 500 | 301 | 310 | 4 | 16 | 795 | 90 | 603 | 433 |
| 15 | 2 | 1 | 725 | 500 | 298 | 307 | 4 | 15 | 568 | 90 | 584 | 220 |
| 16 | 2 | 1 | 725 | 480 | 298 | 316 | 3 | 15 | 110 | 90 | 584 | 217 |
| 17 | 2 | 1 | 725 | 480 | 295 | 310 | 3 | 15 | 100 | 100 | 584 | 217 |
| 18 | 1 | 2 | 725 | 480 | 292 | 307 | 2 | 16 | 95 | 95 | 668 | 214 |
| 19 | 1 | 2 | 725 | 480 | 289 | 159 | 2 | 16 | 95 | 90 | 832 | 212 |
| 20 | 2 | 2 | 704 | 480 | 286 | 11 | 115 | 18 | 90 | 100 | 810 | 187 |
| 21 | 2 | 2 | 544 | 460 | 284 | 11 | 155 | 19 | 90 | 90 | 810 | 6 |
| 22 | 2 | 2 | 436 | 460 | 284 | 9 | 7 | 19 | 90 | 85 | 788 | 2 |
| 23 | 1 | 2 | 436 | 460 | 280 | 9 | 93 | 18 | 90 | 80 | 788 | 1 |
| 24 | 2 | 2 | 436 | 440 | 280 | 6 | 24 | 17 | 90 | 448 | 767 | 1 |
| 25 | 4 | 2 | 570 | 440 | 280 | 5 | 278 | 19 | 90 | 570 | 767 | 1 |
| 26 | 2 | 2 | 623 | 440 | 280 | 5 | 178 | 22 | 173 | 353 | 767 | 1 |
| 27 | 2 | 2 | 623 | 420 | 88 | 3 | 160 | 22 | 18 | 405 | 746 | 2 |
| 28 | 3 | 64 | 623 | 420 | 4 | 2 | 7 | 22 | 14 | 584 | 746 | 1 |
| 29 | 3 | 281 | 600 | 420 | ..... | 3 | 7 | 22 | 13 | 584 | 725 | 1 |
| 30 | 15 | 281 | 600 | 400 | ..... | 47 | 7 | 23 | 12 | 564 | 725 | 1 |
| 31 | 7 | ..... | 600 | 400 | ..... | 130 | ..... | 24 | ..... | 564 | 746 | ..... |

NOTE.—Discharge Dec. 29 to Jan. 6, and Jan. 13 to 31 estimated, for lack of gage-height record, from study of recorder graph and examination of record of operation of gates at Indian Lake dam. Discharge June 16 to July 25 estimated, because of logs on the control, from discharge measurements and study of recorder graph.

*Monthly discharge of Indian River near Indian Lake, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 132 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 623 | 1 | 124 | 0.939 | 1.08 |
| November | 281 | 1 | 22.4 | .170 | .19 |
| December | 725 | 270 | 513 | 3.89 | 4.48 |
| January | 600 | 400 | 496 | 3.76 | 4.34 |
| February | 402 | 4 | 297 | 2.25 | 2.34 |
| March | 338 | 2 | 113 | .856 | .99 |
| April | 278 | 2 | 36.7 | .278 | .31 |
| May | 292 | 9 | 34.7 | .263 | .30 |
| June | 874 | 12 | 161 | 1.22 | 1.36 |
| July | 584 | 18 | 180 | 1.36 | 1.57 |
| August | 832 | 564 | 673 | 5.10 | 5.88 |
| September | 725 | 1 | 320 | 2.42 | 2.70 |
| The year | 874 | 1 | 248 | 1.88 | 25.54 |

### 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, 1918.

GAGE.—Chain, on upstream side of bridge; read by J. H. Roberts.

DISCHARGE MEASUREMENTS.—Made from the upstream side of bridge.

CHANNEL AND CONTROL.—Gravel; occasionally shifting. Logs become lodged on the control for a portion of nearly every year.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.25 feet at 9 a. m. and 4 p. m. April 4 (discharge, 5,820 second-feet); minimum stage recorded, 1.16 feet at 4 p. m. October 10 (discharge, 89 second-feet).

1907–1918: 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 about 28 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Flow affected by storage in Schroon and Brant lakes.

ACCURACY.—Stage-discharge relation probably permanent during year, except as affected by ice for a large part of the period from December to March and by logs on the control for a short period in May and June. Rating curve well defined between 150 and 4,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-channel records good; other records fair.

*Discharge measurements of Schroon River at Riverbank, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 15[a] | E. D. Burchard | 3.08 | 394 | Apr. 10[c] | J. W. Moulton | 6.07 | 3,660 |
| Jan. 9[a] | J. W. Moulton | 2.41 | 257 | May 3 | do | 4.52 | 2,050 |
| 28[b] | E. D. Burchard | 2.34 | 207 | June 19[c] | do | 3.86 | 1,090 |
| Mar. 2[b] | J. W. Moulton | 2.85 | 324 | July 12 | do | 1.54 | 179 |
| 25[c] | do | 4.35 | 1,380 | 12 | do | 1.54 | 180 |
| Apr. 1[c] | do | 6.02 | 3,040 | | | | |

[a] Measurement made through incomplete ice cover.
[b] Measurement made through complete ice cover.
[c] Gage height affected by logs on the control.

*Daily discharge, in second-feet, of Schroon River at Riverbank, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 248 | 1,060 | 535 | 280 | 200 | 300 | 3,000 | 2,040 | 800 | 585 | 201 | 186 |
| 2 | 216 | 1,290 | 535 | 280 | 200 | 320 | 3,600 | 2,150 | 800 | 156 | 201 | 172 |
| 3 | 201 | 1,290 | 490 | 260 | 190 | 340 | 5,000 | 2,040 | 1,100 | 130 | 201 | 158 |
| 4 | 201 | 1,210 | 512 | 260 | 190 | 340 | 5,750 | 1,940 | 750 | 130 | 186 | 156 |
| 5 | 201 | 1,210 | 490 | 260 | 200 | 360 | 5,570 | 1,550 | 650 | 135 | 186 | 158 |
| 6 | 216 | 1,130 | 468 | 260 | 190 | 380 | 4,950 | 1,640 | 600 | 140 | 172 | 153 |
| 7 | 201 | 1,060 | 468 | 260 | 200 | 400 | 4,320 | 1,600 | 600 | 158 | 172 | 158 |
| 8 | 125 | 1,060 | 460 | 260 | 200 | 420 | 4,170 | 1,600 | 900 | 140 | 158 | 186 |
| 9 | 93 | 990 | 440 | 260 | 200 | 440 | 4,020 | 1,700 | 600 | 132 | 156 | 158 |
| 10 | 89 | 920 | 440 | 240 | 200 | 480 | 3,880 | 1,600 | 1,200 | 158 | 148 | 150 |
| 11 | 145 | 860 | 420 | 240 | 190 | 500 | 3,740 | 1,500 | 950 | 167 | 186 | 167 |
| 12 | 216 | 800 | 420 | 240 | 186 | 550 | 3,470 | 1,500 | 500 | 172 | 186 | 164 |
| 13 | 281 | 800 | 400 | 240 | 180 | 550 | 3,210 | 1,700 | 400 | 172 | 186 | 172 |
| 14 | 298 | 860 | 400 | 260 | 180 | 600 | 2,960 | 2,000 | 1,600 | 186 | 186 | 172 |
| 15 | 298 | 860 | 400 | 260 | 180 | 600 | 2,840 | 2,200 | 1,000 | 232 | 201 | 169 |
| 16 | 298 | 920 | 400 | 260 | 170 | 600 | 2,840 | 2,200 | 460 | 232 | 186 | 167 |
| 17 | 298 | 860 | 380 | 260 | 150 | 550 | 2,960 | 2,000 | 1,000 | 264 | 186 | 490 |
| 18 | 298 | 800 | 380 | 260 | 150 | 600 | 3,080 | 2,000 | 1,100 | 298 | 158 | 662 |
| 19 | 316 | 800 | 360 | 260 | 150 | 650 | 3,080 | 1,800 | 1,100 | 298 | 169 | 560 |
| 20 | 298 | 745 | 360 | 260 | 160 | 800 | 3,080 | 1,600 | 920 | 264 | 153 | 232 |
| 21 | 298 | 690 | 340 | 260 | 170 | 800 | 2,840 | 1,500 | 920 | 264 | 148 | 201 |
| 22 | 264 | 718 | 340 | 260 | 190 | 800 | 2,840 | 1,300 | 990 | 264 | 145 | 186 |
| 23 | 232 | 745 | 320 | 240 | 200 | 900 | 2,840 | 1,000 | 407 | 264 | 153 | 369 |
| 24 | 248 | 662 | 320 | 240 | 220 | 1,100 | 2,840 | 1,200 | 407 | 248 | 153 | 369 |
| 25 | 216 | 635 | 320 | 240 | 240 | 1,400 | 2,840 | 850 | 535 | 248 | 142 | 369 |
| 26 | 216 | 610 | 320 | 220 | 260 | 1,600 | 2,600 | 800 | 535 | 232 | 142 | 407 |
| 27 | 248 | 685 | 320 | 220 | 280 | 1,900 | 2,370 | 800 | 512 | 216 | 140 | 298 |
| 28 | 232 | 560 | 300 | 200 | 280 | 2,200 | 2,150 | 750 | 535 | 216 | 145 | 351 |
| 29 | 264 | 535 | 300 | 200 | ..... | 2,400 | 1,740 | 750 | 298 | 232 | 140 | 351 |
| 30 | 490 | 512 | 300 | 200 | ..... | 2,400 | 1,940 | 750 | 153 | 232 | 142 | 369 |
| 31 | 216 | ..... | 280 | 200 | ..... | 2,600 | ..... | 800 | ..... | 216 | 132 | ..... |

NOTE.—Discharge Dec. 8 to Apr. 3 estimated, because of ice, and discharge May 7 to June 19 estimated, because of logs, from discharge measurements, weather records, study of recorder graph, and comparison with similar studies for Hudson River at North Creek.

*Monthly discharge of Schroon River at Riverbank, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 534 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 490 | 89 | 241 | 0.451 | 0.52 |
| November | 1,290 | 512 | 862 | 1.62 | 1.81 |
| December | 535 | 280 | 394 | .738 | .85 |
| January | 280 | 200 | 246 | .461 | .53 |
| February | 280 | 150 | 196 | .367 | .38 |
| March | 2,600 | 300 | 899 | 1.68 | 1.94 |
| April | 5,750 | 1,740 | 3,350 | 6.28 | 7.01 |
| May | 2,200 | 750 | 1,510 | 2.83 | 3.26 |
| June | 1,200 | 153 | 724 | 1.35 | 1.51 |
| July | 585 | 130 | 219 | .410 | .47 |
| August | 201 | 132 | 166 | .311 | .36 |
| September | 662 | 153 | 262 | .492 | .55 |
| The year | 5,750 | 89 | 755 | 1.41 | 19.19 |

### SACANDAGA RIVER NEAR HOPE, N. Y.

LOCATION.—About 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, 1918.

GAGE.—Staff in two sections, the lower inclined, the upper vertical; read by Melvin Willis.

DISCHARGE MEASUREMENTS.—Made from a cable about 100 feet below the gage or by wading.

CHANNEL AND CONTROL.—Rocky; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.7 feet at 5.55 p. m. October 30 (discharge, 8,490 second-feet); minimum stage recorded, 1.28 feet at 6.30 p. m. August 28 and 7.20 a. m. August 29 (discharge, 37 second-feet).

1911–1918: Maximum stage recorded, 10.0 feet at 5.30 p. m. March 27, 1913 (discharge, 24,800 second-feet); minimum stage recorded, 1.17 feet at 7.55 a. m. September 30, 1913 (discharge about 20 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation permanent; affected by ice for a large part of the period December to March, inclusive. Rating curve well defined between 60 and 10,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good; winter records fair.

*Discharge measurements of Sacandaga River near Hope, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* |
| Jan. 8[a] | E. D. Burchard | 2.62 | 203 |
| 29[a] | J. W. Moulton | 2.70 | 203 |
| 30[a] | ....do | 2.72 | 201 |

[a] Measurement made through complete ice cover.

*Daily discharge, in second-feet, of Sacandaga River near Hope, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 202 | 3,540 | 240 | 200 | 200 | 1,330 | 4,480 | 2,740 | 660 | 310 | 114 | 590 |
| 2 | 164 | 2,740 | 240 | 200 | 200 | 1,220 | 5,790 | 2,740 | 660 | 320 | 106 | 335 |
| 3 | 147 | 2,230 | 220 | 190 | 200 | 1,160 | 7,530 | 2,930 | 590 | 273 | 101 | 175 |
| 4 | 230 | 1,810 | 240 | 190 | 200 | 1,010 | 6,350 | 2,930 | 590 | 255 | 89 | 111 |
| 5 | 400 | 1,440 | 220 | 180 | 200 | 910 | 5,250 | 2,560 | 558 | 230 | 81 | 111 |
| 6 | 525 | 1,220 | 220 | 180 | 200 | 820 | 3,760 | 2,080 | 525 | 217 | 83 | 202 |
| 7 | 410 | 1,110 | 220 | 180 | 200 | 910 | 3,540 | 1,810 | 910 | 221 | 79 | 154 |
| 8 | 370 | 1,010 | 220 | 200 | 200 | 910 | 4,480 | 1,810 | 1,110 | 213 | 73 | 141 |
| 9 | 335 | 910 | 220 | 220 | 200 | 820 | 6,070 | 1,680 | 1,010 | 213 | 161 | 132 |
| 10 | 310 | 820 | 220 | 220 | 200 | 740 | 5,790 | 1,560 | 1,010 | 320 | 141 | 128 |
| 11 | 264 | 700 | 240 | 260 | 220 | 700 | 3,990 | 1,680 | 820 | 273 | 128 | 164 |
| 12 | 380 | 625 | 240 | 280 | 240 | 660 | 4,230 | 1,560 | 910 | 273 | 122 | 182 |
| 13 | 910 | 558 | 260 | 320 | 260 | 740 | 2,390 | 4,230 | 1,110 | 255 | 111 | 186 |
| 14 | 780 | 525 | 260 | 280 | 320 | 780 | 2,230 | 5,520 | 1,160 | 400 | 96 | 213 |
| 15 | 820 | 495 | 260 | 240 | 400 | 910 | 2,740 | 3,990 | 960 | 365 | 89 | 205 |
| 16 | 1,010 | 495 | 260 | 240 | 500 | 820 | 3,330 | 3,130 | 780 | 350 | 83 | 175 |
| 17 | 1,010 | 495 | 260 | 240 | 700 | 820 | 4,230 | 2,560 | 660 | 330 | 75 | 175 |
| 18 | 960 | 465 | 240 | 240 | 850 | 865 | 5,250 | 2,080 | 590 | 305 | 71 | 242 |
| 19 | 1,010 | 443 | 240 | 260 | 1,000 | 910 | 4,990 | 1,560 | 465 | 273 | 68 | 230 |
| 20 | 1,330 | 421 | 260 | 260 | 1,100 | 1,110 | 3,760 | 1,330 | 400 | 255 | 61 | 230 |
| 21 | 1,160 | 410 | 260 | 260 | 1,300 | 1,440 | 3,330 | 1,220 | 355 | 230 | 59 | 310 |
| 22 | 910 | 380 | 260 | 240 | 1,300 | 2,560 | 3,130 | 1,160 | 454 | 213 | 56 | 340 |
| 23 | 820 | 360 | 260 | 240 | 1,300 | 2,740 | 3,330 | 1,110 | 465 | 182 | 52 | 360 |
| 24 | 910 | 340 | 240 | 240 | 1,220 | 2,390 | 3,330 | 1,110 | 443 | 161 | 48 | 330 |
| 25 | 1,560 | 320 | 240 | 220 | 1,220 | 2,930 | 3,130 | 1,010 | 375 | 141 | 45 | 310 |
| 26 | 1,560 | 320 | 220 | 220 | 1,440 | 2,740 | 2,740 | 1,010 | 340 | 132 | 44 | 310 |
| 27 | 1,330 | 300 | 220 | 200 | 1,440 | 2,390 | 2,560 | 910 | 315 | 116 | 40 | 292 |
| 28 | 1,940 | 280 | 220 | 220 | 1,440 | 2,230 | 2,560 | 820 | 292 | 116 | 38 | 315 |
| 29 | 1,810 | 280 | 200 | 200 | ..... | 2,230 | 2,560 | 780 | 255 | 108 | 39 | 335 |
| 30 | 1,810 | 260 | 200 | 200 | ..... | 3,130 | 2,740 | 820 | 238 | 122 | 48 | 350 |
| 31 | 5,790 | ..... | 200 | 200 | ..... | 3,540 | ..... | 740 | ..... | 128 | 45 | ..... |

NOTE.—Discharge Nov. 22 to Feb. 23 estimated, because of ice, from discharge measurements, weather records, study of recorder graph, and comparison with similar studies for Sacandaga River near Hadley.

*Monthly discharge of Sacandaga River near Hope, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 494 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 5,790 | 147 | 1,010 | 2.06 | 2.38 |
| November | 3,540 | 260 | 843 | 1.71 | 1.91 |
| December | 260 | 200 | 235 | .476 | .55 |
| January | 320 | 180 | 226 | .457 | .53 |
| February | 1,440 | 200 | 652 | 1.32 | 1.38 |
| March | 3,540 | 660 | 1,500 | 3.04 | 3.50 |
| April | 7,530 | 2,230 | 3,990 | 8.08 | 9.02 |
| May | 5,520 | 740 | 1,970 | 3.99 | 4.60 |
| June | 1,160 | 238 | 634 | 1.28 | 1.43 |
| July | 400 | 108 | 235 | .476 | .55 |
| August | 161 | 38 | 78.9 | .160 | .18 |
| September | 590 | 111 | 244 | .494 | .55 |
| The year | 7,530 | 38 | 965 | 1.95 | 26.58 |

### 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, 1918. September 13, 1907, to December 31, 1910, at upper bridge station; September 24, 1909, to midsummer of 1911 at lower bridge station.

GAGE.—Gurley water-stage recorder in a concrete shelter on the left bank, about one-half mile west of railroad station at Hadley; installed January 6, 1916, replacing a Barrett & Lawrence water-stage recorder. Recorder inspected by J. F. Kelly.

DISCHARGE MEASUREMENTS.—Made from a cable about 30 feet above the gage, or by wading under the cable or about three-fourths of a mile above gage.

CHANNEL AND CONTROL.—Very rough, but permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 8.8 feet from 1 to 4 a. m. April 4 (discharge, 13,900 second-feet); minimum stage, from water-stage recorder, 2.36 feet at 10 p. m. August 28 (discharge, 92 second-feet).

1911–1918: Maximum stage, from water-stage recorder, 12.36 feet from 11 a. m. till noon March 28, 1913 (discharge, from 35,500 second-feet); minimum stage, from water-stage recorder, 2.25 feet all day September 15, 1913 (discharge about 61 second-feet).

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

ACCURACY.—Stage-discharge relation permanent; affected by ice during a large part of period from December to March, inclusive. Rating curve well defined between 150 and 20,000 second-feet. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph. Open-water records excellent; winter records fair.

*Discharge measurements of Sacandaga River at Hadley, N. Y., for the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 11[a] | E. D. Burchard | 5.63 | 486 | Apr. 2 | J. W. Moulton | 7.82 | 10,200 |
| Jan. 4[b] | J. W. Moulton | 3.61 | 410 | 25 | do | 6.91 | 7,400 |
| 29[b] | E. D. Burchard | 3.44 | 437 | 26 | E. D. Burchard | 6.74 | 6,630 |
| Mar. 1[a] | J. W. Moulton | 8.52 | 3,750 | July 11 | J. W. Moulton | 3.29 | 607 |
| 9[a] | do | 5.48 | 1,850 | 11 | do | 3.31 | 599 |
| 21[a] | do | 5.72 | 3,190 | | | | |

[a] Incomplete ice cover or ice jam on control. [b] Complete ice cover on control.

*Daily discharge, in second-feet, of Sacandaga River at Hadley, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 218 | 7,430 | 420 | 420 | 420 | 3,800 | 8,700 | 4,580 | 1,800 | 539 | 250 | 214 |
| 2 | 250 | 7,130 | 440 | 420 | 440 | 3,800 | 10,400 | 4,580 | 1,620 | 601 | 250 | 631 |
| 3 | 268 | 6,140 | 460 | 420 | 440 | 2,800 | 12,600 | 4,460 | 1,330 | 714 | 232 | 545 |
| 4 | 278 | 5,080 | 480 | 400 | 420 | 2,200 | 13,500 | 4,460 | 1,100 | 637 | 222 | 383 |
| 5 | 334 | 4,100 | 460 | 380 | 440 | 1,800 | 11,500 | 4,340 | 986 | 552 | 210 | 292 |
| 6 | 608 | 3,250 | 440 | 340 | 420 | 1,600 | 9,710 | 4,100 | 947 | 506 | 201 | 283 |
| 7 | 730 | 2,600 | 460 | 300 | 420 | 1,700 | 8,700 | 3,660 | 1,040 | 461 | 197 | 307 |
| 8 | 668 | 2,110 | 460 | 260 | 420 | 1,800 | 8,050 | 3,350 | 1,780 | 486 | 184 | 389 |
| 9 | 552 | 1,660 | 440 | 240 | 420 | 1,800 | 8,700 | 2,960 | 1,740 | 455 | 222 | 344 |
| 10 | 506 | 1,520 | 460 | 240 | 380 | 1,900 | 9,370 | 2,780 | 1,560 | 461 | 263 | 288 |
| 11 | 474 | 1,380 | 440 | 260 | 360 | 2,000 | 9,710 | 2,960 | 1,760 | 552 | 323 | 252 |
| 12 | 443 | 1,240 | 550 | 300 | 400 | 1,600 | 8,700 | 2,870 | 1,950 | 615 | 317 | 234 |
| 13 | 594 | 1,130 | 550 | 320 | 600 | 1,500 | 7,430 | 3,060 | 2,780 | 660 | 307 | 227 |
| 14 | 1,150 | 1,020 | 550 | 320 | 800 | 1,700 | 6,410 | 4,700 | 2,870 | 746 | 292 | 263 |
| 15 | 1,080 | 956 | 600 | 340 | 800 | 1,900 | 5,730 | 5,860 | 2,600 | 996 | 273 | 344 |
| 16 | 1,290 | 901 | 600 | 400 | 1,000 | 2,000 | 5,730 | 6,000 | 2,110 | 1,090 | 245 | 366 |
| 17 | 1,480 | 882 | 600 | 380 | 1,300 | 1,600 | 6,270 | 5,470 | 1,650 | 966 | 222 | 334 |
| 18 | 1,230 | 847 | 600 | 420 | 1,600 | 1,700 | 6,980 | 4,700 | 1,340 | 956 | 218 | 328 |
| 19 | 1,110 | 795 | 550 | 440 | 2,000 | 2,000 | 7,740 | 3,880 | 1,100 | 976 | 189 | 443 |
| 20 | 1,160 | 778 | 550 | 480 | 2,400 | 2,400 | 7,740 | 3,250 | 919 | 847 | 176 | 566 |
| 21 | 1,650 | 730 | 550 | 500 | 2,600 | 3,200 | 7,430 | 2,780 | 787 | 706 | 161 | 683 |
| 22 | 1,530 | 750 | 550 | 440 | 2,600 | 4,400 | 7,280 | 2,430 | 821 | 601 | 149 | 795 |
| 23 | 1,270 | 750 | 350 | 400 | 2,600 | 5,730 | 7,430 | 2,110 | 1,090 | 493 | 146 | 795 |
| 24 | 1,170 | 750 | 550 | 400 | 2,400 | 6,980 | 7,430 | 1,880 | 1,200 | 436 | 138 | 683 |
| 25 | 1,480 | 750 | 500 | 400 | 2,400 | 7,740 | 6,980 | 1,600 | 1,140 | 412 | 135 | 630 |
| 26 | 2,110 | 650 | 480 | 440 | 2,800 | 7,740 | 6,550 | 1,520 | 976 | 401 | 124 | 1,040 |
| 27 | 2,110 | 600 | 480 | 460 | 3,400 | 7,430 | 5,860 | 1,600 | 821 | 355 | 118 | 2,840 |
| 28 | 1,950 | 550 | 480 | 440 | 3,800 | 7,740 | 5,210 | 1,770 | 714 | 297 | 101 | 3,150 |
| 29 | 2,600 | 500 | 480 | 440 | ..... | 7,430 | 4,700 | 1,720 | 622 | 283 | 101 | 2,690 |
| 30 | 4,440 | 440 | 460 | 420 | ..... | 7,740 | 4,580 | 1,650 | 559 | 263 | 107 | 2,190 |
| 31 | 6,550 | ..... | 440 | 420 | ..... | 7,740 | ..... | 2,030 | ..... | 250 | 121 | ..... |

NOTE.—Discharge Nov. 22 to Mar. 22 estimated, because of ice, from discharge measurements, weather records, study of graph, and comparison with similar studies for Sacandaga River near Hope.

*Monthly discharge of Sacandaga River near Hadley, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 1,060 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 6,550 | 218 | 1,330 | 1.25 | 1.44 |
| November | 7,430 | 440 | 1,910 | 1.80 | 2.01 |
| December | 600 | 420 | 504 | .475 | .55 |
| January | 500 | 240 | 382 | .360 | .42 |
| February | 3,800 | 360 | 1,360 | 1.28 | 1.33 |
| March | 7,740 | 1,500 | 3,720 | 3.51 | 4.05 |
| April | 13,500 | 4,580 | 7,900 | 7.45 | 8.31 |
| May | 6,000 | 1,520 | 3,330 | 3.14 | 3.62 |
| June | 2,870 | 559 | 1,390 | 1.31 | 1.46 |
| July | 1,090 | 250 | 591 | .558 | .64 |
| August | 323 | 101 | 200 | .189 | .22 |
| September | 3,150 | 214 | 751 | .708 | .79 |
| The year | 13,500 | 101 | 1,940 | 1.83 | 24.84 |

### HOOSIC RIVER NEAR EAGLE BRIDGE, N. Y.

LOCATION.—Half a mile below Walloomsac River and 1½ miles above Owl Kill and Eagle Bridge, Rensselaer County.

DRAINAGE AREA.—512 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 13, 1910, to September 30, 1918. September 25, 1903, to December 31, 1908, at Buskirk, 4 miles below present station.

GAGE.—Chain gage on the left bank near the farmhouse of James Russell, about 1½ miles above Eagle Bridge, installed September 4, 1918. From August 17, 1914, to September 3, 1918, an inclined staff gage on the left bank about 50 feet above the chain gage. From August 13, 1910, to August 16, 1914, chain gage on the left bank about 450 feet above the present chain gage. Gage read by Mrs. Viola Davis, Mrs. Volney Russell, and Mrs. 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 recorded during year, 12.8 feet at 5 p. m. February 15 (discharge about 11,300 second-feet); minimum stage recorded, 2.1 feet at 7.30 a. m. September 8 (discharge about 40 second-feet).

1910–1918: Maximum stage not recorded, as gage used prior to August 17, 1914, could not be reached at high stages; minimum stage recorded, 6.1 feet at 5 p. m. September 14, 1913 (discharge practically zero).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Flow affected by storage on Walloomsac River and at Hoosick Falls about 2 miles above gage.

ACCURACY.—Stage-discharge relation probably permanent between dates of shifting; affected by ice during a large part of the period December to March, inclusive. Rating curve well defined between 75 and 7,000 second-feet. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for periods of low water when semidaily gage heights may not indicate the true mean, and those for periods when the stage-discharge relation is affected by ice, which are fair.

*Discharge measurements of Hoosic River near Eagle Bridge, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Dec. 28[a] | J. W. Moulton | 3.80 | 201 | May 20 | J. W. Moulton | 4.52 | 1,040 |
| Jan. 7[a] | E. D. Burchard | 4.10 | 133 | June 19 | M. H. Carson | 3.14 | 288 |
| 28[a] | J. W. Moulton | 4.68 | 199 | 19 | do | 3.21 | 288 |
| Apr. 1 | E. D. Burchard | 6.19 | 2,830 | 19 | E. D. Burchard | 3.21 | 294 |
| 1 | do | 6.08 | 2,630 | Sept. 4 | do | [b] 2.86 | 181 |
| May 20 | J. W. Moulton | 4.54 | 1,040 | 4 | do | [b] 2.85 | 178 |

[a] Measurement made under complete ice cover. [b] Observed on chain gage installed this day.

*Daily discharge, in second-feet, of Hoosic River near Eagle Bridge, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 133 | 1,390 | 445 | 130 | 200 | 1,770 | 2,810 | 1,670 | 450 | 340 | 155 | 320 |
| 2 | 162 | 940 | 370 | 110 | 200 | 1,570 | 4,300 | 2,100 | 428 | 320 | 132 | 268 |
| 3 | 130 | 860 | 498 | 100 | 65 | 1,470 | 4,150 | 1,570 | 450 | 360 | 108 | 188 |
| 4 | 159 | 555 | 370 | 130 | 130 | 1,020 | 2,690 | 1,280 | 340 | 208 | 88 | 185 |
| 5 | 182 | 645 | 280 | 95 | 220 | 1,020 | 1,990 | 1,100 | 302 | 302 | 82 | 136 |
| 6 | 152 | 498 | 348 | 110 | 120 | 2,570 | 1,570 | 870 | 320 | 250 | 142 | 150 |
| 7 | 200 | 370 | 445 | 220 | 110 | 1,990 | 1,670 | 835 | 500 | 136 | 110 | 112 |
| 8 | 193 | 420 | 370 | 280 | 100 | 1,100 | 1,880 | 765 | 582 | 285 | 132 | 65 |
| 9 | 152 | 395 | 272 | 120 | 170 | 870 | 2,210 | 765 | 428 | 250 | 168 | 97 |
| 10 | 179 | 302 | 440 | 280 | 70 | 835 | 2,450 | 1,470 | 500 | 250 | 199 | 108 |
| 11 | 133 | 348 | 480 | 240 | 160 | 555 | 1,880 | 980 | 340 | 340 | 150 | 116 |
| 12 | 268 | 420 | 440 | 220 | 200 | 800 | 1,570 | 940 | 450 | 302 | 145 | 82 |
| 13 | 216 | 325 | 360 | 190 | 460 | 2,100 | 1,280 | 905 | 640 | 340 | 142 | 124 |
| 14 | 248 | 325 | 380 | 260 | 600 | 1,770 | 1,280 | 3,590 | 582 | 217 | 140 | 85 |
| 15 | 182 | 325 | 280 | 300 | 7,000 | 1,370 | 1,670 | 2,450 | 475 | 428 | 130 | 68 |
| 16 | 260 | 280 | 360 | 220 | 4,400 | 980 | 1,770 | 1,770 | 340 | 220 | 128 | 110 |
| 17 | 208 | 348 | 420 | 280 | 2,200 | 1,570 | 1,770 | 1,280 | 405 | 285 | 120 | 128 |
| 18 | 200 | 248 | 420 | 240 | 1,700 | 1,570 | 2,330 | 1,100 | 268 | 320 | 72 | 130 |
| 19 | 248 | 348 | 420 | 200 | 2,200 | 2,330 | 1,880 | 940 | 268 | 285 | 80 | 190 |
| 20 | 280 | 280 | 340 | 140 | 9,000 | 2,690 | 1,470 | 1,020 | 250 | 235 | 132 | 208 |
| 21 | 280 | 260 | 190 | 200 | 3,870 | 3,450 | 1,570 | 765 | 250 | 185 | 140 | 555 |
| 22 | 280 | 325 | 340 | 240 | 2,100 | 4,450 | 3,730 | 835 | 450 | 199 | 128 | 640 |
| 23 | 204 | 498 | 170 | 260 | 1,990 | 4,150 | 2,690 | 300 | 1,020 | 170 | 91 | 405 |
| 24 | 220 | 420 | 120 | 320 | 1,990 | 2,690 | 2,450 | 610 | 905 | 170 | 70 | 285 |
| 25 | 370 | 280 | 200 | 220 | 1,470 | 3,590 | 1,880 | 640 | 582 | 132 | 92 | 360 |
| 26 | 470 | 445 | 190 | 280 | 7,070 | 2,330 | 1,570 | 730 | 450 | 145 | 104 | 1,770 |
| 27 | 260 | 470 | 180 | 95 | 2,570 | 1,770 | 1,280 | 730 | 475 | 140 | 126 | 3,190 |
| 28 | 302 | 395 | 240 | 240 | 1,990 | 1,280 | 1,190 | 640 | 302 | 86 | 100 | 1,370 |
| 29 | 470 | 280 | 130 | 190 | ..... | 1,370 | 1,190 | 555 | 268 | 110 | 120 | 800 |
| 30 | 325 | 302 | 65 | 260 | ..... | 1,670 | 1,190 | 582 | 170 | 130 | 130 | 730 |
| 31 | 3,330 | ..... | 130 | 180 | ..... | 2,100 | ..... | 528 | ..... | 130 | 110 | ..... |

NOTE.—Discharge Dec. 10 to Feb. 20 estimated, because of ice, from discharge measurements, weather records, and study of recorder graph. Discharge Sept. 4 to 30 determined from gage heights observed on new chain gage.

*Monthly discharge of Hoosic River near Eagle Bridge, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 512 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 3,330 | 130 | 336 | 0.656 | 0.76 |
| November | 1,390 | 248 | 443 | .866 | .97 |
| December | 498 | 65 | 313 | .611 | .70 |
| January | 320 | 95 | 205 | .400 | .46 |
| February | 9,000 | 65 | 1,870 | 3.65 | 3.80 |
| March | 4,450 | 555 | 1,900 | 3.71 | 4.28 |
| April | 4,300 | 1,190 | 2,050 | 4.00 | 4.46 |
| May | 3,590 | 528 | 1,120 | 2.19 | 2.52 |
| June | 1,020 | 170 | 440 | .859 | .96 |
| July | 428 | 86 | 235 | .459 | .53 |
| August | 199 | 70 | 121 | .236 | .27 |
| September | 3,190 | 65 | 432 | .844 | .94 |
| The year | 9,000 | 65 | 779 | 1.52 | 20.65 |

### 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.—June 24, 1913, to September 30, 1918.

GAGE.—Stevens water-gage recorder (showing head on crest of spillway) in the southerly corner of the basin near upper end of Barge canal lock, installed August 18, 1916. Inclined staff gage at foot of an old bridge abutment about 100 feet above Vischer Ferry, read June 24 to December 16, 1913, and May 24 to June 2, 1914; staff gage in masonry of outer lock wall, just above upper gates, read March 30 to May 23, 1914, and March 30 to August 17, 1916. Datum of staff gage 12.1 feet lower than that of recorder. Gurley water-stage recorder in the northerly (out stream) corner of the basin, used December 17, 1913, to March 29, 1914, and May 24, 1914, to February 23, 1916. This gage was destroyed by ice April 2, 1916, and the record from February 24 to April 2 was lost with it. Water-stage recorder inspected by engineers from the Albany office of the United States Geological Survey; staff gage read by lock tenders.

DISCHARGE MEASUREMENTS.—Made by wading below the dam at low water during 1913–14. During the spring of 1915 the Crescent dam (next downstream) was closed, making further measurement impossible. No provision for measurements at medium and high stages.

CHANNEL AND CONTROL.—The control is the crest of the spillway.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.00 feet at 7 a. m. October 31 (discharge, 50,200 second-feet); minimum stage, from water-stage recorder, 0.29 foot at 6.45 p. m. October 14 (discharge, 670 second-feet).

1913–1918: Maximum stage recorded, 7.6 feet just before noon March 28, 1914, determined by leveling from flood marks (discharge estimated by New York State engineer about 140,000 second-feet). This stage lasted but a few moments and was caused by the breaking of an ice jam near Schenectady. Minimum stage from water-stage recorder 0.18 foot from 4 a. m. to 5 a. m. and 4 p. m. to 6 p. m. October 31, 1914 (discharge about 290 second-feet).

DIVERSIONS.—Water was diverted into Erie canal at temporary lock in north end of dam prior to December, 1914. Measurements of this diversion were made at bridge 48, about a mile downstream, but no allowance for the diversion was made in computing the flow.

Barge canal lock No. 7 at the south end of dam was put in operation May 15, 1915. The following tables of discharge include the flow over the spillway and through the lock and water wheels.

ACCURACY.—Stage-discharge relation practically permanent; probably not affected by ice. Rating curve fairly well defined by discharge measurements between 350 and 2,500 second-feet; above 2,500 second-feet, based on theoretic coefficients. Operation of water-stage recorder satisfactory during periods of record. Daily discharge determined by use of discharge integrator. Records good for periods of low water when the water-stage recorder was in operation; fair for other periods.

COOPERATION.—Recorder inspected by an employee of the State superintendent of public works.

*Daily discharge, in second-feet, of Mohawk River at Vischer Ferry dam, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,200 | 23,900 | 3,930 | ..... | 15,800 | ..... | 2,940 | 2,490 | 1,080 | ..... |
| 2 | 1,740 | 14,900 | 4,810 | ..... | 18,200 | ..... | 2,790 | 4,800 | 1,250 | ..... |
| 3 | 1,570 | 9,830 | 5,570 | ..... | 18,900 | ..... | 2,020 | 2,690 | 1,510 | ..... |
| 4 | 1,740 | 7,280 | 4,860 | ..... | 15,700 | ..... | 2,080 | 2,490 | 1,490 | ..... |
| 5 | 2,390 | 5,740 | ..... | ..... | 12,500 | ..... | 2,020 | 1,950 | 1,450 | ..... |
| 6 | 2,670 | 5,120 | ..... | ..... | 10,500 | ..... | 2,180 | 2,700 | 1,510 | ..... |
| 7 | 2,800 | 5,020 | ..... | ..... | 9,790 | ..... | 2,610 | 2,130 | 1,530 | 2,520 |
| 8 | 1,720 | 5,270 | ..... | ..... | 9,680 | ..... | 3,480 | 1,660 | 2,730 | 1,260 |
| 9 | 1,810 | 4,470 | ..... | ..... | 15,000 | ..... | 2,850 | 1,950 | 1,490 | 1,180 |
| 10 | 2,130 | 3,750 | ..... | ..... | 19,600 | ..... | 3,340 | 2,280 | 3,570 | 1,110 |
| 11 | 2,340 | 3,920 | ..... | ..... | 15,800 | ..... | 4,620 | 3,030 | 2,490 | 1,320 |
| 12 | 1,910 | 3,740 | ..... | ..... | 13,200 | ..... | 11,100 | 2,610 | ..... | 1,890 |
| 13 | 2,680 | 3,770 | ..... | ..... | 11,400 | ..... | 8,900 | 3,040 | ..... | ..... |
| 14 | 2,440 | 3,620 | ..... | ..... | 12,500 | ..... | 5,670 | 3,600 | ..... | ..... |
| 15 | 3,410 | 3,410 | ..... | ..... | 16,700 | ..... | 3,730 | 5,180 | ..... | ..... |
| 16 | 6,380 | 3,310 | ..... | ..... | 14,600 | ..... | 3,590 | 5,240 | ..... | ..... |
| 17 | 4,310 | 2,870 | ..... | ..... | 13,600 | ..... | 3,440 | 2,950 | ..... | 1,790 |
| 18 | 4,120 | 3,220 | ..... | ..... | 16,700 | 4,540 | ..... | 3,350 | ..... | 3,420 |
| 19 | 3,290 | 2,990 | ..... | 20,400 | 19,200 | 4,000 | 2,340 | 3,040 | ..... | 2,880 |
| 20 | 6,830 | 3,100 | ..... | 22,100 | 15,700 | 3,720 | 2,150 | 2,440 | 1,120 | 2,960 |
| 21 | 8,070 | 3,230 | ..... | 26,000 | 12,600 | 4,920 | 2,090 | 2,350 | 1,320 | 3,830 |
| 22 | 6,490 | 3,790 | ..... | 28,700 | 16,800 | 4,270 | 3,260 | 1,820 | 1,260 | 3,730 |
| 23 | 4,480 | 8,840 | ..... | 36,000 | ..... | 4,580 | 2,770 | 2,180 | 1,140 | 2,560 |
| 24 | 5,870 | 6,680 | ..... | 29,500 | ..... | 3,560 | 2,590 | 1,650 | 1,130 | 3,620 |
| 25 | 10,200 | 4,820 | ..... | 22,300 | ..... | 3,660 | 3,150 | 1,710 | 1,160 | 2,910 |
| 26 | 8,880 | 2,820 | ..... | 19,300 | ..... | 2,800 | 2,520 | 1,480 | ..... | 7,370 |
| 27 | 6,520 | 2,470 | ..... | 14,400 | ..... | 5,120 | 2,340 | 1,420 | ..... | ..... |
| 28 | 7,120 | 3,690 | ..... | 11,100 | ..... | 5,400 | 2,020 | 1,250 | ..... | ..... |
| 29 | 8,980 | 2,340 | ..... | 11,000 | ..... | 4,470 | 2,540 | 1,160 | ..... | ..... |
| 30 | 23,200 | 2,650 | ..... | 13,400 | ..... | 3,750 | 1,560 | 1,180 | ..... | ..... |
| 31 | 43,900 | ..... | ..... | 14,900 | ..... | 3,300 | ..... | 1,020 | ..... | ..... |

NOTE.—No discharge record Dec. 5 to Mar. 18, Apr. 23 to May 17, June 18, Aug. 12 to 19, Aug. 26 to Sept. 6, Sept. 13–16, and 27–30.

*Monthly discharge of Mohawk River at Vischer Ferry dam, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 3,430 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 43,900 | 1,200 | 6,170 | 1.80 | 2.08 |
| November | 23,900 | 2,340 | 5,350 | 1.56 | 1.74 |
| December | 5,800 | 1,550 | 2,900 | .845 | .97 |
| January | ..... | 1,570 | 1,890 | .551 | .64 |
| February | 34,600 | 1,390 | 6,930 | 2.02 | 2.10 |
| March | 36,000 | 6,360 | 15,400 | 4.49 | 5.18 |
| April | 22,900 | 6,980 | 14,100 | 4.11 | 4.59 |
| May | 17,300 | 2,800 | 5,810 | 1.70 | 1.96 |
| June | 11,100 | 1,560 | 3,340 | .974 | 1.09 |
| July | 5,240 | 1,020 | 2,480 | .723 | .83 |
| August | 3,570 | 1,010 | 1,490 | .435 | .50 |
| September | 12,300 | 1,110 | 3,130 | .912 | 1.02 |
| The year | 43,900 | 1,010 | 5,730 | 1.67 | 22.70 |

NOTE.—Above table completed by using discharge from Crescent dam station on days when no record is available.

### MOHAWK RIVER AT CRESCENT DAM, N. Y.

LOCATION.—At Crescent dam of Barge canal, about 3 miles above mouth of river at Cohoes, Albany County.

DRAINAGE AREA.—3,490 square miles (measured on topographic maps by State engineer department).

RECORDS AVAILABLE.—December 1, 1917, to September 30, 1918.

GAGE.—Gurley 7-day water-stage recorder on left bank about 50 feet above guard gate at head of Waterford flight of locks, about 200 yards from left end of spillway; inspected by operator from Barge canal power house at the dam.

DISCHARGE MEASUREMENTS.—Made from steel highway bridge at Crescent, about 1½ miles upstream.

CHANNEL AND CONTROL.—The control is the crest of the spillway.

DIVERSIONS.—Water is diverted at this point for canal purposes through Lock 6 and through the power plant located at this lock. The following tables of discharge include the flow through Lock 6 and through the power plant.

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 during low water caused by operation of movable dams upstream.

ACCURACY.—Stage-discharge relation permanent; probably not affected by ice. Rating curve well defined between 5,000 and 50,000 second-feet. Record from water-stage recorder satisfactory. Records good.

COOPERATION.—Station established and maintained by the United States Geological Survey in cooperation with the State engineer and surveyor. Recorder inspected by an employee of the State superintendent of public works.

No discharge measurements made at station during year.

*Daily discharge, in second-feet, of Mohawk River at Crescent dam, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5,400 | ..... | 1,670 | 16,700 | 18,700 | 8,680 | 4,110 | 2,150 | 1,270 | 2,760 |
| 2 | 5,560 | ..... | 1,620 | 16,000 | 21,500 | 10,300 | 3,710 | 4,770 | 1,280 | 1,790 |
| 3 | 5,640 | ..... | 1,620 | 13,500 | 22,900 | 8,360 | 3,090 | 2,670 | 1,340 | 1,630 |
| 4 | 6,040 | ..... | 1,480 | 13,000 | 20,100 | 5,960 | 3,020 | 2,840 | 1,370 | 1,640 |
| 5 | 4,890 | 2,180 | 1,530 | 10,500 | 15,300 | 6,080 | 2,940 | 2,120 | 1,390 | 1,690 |
| 6 | 5,800 | 2,130 | 1,970 | 9,210 | 12,700 | 4,930 | 2,950 | 2,420 | 1,300 | 1,980 |
| 7 | 4,040 | 2,070 | 1,870 | 11,500 | 11,700 | 5,000 | 3,300 | 2,160 | 1,430 | 2,890 |
| 8 | 3,710 | 1,920 | 1,670 | 11,600 | 11,500 | 5,220 | 4,110 | 1,430 | 2,360 | 2,270 |
| 9 | 2,530 | 1,770 | 1,570 | 9,320 | 16,800 | 3,690 | 3,160 | 1,850 | 1,430 | 2,110 |
| 10 | 1,550 | 1,670 | 1,530 | 7,590 | 25,100 | 3,420 | 3,580 | 2,140 | 2,600 | 1,880 |
| 11 | 1,550 | 1,620 | 1,480 | 6,450 | 20,100 | 5,000 | 4,160 | 3,020 | 2,020 | 2,040 |
| 12 | 2,250 | 1,820 | 1,390 | 6,360 | 16,700 | 5,000 | 7,410 | 2,720 | 1,690 | 2,190 |
| 13 | 2,420 | 1,570 | 1,430 | 8,310 | 13,900 | 6,500 | 11,200 | 2,950 | 1,680 | 2,370 |
| 14 | 2,370 | 1,570 | 2,020 | 18,000 | 13,300 | 17,300 | 8,510 | 3,580 | 1,420 | 2,530 |
| 15 | 1,940 | 1,770 | 4,570 | 15,300 | 18,000 | 12,700 | 5,170 | 4,680 | 1,630 | 2,580 |
| 16 | 1,840 | 1,670 | 5,540 | 9,940 | 16,700 | 8,660 | 4,090 | 5,050 | 1,270 | 2,310 |
| 17 | 1,990 | 2,070 | 5,460 | 7,490 | 15,300 | 5,280 | 3,710 | 3,220 | 1,390 | 2,030 |
| 18 | 2,250 | 1,970 | 5,000 | 18,000 | 17,300 | 4,960 | 3,550 | 3,240 | 1,090 | 3,910 |
| 19 | 2,470 | 1,670 | 4,360 | 24,300 | 22,900 | 4,290 | 2,750 | 3,360 | 1,010 | 3,770 |
| 20 | 2,470 | 1,720 | 12,600 | 26,500 | 18,700 | 3,900 | 2,330 | 2,840 | 1,120 | 3,710 |
| 21 | 2,470 | 2,070 | 34,600 | 31,800 | 14,500 | 5,100 | 2,620 | 2,420 | 1,080 | 3,460 |
| 22 | 2,250 | 1,720 | 17,100 | 35,000 | 18,000 | 4,520 | 3,410 | 1,870 | 1,060 | 3,660 |
| 23 | ..... | 1,720 | 12,000 | 44,800 | 22,900 | 4,800 | 3,160 | 2,370 | 1,070 | 2,720 |
| 24 | ..... | 1,620 | 9,210 | 39,800 | 18,700 | 3,970 | 2,790 | 2,030 | 1,210 | 3,230 |
| 25 | ..... | 1,820 | 8,690 | 29,500 | 14,700 | 3,910 | 3,460 | 2,020 | 1,470 | 2,770 |
| 26 | ..... | 1,770 | 10,500 | 23,600 | 11,700 | 3,550 | 2,650 | 1,860 | 1,250 | 6,330 |
| 27 | ..... | 1,820 | 22,900 | 17,300 | 8,390 | 4,900 | 2,600 | 1,740 | 1,050 | 12,300 |
| 28 | 2,530 | 2,020 | 18,700 | 12,700 | 7,480 | 6,280 | 2,110 | 1,560 | 1,020 | 7,830 |
| 29 | 2,530 | 2,070 | ..... | 11,700 | 6,980 | 5,160 | 2,380 | 1,440 | 1,220 | 4,480 |
| 30 | ..... | 1,720 | ..... | 14,700 | 7,480 | 4,580 | 1,830 | 1,440 | 1,340 | 3,590 |
| 31 | ..... | 1,720 | ..... | 17,300 | ..... | 3,980 | ..... | 1,310 | 1,870 | ..... |

NOTE.—Mean daily discharge estimated Dec. 23–27, 2,420 second-feet; 30–31, 2,330 second-feet; Jan. 1–4, 2,310 second-feet; Dec. 9–10, Feb. 1–2, Sept. 11–14, as shown in table, from hydrograph of staff gage readings; no automatic record.

*Monthly discharge of Mohawk River at Crescent dam, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 3,490 sqare miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| December | 6,040 | 1,550 | 3,010 | 0.862 | 0.99 |
| January | ..... | 1,570 | 1,890 | .542 | .62 |
| February | 34,600 | 1,390 | 6,930 | 1.99 | 2.07 |
| March | 44,800 | 6,360 | 17,300 | 4.96 | 5.72 |
| April | 25,100 | 6,980 | 16,000 | 4.58 | 5.11 |
| May | 17,300 | 3,420 | 6,000 | 1.72 | 1.98 |
| June | 11,200 | 1,830 | 3,800 | 1.09 | 1.22 |
| July | 5,050 | 1,310 | 2,560 | .734 | .85 |
| August | 2,600 | 1,010 | 1,410 | .404 | .47 |
| September | 12,300 | 1,630 | 3,280 | .940 | 1.05 |

## DELAWARE RIVER BASIN.

### EAST BRANCH OF DELAWARE RIVER AT FISH EDDY, N. Y.

LOCATION.—At railway bridge in village of Fish Eddy, Delaware County, 4 miles below mouth of Beaver Kill and 5½ miles above confluence of East and West branches.

DRAINAGE AREA.—790 square miles (measured on Post Route map).

RECORDS AVAILABLE.—November 19, 1912, to September 30, 1918. Records were obtained at Hancock, about 4 miles below from October 14, 1902, to December 31, 1912.

GAGE.—Staff, in two sections, on downstream end of left pier of railroad bridge; read by J. P. Lyons.

DISCHARGE MEASUREMENTS.—Made from the highway bridge about 200 feet above the gage or by wading.

CHANNEL AND CONTROL.—Coarse gravel; occasionally shifting.

EXTREMES OF DISCHARGE.—Maximum open-water stage recorded during year, 15.4 feet at 3 p. m., October 30 (discharge, about 27,400 second-feet); minimum stage recorded, 1.70 feet several times in August and September (discharge, 141 second feet 1912–1918: Maximum stage, 17.4 feet during the afternoon of March 27, 1913, determined by leveling from flood marks (discharge, about 33,500 second-feet); minimum stage recorded, 1.64 feet at 5 p. m., October 12, 14, 15, 1914 (discharge, 97 second-feet).

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

ACCURACY.—Stage-discharge relation apparently permanent, except for two or three months immediately after the spring flood; affected by ice during a large part of the period from December to March, inclusive. Rating curve well defined between 200 and 20,000 second-feet. Gage read twice daily. Open-water records good; winter records fair.

*Discharge measurements of East Branch of Delaware River at Fish Eddy, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 15 | E. D. Burchard | 2.95 | 702 | Mar. 9 | E. D. Burchard | 5.13 | 2,670 |
| Dec. 20[a] | C. C. Covert | 4.92 | 590 | June 5 | do | 3.55 | 1,120 |
| Jan. 14[b] | do | 3.85 | 456 | Aug. 15 | do | 2.08 | 243 |
| Feb. 9[a] | E. D. Burchard | 3.50 | 250 | | | | |

[a] Measurement made through incomplete ice cover. [b] Measurement made through complete ice cover.

*Daily discharge, in second-feet, of East Branch of Delaware River at Fish Eddy, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 300 | 7,360 | 1,080 | 360 | 340 | 4,560 | 2,210 | 2,210 | 2,210 | 530 | 228 | 340 |
| 2 | 300 | 5,620 | 1,080 | 340 | 340 | 4,390 | 2,210 | 2,100 | 1,890 | 480 | 228 | 385 |
| 3 | 300 | 3,910 | 1,000 | 320 | 340 | 4,390 | 2,100 | 1,410 | 1,590 | 480 | 228 | 300 |
| 4 | 300 | 3,760 | 1,000 | 300 | 300 | 4,390 | 2,100 | 1,160 | 1,320 | 430 | 228 | 245 |
| 5 | 408 | 3,760 | 1,080 | 300 | 280 | 3,610 | 2,100 | 1,160 | 1,160 | 385 | 228 | 228 |
| 6 | 320 | 3,460 | 1,160 | 300 | 260 | 3,760 | 1,990 | 1,160 | 920 | 385 | 228 | 183 |
| 7 | 300 | 2,430 | 1,160 | 300 | 220 | 3,610 | 1,990 | 1,160 | 850 | 385 | 213 | 168 |
| 8 | 300 | 1,690 | 1,160 | 300 | 240 | 3,320 | 1,990 | 1,160 | 850 | 385 | 213 | 163 |
| 9 | 300 | 1,500 | 1,160 | 300 | 280 | 2,920 | 2,920 | 1,000 | 780 | 385 | 198 | 141 |
| 10 | 281 | 1,160 | 1,200 | 300 | 220 | 3,050 | 3,460 | 1,000 | 745 | 408 | 198 | 141 |
| 11 | 920 | 1,080 | 1,100 | 300 | 200 | 2,550 | 2,920 | 920 | 1,590 | 480 | 198 | 141 |
| 12 | 1,690 | 1,080 | 1,000 | 340 | 220 | 2,320 | 2,790 | 920 | 2,430 | 430 | 198 | 141 |
| 13 | 1,320 | 1,000 | 1,000 | 400 | 300 | 2,320 | 3,050 | 1,000 | 1,790 | 320 | 228 | 141 |
| 14 | 960 | 920 | 900 | 550 | 500 | 3,050 | 3,320 | 1,160 | 1,240 | 281 | 228 | 141 |
| 15 | 710 | 850 | 900 | 500 | 1,000 | 2,790 | 3,320 | 1,500 | 1,160 | 281 | 245 | 141 |
| 16 | 650 | 780 | 800 | 440 | 3,400 | 2,320 | 3,910 | 1,320 | 1,040 | 300 | 228 | 141 |
| 17 | 590 | 780 | 750 | 460 | 2,400 | 2,320 | 4,730 | 1,240 | 850 | 408 | 198 | 168 |
| 18 | 590 | 780 | 650 | 440 | 1,500 | 3,460 | 4,900 | 1,080 | 780 | 480 | 183 | 168 |
| 19 | 650 | 650 | 600 | 480 | 1,000 | 3,610 | 5,620 | 1,080 | 710 | 430 | 174 | 198 |
| 20 | 2,100 | 590 | 550 | 420 | 5,500 | 5,620 | 5,620 | 2,210 | 710 | 385 | 168 | 262 |
| 21 | 1,790 | 590 | 550 | 400 | 4,900 | 6,000 | 5,810 | 1,500 | 710 | 340 | 168 | 455 |
| 22 | 1,590 | 710 | 500 | 440 | 3,760 | 7,970 | 6,000 | 1,320 | 1,320 | 340 | 154 | 620 |
| 23 | 1,240 | 2,320 | 500 | 420 | 2,790 | 7,760 | 5,440 | 1,320 | 1,160 | 320 | 154 | 430 |
| 24 | 1,080 | 1,890 | 500 | 440 | 2,550 | 7,160 | 4,900 | 1,240 | 1,040 | 300 | 141 | 385 |
| 25 | 3,910 | 1,790 | 500 | 340 | 2,430 | 7,160 | 4,230 | 1,160 | 960 | 300 | 141 | 455 |
| 26 | 2,920 | 1,690 | 480 | 320 | 2,550 | 6,380 | 3,460 | 2,100 | 780 | 300 | 141 | 430 |
| 27 | 2,790 | 1,500 | 440 | 320 | 2,670 | 4,070 | 2,920 | 2,670 | 710 | 281 | 141 | 3,610 |
| 28 | 4,560 | 1,160 | 380 | 360 | 3,610 | 2,790 | 2,550 | 2,550 | 710 | 262 | 141 | 1,890 |
| 29 | 3,050 | 1,160 | 380 | 360 | ..... | 2,430 | 2,320 | 2,320 | 590 | 228 | 141 | 1,500 |
| 30 | 17,500 | 885 | 380 | 340 | ..... | 2,320 | 2,100 | 2,100 | 530 | 228 | 141 | 1,000 |
| 31 | 14,500 | ..... | 380 | 360 | ..... | 2,320 | ..... | 2,320 | ..... | 228 | 168 | ..... |

NOTE.—Discharge Dec. 10 to Feb. 20 estimated, because of ice, from discharge measurements, weather records, study of recorder graph, and comparison with similar studies for the station at Hale Eddy.

*Monthly discharge of East Branch of Delaware River at Fish Eddy, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 790 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 14,500 | 281 | 2,200 | 2.79 | 3.22 |
| November | 7,360 | 590 | 1,900 | 2.41 | 2.69 |
| December | 1,200 | 380 | 785 | .994 | 1.15 |
| January | 550 | 300 | 373 | .472 | .54 |
| February | 5,500 | 200 | 1,580 | 2.00 | 2.08 |
| March | 7,970 | 2,320 | 4,020 | 5.09 | 5.87 |
| April | 6,000 | 1,990 | 3,430 | 4.34 | 4.84 |
| May | 2,670 | 920 | 1,500 | 1.90 | 2.19 |
| June | 2,430 | 530 | 1,100 | 1.39 | 1.55 |
| July | 530 | 228 | 360 | .456 | .53 |
| August | 245 | 141 | 189 | .239 | .28 |
| September | 3,610 | 141 | 490 | .620 | .69 |
| The year | 14,500 | 141 | 1,490 | 1.89 | 25.63 |

### DELAWARE RIVER AT PORT JERVIS, N. Y.

LOCATION.—At toll bridge at Port Jervis, Orange County, 1 mile above Neversink River and 6 miles below Mongaup River.

DRAINAGE AREA.—3,250 square miles.

RECORDS AVAILABLE.—October 12, 1904, to September 30, 1918.

GAGE.—Staff, in two sections; the upper section vertical and attached to downstream end of left abutment; the lower section inclined, about 30 feet downstream. Prior to June 20, 1914, a chain gage on the bridge was used; read by Mrs. Bella Fuller.

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

CHANNEL AND CONTROL.—Gravel; occasionally shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.3 feet at 8 a. m. October 31 (discharge, 61,600 second-feet); minimum stage recorded, 1.1 feet, 8 a. m. August 26 and 5 p. m. August 28 (discharge, 390 second-feet).

1904–1918: 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 somewhat affected by ice.

ACCURACY.—Stage-discharge relation practically permanent between dates of shifting; affected by ice during large part of January and February. Rating curve well defined between 1,000 and 30,000 second-feet. Gage read to hundredths twice daily from October 1 to December 31, and to tenths once daily, January 1 to September 30. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good; winter records fair.

COOPERATION.—Gage heights, October 1 to June 30, furnished by United States Weather Bureau.

*Discharge measurements of Delaware River at Port Jervis, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 17 | E. D. Burchard | 2.37 | 1,800 | June 8 | J. W. Moulton | 3.10 | 3,330 |
| Feb. 8[a] | C. C. Covert | 3.19 | 1,170 | Aug. 13 | E. D. Burchard | 1.50 | 650 |
| Mar. 12 | E. D. Burchard | 4.82 | 9,450 | 13 | .....do | 1.53 | 657 |
| 12 | .....do | 4.80 | 9,540 | | | | |

[a] Measurement made through incomplete ice cover.

*Daily discharge, in second-feet, of Delaware River at Port Jervis, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 685 | 33,500 | 2,920 | 1,200 | 1,200 | 14,100 | 6,700 | 7,810 | 7,060 | 2,070 | 780 | 830 |
| 2 | 685 | 19,200 | 3,160 | 1,200 | 1,100 | 28,200 | 7,430 | 7,060 | 6,700 | 1,720 | 880 | 880 |
| 3 | 685 | 13,100 | 3,160 | 1,200 | 1,000 | 18,600 | 8,200 | 6,700 | 5,360 | 2,070 | 780 | 1,110 |
| 4 | 990 | 10,300 | 3,160 | 1,200 | 1,000 | 14,100 | 9,010 | 5,680 | 3,910 | 1,890 | 732 | 935 |
| 5 | 780 | 8,200 | 2,920 | 1,200 | 1,000 | 11,600 | 8,600 | 5,360 | 3,910 | 1,640 | 780 | 780 |
| 6 | 780 | 7,060 | 2,470 | 1,000 | 1,000 | 11,600 | 8,200 | 5,050 | 3,650 | 1,240 | 685 | 780 |
| 7 | 880 | 6,010 | 2,070 | 1,000 | 1,000 | 20,500 | 6,010 | 4,750 | 3,650 | 1,240 | 642 | 686 |
| 8 | 990 | 5,680 | 1,720 | 950 | 1,200 | 14,100 | 5,360 | 4,460 | 3,400 | 1,390 | 685 | 642 |
| 9 | 1,110 | 4,750 | 1,390 | 1,200 | 1,200 | 11,600 | 5,050 | 3,650 | 3,650 | 1,550 | 685 | 600 |
| 10 | 990 | 3,910 | 1,720 | 1,300 | 1,200 | 10,300 | 9,840 | 3,400 | 2,920 | 1,390 | 732 | 525 |
| 11 | 880 | 3,910 | 2,070 | 1,300 | 1,200 | 12,100 | 10,300 | 3,160 | 2,470 | 1,390 | 732 | 490 |
| 12 | 780 | 3,650 | 2,920 | 1,400 | 1,000 | 9,010 | 9,010 | 2,920 | 2,690 | 1,470 | 685 | 490 |
| 13 | 1,110 | 3,160 | 2,690 | 1,600 | 1,200 | 7,810 | 8,600 | 4,460 | 3,160 | 1,470 | 780 | 490 |
| 14 | 3,650 | 2,920 | 2,470 | 1,600 | 1,600 | 14,100 | 8,200 | 7,430 | 5,360 | 1,550 | 780 | 562 |
| 15 | 2,470 | 2,690 | 2,260 | 1,700 | 2,400 | 15,100 | 13,100 | 6,350 | 4,180 | 1,720 | 990 | 830 |
| 16 | 2,070 | 2,690 | 2,000 | 1,700 | 3,600 | 12,100 | 16,200 | 5,050 | 3,650 | 1,980 | 990 | 780 |
| 17 | 1,890 | 2,690 | 2,000 | 1,900 | 8,500 | 11,200 | 14,100 | 4,460 | 2,920 | 1,640 | 780 | 685 |
| 18 | 1,890 | 2,470 | 1,900 | 1,500 | 8,000 | 15,100 | 15,100 | 3,910 | 2,470 | 1,550 | 685 | 685 |
| 19 | 1,720 | 2,260 | 1,700 | 1,500 | 7,000 | 16,200 | 16,800 | 3,650 | 2,260 | 1,550 | 562 | 880 |
| 20 | 1,720 | 2,260 | 1,600 | 1,300 | 11,600 | 18,600 | 13,600 | 3,650 | 2,070 | 1,550 | 490 | 1,050 |
| 21 | 4,460 | 2,070 | 1,600 | 1,200 | 35,000 | 20,500 | 11,600 | 6,010 | 1,890 | 1,550 | 455 | 1,640 |
| 22 | 3,910 | 2,070 | 1,600 | 1,000 | 29,000 | 21,800 | 19,200 | 5,360 | 2,070 | 1,240 | 422 | 2,690 |
| 23 | 3,400 | 4,460 | 1,600 | 1,000 | 15,100 | 23,900 | 21,200 | 5,360 | 5,360 | 1,180 | 390 | 2,260 |
| 24 | 2,920 | 4,180 | 1,600 | 1,600 | 10,700 | 19,800 | 16,200 | 4,750 | 4,460 | 990 | 390 | 1,890 |
| 25 | 4,460 | 3,650 | 1,700 | 1,500 | 8,200 | 15,100 | 13,600 | 3,910 | 3,400 | 880 | 390 | 1,550 |
| 26 | 9,010 | 3,400 | 1,600 | 1,200 | 8,600 | 13,100 | 11,200 | 3,910 | 2,920 | 780 | 390 | 1,550 |
| 27 | 7,060 | 3,160 | 1,700 | 1,200 | 35,000 | 11,200 | 9,010 | 4,460 | 2,470 | 780 | 455 | 6,700 |
| 28 | 6,010 | 2,920 | 1,600 | 1,100 | 24,600 | 9,010 | 7,810 | 6,010 | 2,070 | 685 | 390 | 7,430 |
| 29 | 7,060 | 2,690 | 1,500 | 1,100 | ..... | 7,430 | 6,700 | 6,010 | 1,890 | 685 | 455 | 5,050 |
| 30 | 9,420 | 2,470 | 1,400 | 1,100 | ..... | 7,060 | 6,350 | 6,010 | 1,720 | 685 | 455 | 3,650 |
| 31 | 61,600 | ..... | 1,300 | 1,100 | ..... | 6,700 | ..... | 8,200 | ..... | 880 | 455 | ..... |

NOTE—Discharge Dec. 10 to Feb. 19 estimated, because of ice, from discharge measurements, weather records, study of recorder graph, and comparison with similar studies for stations on the East and West branches.

*Monthly discharge of Delaware River at Port Jarvis, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 3,250 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 61,600 | 685 | 4,710 | 1.45 | 1.67 |
| November | 33,500 | 2,070 | 5,720 | 1.76 | 1.96 |
| December | 3,160 | 1,300 | 2,030 | .624 | .72 |
| January | 1,900 | 950 | 1,290 | .397 | .46 |
| February | 35,000 | 1,000 | 7,980 | 2.45 | 2.55 |
| March | 28,200 | 6,700 | 14,200 | 4.38 | 5.05 |
| April | 21,200 | 5,050 | 10,700 | 3.30 | 3.68 |
| May | 8,200 | 2,920 | 5,130 | 1.58 | 1.82 |
| June | 7,060 | 1,720 | 3,460 | 1.06 | 1.18 |
| July | 2,070 | 685 | 1,370 | .422 | .49 |
| August | 990 | 390 | 629 | .194 | .22 |
| September | 7,430 | 490 | 1,640 | .505 | .56 |
| The year | 61,600 | 390 | 4,880 | 1.50 | 20.36 |

## DELAWARE RIVER AT RIEGELSVILLE, N. J.

LOCATION.—At toll suspension bridge between Riegelsville, N. J., and Riegelsville, Pa., 600 feet above Musconetcong River and 9 miles below Lehigh River.

DRAINAGE AREA.—6,430 square miles.

RECORDS AVAILABLE.—July 3, 1906, to September 30, 1918.

GAGE.—Staff in three sections installed November 14, 1914, on left bank (New Jersey side) at upstream side of bridge; lower section inclined, middle and upper sections vertical. Prior to November 14, 1914, chain gage attached to upstream side of bridge. Gage read by Herbert J. Bernholz.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Large boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.4 feet at 4 p. m. October 31 (discharge, 90,700 second-feet); minimum stage recorded, 1.95 feet, August 28 (discharge, 1,420 second-feet).

1906–1918: Maximum stage [1] recorded, 25 feet March 28, 1913 (discharge, 144,000 second-feet); minimum stage recorded, 1.55 feet 8 a. m. Sept. 20, 1908 (discharge, 870 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters only.

DIVERSIONS.—The Delaware division of the Pennsylvania canal diverts about 250 second-feet from Lehigh River near its mouth from about the last of March to the middle of December each year.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice to some extent during December, January, and February. Rating curve well defined. Gage read to quarter-tenths twice a day. Daily discharge obtained by applying mean daily gage height to rating table. Records good.

No current-meter measurements were made during the year.

*Daily discharge, in second-feet, of Delaware River at Riegelsville, N. J., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,990 | 62,400 | 5,610 | 2,340 | 3,390 | 44,200 | 12,000 | 13,900 | 14,600 | 4,710 | 3,880 | 4,140 |
| 2 | 1,990 | 34,500 | 5,610 | 2,340 | 3,390 | 32,700 | 11,600 | 14,600 | 12,400 | 4,140 | 2,940 | 2,340 |
| 3 | 1,990 | 24,000 | 5,920 | 2,340 | 3,390 | 31,600 | 12,400 | 13,900 | 10,200 | 4,140 | 2,730 | 2,530 |
| 4 | 1,990 | 18,800 | 5,610 | 2,340 | 3,390 | 29,300 | 15,000 | 12,700 | 8,820 | 4,140 | 2,530 | 2,440 |
| 5 | 1,990 | 15,000 | 5,610 | 2,160 | 3,390 | 25,600 | 14,600 | 12,000 | 7,490 | 3,880 | 2,340 | 2,340 |
| 6 | 2,160 | 12,400 | 5,010 | 2,160 | 3,390 | 23,500 | 13,100 | 10,900 | 7,490 | 3,880 | 2,530 | 2,440 |
| 7 | 2,080 | 10,900 | 4,420 | 2,160 | 3,390 | 33,300 | 11,200 | 10,200 | 7,490 | 3,390 | 2,340 | 2,340 |
| 8 | 1,990 | 9,840 | 3,880 | 2,080 | 3,390 | 35,700 | 9,840 | 9,500 | 8,150 | 3,160 | 2,160 | 2,250 |
| 9 | 2,340 | 8,820 | 2,730 | 2,160 | 3,280 | 24,500 | 10,900 | 8,820 | 7,820 | 3,160 | 2,160 | 1,990 |
| 10 | 2,250 | 8,150 | 2,160 | 2,160 | 3,390 | 25,600 | 16,300 | 8,480 | 6,850 | 2,940 | 1,990 | 1,990 |
| 11 | 2,160 | 7,490 | 2,840 | 1,990 | 3,390 | 22,600 | 21,600 | 8,480 | 7,490 | 3,160 | 1,990 | 1,820 |
| 12 | 2,160 | 6,850 | 2,940 | 7,820 | 3,390 | 20,700 | 19,700 | 8,480 | 6,850 | 3,050 | 1,990 | 1,820 |
| 13 | 2,630 | 6,540 | 2,940 | 8,820 | 3,630 | 18,800 | 18,400 | 8,480 | 7,490 | 3,050 | 2,340 | 1,990 |
| 14 | 2,940 | 6,230 | 2,940 | 7,490 | 5,920 | 23,500 | 19,700 | 10,200 | 7,820 | 3,390 | 3,160 | 1,990 |
| 15 | 3,390 | 5,610 | 3,160 | 7,170 | 10,500 | 36,900 | 23,500 | 12,700 | 8,820 | 3,880 | 3,390 | 1,990 |
| 16 | 4,140 | 5,610 | 3,390 | 5,610 | 13,100 | 30,400 | 29,300 | 12,700 | 7,490 | 3,630 | 2,940 | 2,160 |
| 17 | 3,390 | 5,010 | 3,630 | 5,310 | 12,000 | 25,600 | 31,000 | 10,900 | 6,540 | 3,390 | 2,840 | 1,990 |
| 18 | 3,160 | 4,710 | 3,880 | 5,010 | 11,600 | 25,600 | 31,600 | 9,500 | 5,610 | 3,630 | 2,340 | 1,990 |
| 19 | 2,940 | 4,710 | 3,880 | 4,710 | 13,900 | 28,800 | 34,500 | 8,480 | 5,010 | 3,390 | 2,080 | 1,990 |
| 20 | 3,390 | 4,420 | 3,880 | 4,420 | 56,700 | 28,800 | 35,100 | 8,150 | 4,420 | 2,940 | 1,820 | 2,440 |
| 21 | 4,140 | 4,420 | 4,140 | 4,710 | 65,300 | 32,100 | 35,100 | 8,480 | 4,140 | 2,730 | 1,820 | 3,630 |
| 22 | 5,310 | 4,710 | 4,140 | 5,010 | 46,500 | 33,300 | 38,100 | 10,900 | 5,920 | 2,730 | 1,660 | 4,710 |
| 23 | 5,610 | 5,610 | 4,420 | 4,710 | 27,700 | 34,500 | 46,400 | 10,900 | 8,150 | 2,530 | 1,660 | 4,710 |
| 24 | 5,310 | 7,490 | 4,140 | 5,010 | 22,600 | 31,000 | 38,100 | 10,200 | 9,160 | 2,530 | 1,580 | 4,420 |
| 25 | 8,150 | 8,150 | 3,880 | 4,710 | 20,700 | 26,600 | 33,300 | 9,160 | 7,490 | 2,630 | 1,580 | 3,880 |
| 26 | 10,500 | 6,850 | 3,390 | 3,880 | 66,800 | 22,600 | 24,500 | 8,480 | 6,230 | 2,530 | 1,500 | 3,390 |
| 27 | 11,600 | 5,010 | 3,160 | 3,880 | 59,500 | 19,700 | 20,700 | 7,820 | 5,310 | 2,340 | 1,500 | 4,420 |
| 28 | 9,160 | 4,710 | 2,940 | 3,880 | 52,500 | 17,100 | 18,000 | 17,500 | 5,010 | 2,340 | 1,420 | 7,490 |
| 29 | 9,840 | 4,420 | 2,530 | 3,880 | ..... | 14,200 | 16,300 | 12,400 | 4,420 | 2,340 | 1,500 | 7,820 |
| 30 | 13,900 | 4,710 | 2,530 | 3,390 | ..... | 13,100 | 14,600 | 11,200 | 3,880 | 2,340 | 1,580 | 7,170 |
| 31 | 73,300 | ..... | 2,340 | 3,390 | ..... | 12,400 | ..... | 12,700 | ..... | 4,710 | 1,660 | ..... |

NOTE.—Discharge interpolated Feb. 5–7 as gage was read to top of ice. Stage-discharge relation probably affected by ice to some extent in December and January but no correction made therefor. Gage not read Feb. 22; discharge interpolated.

[1] It has been estimated that the flood of Oct. 10–11, 1903, reached a stage of 41.5 feet with a corresponding discharge of 275,000 second-feet.

*Monthly discharge of Delaware River at Riegelsville, N. J., for the year ending Sept. 30, 1918.*

[Drainage area, 6,430 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 73,300 | 1,990 | 6,710 | 1.08 | 1.24 |
| November | 62,400 | 4,420 | 10,600 | 1.68 | 1.87 |
| December | 5,920 | 2,160 | 3,800 | .600 | .69 |
| January | 8,820 | 1,990 | 4,100 | .638 | .74 |
| February | 66,800 | 3,280 | 18,900 | 2.94 | 3.06 |
| March | 44,200 | 12,400 | 26,600 | 4.15 | 4.78 |
| April | 46,400 | 9,840 | 22,500 | 3.55 | 3.96 |
| May | 17,500 | 8,150 | 10,700 | 1.71 | 1.97 |
| June | 14,600 | 3,880 | 7,290 | 1.17 | 1.30 |
| July | 4,710 | 2,340 | 3,250 | .541 | .62 |
| August | 3,880 | 1,420 | 2,190 | .376 | .43 |
| September | 7,820 | 1,820 | 3,220 | .537 | .60 |
| The year | 73,300 | 1,420 | 9,880 | 1.57 | 21.26 |

NOTE.—To allow for water diverted by the canal, 230 second-feet was added to the daily discharge, Oct. 1 to Dec. 9 and Mar. 16 to Sept. 30, before computing discharge per square mile; first three columns of table therefore indicate actual quantity of water flowing in the river; the two remaining columns represent the total run-off from drainage area above Riegelsville, including the discharge of the canal.

### BEAVER KILL AT COOKS FALLS, N. Y.

LOCATION.—At covered highway bridge in Cooks Falls, Delaware County.

DRAINAGE AREA.—236 square miles (measured on Post Route and topographic maps).

RECORDS AVAILABLE.—July 25, 1913, to September 30, 1918.

GAGE.—Vertical staff, in two sections, bolted to rock on left bank under the bridge; read by Ralph Rosa and H. B. Couch.

DISCHARGE MEASUREMENTS.—Made from the bridge or by wading a short distance downstream.

CHANNEL AND CONTROL.—Coarse gravel, boulders, and solid ledge; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.4 feet at 5 p. m. October 30 (discharge, about 9,700 second-feet); minimum stage recorded, 0.84 foot at 7 a. m. and 3 p. m. August 24 (discharge, 41 second-feet).

1913-1918: Maximum stage recorded, 12.4 feet at 5 p. m. October 30, 1917 (discharge, about 9,700 second-feet); minimum stage recorded, 0.70 foot from 7 a. m. October 12 to 7 a. m. October 13, 1916 (discharge, 30 second-feet).

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

ACCURACY.—Stage-discharge relation practically permanent; affected by ice during parts of the period from December to March, inclusive. Rating curve well defined between 50 and 4,500 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good; winter records fair.

*Discharge measurements of Beaver Kill at Cooks Falls, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 16 | E. D. Burchard | 2.32 | 366 | Mar. 11 | E. D. Burchard | 3.39 | 820 |
| Nov. 22 | C. C. Covert | 2.05 | 270 | June 7 | J. W. Moulton | 2.32 | 316 |
| Dec. 20[a] | do | 2.20 | 201 | Aug. 15 | E. D. Burchard | 1.39 | 129 |
| Jan. 14[a] | do | 3.10 | 207 | 15 | do | 1.39 | 128 |
| Feb. 9[b] | E. D. Burchard | 2.28 | 107 | | | | |

[a] Measurement made through complete ice cover. [b] Measurement made through incomplete ice cover.

*Daily discharge, in second-feet, of Beaver Kill at Cooks Falls, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 186 | 1,730 | 371 | 200 | 130 | | 1,330 | 805 | 455 | 197 | 80 | 244 |
| 2 | 186 | 1,400 | 355 | 190 | 130 | | 1,800 | 705 | 371 | 197 | 72 | 132 |
| 3 | 175 | 1,080 | 355 | 190 | 120 | | 1,800 | 615 | 325 | 164 | 65 | 80 |
| 4 | 244 | 805 | 325 | 190 | 120 | | 1,940 | 570 | 296 | 175 | 62 | 67 |
| 5 | 269 | 705 | 310 | 190 | 120 | 1,370 | 1,260 | 530 | 296 | 164 | 89 | 59 |
| 6 | 208 | 615 | 282 | 190 | 110 | | 1,020 | 490 | 269 | 146 | 76 | 56 |
| 7 | 186 | 282 | 256 | 200 | 110 | | 910 | 455 | 355 | 146 | 64 | 59 |
| 8 | 175 | 404 | 244 | 190 | 110 | | 805 | 371 | 325 | 146 | 59 | 56 |
| 9 | 220 | 325 | 232 | 190 | 110 | 805 | 1,400 | 355 | 256 | 142 | 59 | 56 |
| 10 | 164 | 310 | 220 | 200 | 110 | 830 | 1,460 | 355 | 256 | 164 | 59 | 51 |
| 11 | 154 | 296 | 200 | 200 | | 805 | 1,260 | 355 | 232 | 175 | 128 | 54 |
| 12 | 310 | 282 | 200 | 200 | | 755 | 1,080 | 340 | 355 | 164 | 120 | 54 |
| 13 | 244 | 296 | 200 | 200 | | 855 | 910 | 355 | 340 | 186 | 101 | 75 |
| 14 | 340 | 296 | 200 | 200 | | 1,020 | 1,020 | 1,020 | 282 | 256 | 76 | 58 |
| 15 | 355 | 296 | 200 | 200 | | 755 | 1,330 | 660 | 256 | 310 | 130 | 52 |
| 16 | 310 | 269 | 190 | 200 | | 705 | 1,400 | 490 | 220 | 186 | 91 | 51 |
| 17 | 256 | 282 | 200 | 200 | | 855 | 1,200 | 455 | 208 | 164 | 73 | 48 |
| 18 | 232 | 325 | 200 | 200 | | 1,260 | 1,940 | 420 | 197 | 164 | 62 | 55 |
| 19 | 232 | 310 | 200 | 200 | | 1,730 | 1,400 | 387 | 197 | 142 | 59 | 132 |
| 20 | 530 | 296 | 200 | 190 | | 2,240 | 1,080 | 387 | 175 | 130 | 55 | 110 |
| 21 | 490 | 282 | 200 | 180 | 584 | 2,720 | 1,800 | 420 | 164 | 118 | 48 | 310 |
| 22 | 325 | 404 | 200 | 180 | | 3,310 | 2,720 | 387 | 855 | 112 | 46 | 175 |
| 23 | 282 | 1,140 | 190 | 170 | | 2,960 | 1,730 | 387 | 404 | 105 | 43 | 140 |
| 24 | 530 | 615 | 186 | 170 | | 2,160 | 1,400 | 355 | 325 | 100 | 41 | 124 |
| 25 | 910 | 371 | 197 | 170 | | 1,940 | 1,140 | 340 | 256 | 98 | 122 | 112 |
| 26 | 570 | 355 | 197 | 160 | | 1,660 | 910 | 455 | 232 | 94 | 64 | 530 |
| 27 | 1,590 | 340 | 208 | 160 | | 1,400 | 805 | 420 | 197 | 89 | 51 | 910 |
| 28 | 1,260 | 325 | 197 | 160 | | 1,020 | 705 | 387 | 186 | 82 | 46 | 490 |
| 29 | 1,940 | 340 | 200 | 150 | | 910 | 706 | 325 | 186 | 85 | 72 | 325 |
| 30 | 7,110 | 387 | 200 | 140 | | 1,260 | 805 | 455 | 175 | 83 | 64 | 269 |
| 31 | 2,400 | ..... | 200 | 130 | | 1,260 | ..... | 530 | ..... | 92 | 43 | ..... |

NOTE.—Discharge Dec. 11–23 and Dec. 29 to Mar. 8 estimated, because of ice, from discharge measurements, weather records, study of recorder graph and comparison with similar studies for East Branch of Delaware River at Fish Eddy. Braced figures show mean discharge for periods included.

*Monthly discharge of Beaver Kill at Cooks Falls, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 236 square miles]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 7,110 | 154 | 722 | 3.06 | 3.53 |
| November | 1,730 | 269 | 505 | 2.14 | 2.39 |
| December | 371 | 186 | 230 | .975 | 1.12 |
| January | 200 | 130 | 184 | .780 | .90 |
| February | ..... | ..... | 417 | 1.77 | 1.84 |
| March | 3,310 | 705 | 1,420 | 6.02 | 6.94 |
| April | 2,720 | 705 | 1,300 | 5.51 | 6.15 |
| May | 1,020 | 325 | 470 | 1.99 | 2.29 |
| June | 855 | 164 | 288 | 1.22 | 1.36 |
| July | 310 | 82 | 148 | .627 | .72 |
| August | 130 | 41 | 71.6 | .303 | .35 |
| September | 910 | 48 | 164 | .695 | .78 |
| The year | 7,110 | 41 | 493 | 2.09 | 28.37 |

### WEST BRANCH OF DELAWARE RIVER AT HALE EDDY, N. Y.

LOCATION.—At highway bridge in village of 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.—611 square miles (measured on Post Route map).

RECORDS AVAILABLE.—November 15, 1912, to September 30, 1918. Records obtained at Hancock, about 7 miles below, from October 15, 1902, to December 31, 1912.

GAGE.—Vertical staff in four sections, attached to rocks near right abutment of bridge and to abutment; read by William Seeley and W. J. Shanly.

DISCHARGE MEASUREMENTS.—Made from cable, installed in July, 1916, about 400 feet below gage. Previous measurements made from highway bridge or by wading.

CHANNEL AND CONTROL.—Coarse gravel and boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.4 feet at 4 p. m. February 20 (stage-discharge relation affected by ice, discharge not determined); minimum stage recorded, 1.5 feet several times in August (discharge, 65 second-feet).

1912–1918: Maximum stage recorded,[1] 15.3 at 5 p. m. March 27, 1913 (discharge, about 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. Rating curve well defined between 300 and 18,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good; winter records fair.

*Discharge measurements of West Branch of Delaware River at Hale Eddy, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 15 | E. D. Burchard | 2.81 | 484 | Mar. 9 | E. D. Burchard | 4.71 | 1,860 |
| Dec. 21[a] | C. C. Covert | 3.14 | 225 | June 5 | J. W. Moulton | 3.56 | 883 |
| Jan. 15[a] | do | 3.53 | 270 | 5 | do | 3.58 | 875 |
| Feb. 9[a] | do | 3.20 | 212 | Aug. 14 | E. D. Burchard | 1.62 | 94 |
| Mar. 9 | E. D. Burchard | 4.72 | 1,850 | 14 | do | 1.61 | 92.5 |

[a] Measurement made through complete ice cover.

*Daily discharge, in second-feet, of West Branch of Delaware River at Hale Eddy, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 135 | 5,900 | 580 | 100 | 260 | 7,650 | 1,260 | 1,180 | 1,580 | 388 | 150 | 101 |
| 2 | 155 | 3,800 | 605 | 100 | 240 | 4,960 | 1,580 | 1,180 | 1,180 | 555 | 142 | 130 |
| 3 | 130 | 2,670 | 455 | 120 | 240 | 3,800 | 1,850 | 1,110 | 1,110 | 660 | 118 | 232 |
| 4 | 170 | 2,140 | 455 | 170 | 240 | 3,540 | 1,940 | 900 | 1,040 | 480 | 118 | 232 |
| 5 | 250 | 1,760 | 410 | 85 | 240 | 2,560 | 1,580 | 900 | 900 | 432 | 110 | 170 |
| 6 | 325 | 1,420 | 388 | 40 | 240 | 4,080 | 1,260 | 780 | 840 | 410 | 89 | 250 |
| 7 | 325 | 1,260 | 325 | 90 | 220 | 4,660 | 1,260 | 780 | 900 | 432 | 85 | 268 |
| 8 | 305 | 1,110 | 305 | 110 | 220 | 3,030 | 1,110 | 780 | 1,040 | 410 | 69 | 215 |
| 9 | 200 | 970 | 300 | 130 | 220 | 1,940 | 1,850 | 660 | 840 | 345 | 85 | 200 |
| 10 | 232 | 840 | 300 | 130 | 220 | 1,940 | 2,240 | 555 | 720 | 305 | 105 | 155 |
| 11 | 215 | 780 | 300 | 160 | 240 | 1,760 | 1,940 | 530 | 605 | 345 | 170 | 170 |
| 12 | 250 | 720 | 300 | 360 | 300 | 1,580 | 1,940 | 505 | 2,560 | 388 | 118 | 150 |
| 13 | 1,110 | 660 | 280 | 260 | 420 | 2,790 | 1,940 | 1,110 | 2,340 | 388 | 105 | 161 |
| 14 | 720 | 555 | 280 | 260 | 800 | 2,670 | 1,940 | 1,940 | 1,420 | 455 | 85 | 142 |
| 15 | 505 | 555 | 260 | 280 | 1,300 | 2,140 | 3,150 | 1,760 | 970 | 530 | 95 | 150 |
| 16 | 555 | 480 | 260 | 280 | 2,000 | 1,760 | 3,030 | 1,340 | 970 | 505 | 130 | 118 |
| 17 | 480 | 455 | 240 | 280 | 2,400 | 1,760 | 2,560 | 1,110 | 840 | 432 | 142 | 130 |
| 18 | 365 | 455 | 240 | 280 | 2,400 | 2,790 | 2,340 | 900 | 840 | 455 | 130 | 215 |
| 19 | 365 | 410 | 240 | 260 | 2,600 | 3,280 | 2,560 | 840 | 605 | 455 | 118 | 250 |
| 20 | 1,500 | 410 | 240 | 260 | 2,600 | 3,540 | 2,340 | 1,340 | 505 | 410 | 110 | 285 |
| 21 | 1,180 | 410 | 220 | 280 | 2,600 | 4,360 | 2,340 | 2,040 | 505 | 388 | 105 | 720 |
| 22 | 720 | 480 | 240 | 280 | 2,560 | 4,660 | 3,030 | 1,670 | 1,850 | 345 | 110 | 780 |
| 23 | 720 | 900 | 240 | 280 | 2,670 | 3,030 | 2,910 | 1,940 | 1,420 | 325 | 89 | 720 |
| 24 | 900 | 840 | 300 | 280 | 2,670 | 2,560 | 2,340 | 1,580 | 1,040 | 285 | 69 | 840 |
| 25 | 2,340 | 480 | 200 | 280 | 2,910 | 2,340 | 2,140 | 1,260 | 840 | 250 | 69 | 1,260 |
| 26 | 2,140 | 388 | 300 | 260 | 10,900 | 2,040 | 1,850 | 1,580 | 605 | 232 | 75 | 2,340 |
| 27 | 1,340 | 345 | 300 | 260 | 3,800 | 1,760 | 1,580 | 1,850 | 605 | 170 | 81 | 2,560 |
| 28 | 2,140 | 432 | 200 | 260 | 3,540 | 1,760 | 1,420 | 2,140 | 505 | 101 | 81 | 2,240 |
| 29 | 1,940 | 505 | 170 | 260 | ..... | 1,420 | 1,180 | 2,040 | 455 | 95 | 95 | 2,040 |
| 30 | 11,600 | 455 | 150 | 260 | ..... | 1,260 | 1,180 | 2,140 | 455 | 118 | 105 | 1,340 |
| 31 | 12,800 | ..... | 90 | 260 | ..... | 1,180 | ..... | 1,850 | ..... | 250 | 95 | ..... |

NOTE.—Discharge Dec. 9 to Feb. 21 estimated, because of ice, from discharge measurements, weathe records, study of recorder graph, and comparison with similar studies for the station at Fish Eddy.

[1] The observer states that on Oct. 10, 1893, the water rose to an elevation indicated by a nail in a tree near the gage. This nail is at gage height 20.3 feet. No data available indicating whether the present rating is applicable to this gage height.

*Monthly discharge of West Branch of Delaware River at Hale Eddy, N. Y., for the year ending Sept. 30, 1918.*

[Draining area, 611 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 12,800 | 130 | 1,490 | 2.44 | 2.81 |
| November | 5,900 | 345 | 1,090 | 1.78 | 1.99 |
| December | 605 | 90 | 296 | .484 | .56 |
| January | 360 | 40 | 217 | .355 | .41 |
| February | 10,900 | 220 | 1,750 | 2.86 | 2.98 |
| March | 7,650 | 1,180 | 2,860 | 4.68 | 5.40 |
| April | 3,150 | 1,110 | 1,990 | 3.26 | 3.64 |
| May | 2,140 | 505 | 1,300 | 2.13 | 2.46 |
| June | 2,560 | 455 | 1,000 | 1.64 | 1.83 |
| July | 660 | 95 | 366 | .599 | .69 |
| August | 170 | 69 | 105 | .172 | .20 |
| September | 2,560 | 101 | 619 | 1.01 | 1.13 |
| The year | 12,800 | 40 | 1,080 | 1.77 | 24.10 |

## 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 8 miles above Chenango River.

DRAINAGE AREA.—2,350 square miles.

RECORDS AVAILABLE.—November 13, 1912, to September 30, 1918. Records were obtained at Binghamton, 8 miles below, from July 31, 1901, to December 31, 1912.

GAGE.—Stevens water-stage recorder on left bank, just below the bridge, installed October 4, 1914. Prior to that date, staff in two sections, the lower section inclined, the upper vertical, attached to left abutment. Water-stage recorder inspected by George W. Marvin.

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

CHANNEL AND CONTROL.—Coarse gravel and boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 12.87 feet at 10.30 a. m. March 1 (discharge, about 25,900 feet), minimum stage, from water-stage recorder, 2.40 feet October 1–5 (discharge, 470 second-feet).

1912–1918: Maximum stage recorded 19.74 feet at the former station in Binghamton, at 7.40 a. m., March 2, 1902 (discharge, about 62,500 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 practically permament, except when affected by ice (a large part of the period from January to March, inclusive). Rating curve well defined between 250 and 55,000 second-feet. Operation of the water-stage recorder fairly satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table, except for days when the mean gage height would not give the discharge within 1 per cent when the discharge is the mean of 24 hourly determinations. Gage heights determined by inspecting recorder graph or by taking mean of two observations per day. Open-water records good; winter records fair.

*Discharge measurements of Susquehanna River at Conklin, N. Y., during the year ending Sept. 30, 1918.*

| Day. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Jan. 17[a] | C. C. Covert | 5.06 | 811 | Mar. 19 | C. C. Covert | 8.45 | 11,000 |
| Feb 11[a] | do | 4.25 | 959 | Apr. 26 | do | 6.12 | 5,740 |
| Mar. 3[b] | do | 11.1 | 10,600 | June. 4 | J. W. Moulton | 4.50 | 2,620 |
| 8[b] | E. D. Burchard | 9.83 | 11,200 | Aug 16 | E. D. Burchard | 2.73 | 672 |

[a] Measurement made through complete ice cover. [b] Measurement made through incomplete ice cover.

*Daily discharge, in second-feet, of Susquehanna River at Conklin, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 506 | 8,280 | 1,700 | 900 | 800 | 12,000 | 4,840 | 5,170 | 5,380 | 1,570 | 607 | 800 |
| 2 | 500 | 6,860 | 1,800 | 900 | 800 | 11,000 | 5,170 | 5,720 | 4,140 | 2,000 | 572 | 1,800 |
| 3 | 470 | 5,380 | 1,800 | 850 | 800 | 9,000 | 5,720 | 5,170 | 3,330 | 2,510 | 558 | 1,350 |
| 4 | 506 | 4,640 | 1,700 | 850 | 950 | 7,000 | 6,860 | 4,530 | 2,750 | 1,880 | 524 | 979 |
| 5 | 537 | 3,860 | 1,600 | 800 | 950 | 5,500 | 6,170 | 4,230 | 2,360 | 1,690 | 512 | 775 |
| 6 | 726 | 3,500 | 1,500 | 800 | 1,000 | 7,000 | 4,640 | 3,770 | 2,210 | 1,520 | 530 | 882 |
| 7 | 1,010 | 3,160 | 1,400 | 750 | 850 | 10,000 | 3,950 | 3,500 | 2,510 | 1,330 | 512 | 826 |
| 8 | 1,030 | 2,830 | 1,300 | 750 | 900 | 11,000 | 3,590 | 3,240 | 3,950 | 1,200 | 506 | 698 |
| 9 | 1,020 | 3,590 | 1,100 | 700 | 900 | 8,500 | 4,980 | 2,990 | 3,680 | 1,100 | 488 | 712 |
| 10 | 938 | 2,360 | 1,200 | 700 | 950 | 8,000 | 7,100 | 2,590 | 2,590 | 1,150 | 500 | 642 |
| 11 | 890 | 2,360 | 1,200 | 700 | 950 | 8,000 | 6,630 | 2,440 | 2,280 | 1,300 | 530 | 600 |
| 12 | 1,060 | 2,510 | 1,200 | 700 | 1,000 | 7,500 | 5,720 | 2,280 | 4,680 | 1,880 | 530 | 544 |
| 13 | 1,520 | 2,510 | 1,200 | 650 | 1,600 | 7,000 | 5,380 | 5,460 | 5,720 | 2,360 | 635 | 680 |
| 14 | 2,140 | 2,360 | 1,200 | 700 | 2,400 | 12,000 | 6,570 | 13,700 | 4,430 | 1,940 | 726 | 733 |
| 15 | 2,000 | 2,070 | 1,200 | 700 | 6,500 | 13,000 | 11,500 | 10,500 | 3,420 | 1,750 | 768 | 670 |
| 16 | 1,750 | 1,350 | 1,100 | 750 | 8,500 | 10,000 | 12,800 | 6,860 | 2,750 | 1,880 | 691 | 677 |
| 17 | 2,070 | 1,810 | 1,100 | 750 | 10,000 | 8,500 | 10,500 | 4,840 | 2,280 | 1,630 | 663 | 712 |
| 18 | 1,810 | 1,810 | 1,100 | 750 | 9,500 | 9,500 | 10,800 | 3,950 | 2,000 | 1,460 | 558 | 818 |
| 19 | 1,690 | 1,810 | 1,100 | 800 | 8,000 | 12,000 | 10,500 | 3,330 | 1,690 | 1,750 | 530 | 914 |
| 20 | 3,330 | 1,750 | 1,100 | 800 | 6,500 | 14,000 | 8,280 | 3,080 | 1,520 | 1,570 | 530 | 1,300 |
| 21 | 4,530 | 1,880 | 1,100 | 850 | 6,500 | 15,500 | 6,860 | 6,130 | 1,350 | 1,270 | 530 | 2,590 |
| 22 | 3,680 | 1,810 | 1,100 | 850 | 6,500 | 16,800 | 9,500 | 5,280 | 2,830 | 1,200 | 530 | 2,440 |
| 23 | 2,990 | 2,990 | 1,100 | 850 | 6,500 | 16,100 | 11,300 | 6,720 | 3,950 | 1,060 | 530 | 1,940 |
| 24 | 3,640 | 3,500 | 1,100 | 800 | 6,500 | 13,100 | 9,740 | 4,740 | 3,420 | 1,010 | 530 | 1,570 |
| 25 | 6,860 | 2,910 | 1,100 | 800 | 7,000 | 10,200 | 8,280 | 3,590 | 2,590 | 997 | 530 | 1,400 |
| 26 | 6,170 | 2,210 | 1,100 | 800 | 7,500 | 8,760 | 6,860 | 4,640 | 2,140 | 890 | 530 | 3,930 |
| 27 | 4,840 | 1,940 | 1,100 | 800 | 8,000 | 7,560 | 5,720 | 7,330 | 1,750 | 803 | 530 | 7,100 |
| 28 | 5,500 | 1,750 | 1,000 | 900 | 9,500 | 6,400 | 5,060 | 7,330 | 1,460 | 726 | 530 | 6,400 |
| 29 | 6,860 | 1,690 | 1,000 | 850 | ..... | 5,380 | 4,330 | 5,280 | 1,330 | 656 | 530 | 4,640 |
| 30 | 20,400 | 1,700 | 1,000 | 750 | ..... | 4,950 | 4,530 | 7,500 | 1,250 | 663 | 530 | 3,240 |
| 31 | 28,000 | ..... | 950 | 700 | ..... | 4,840 | ..... | 6,170 | ..... | 663 | 530 | ..... |

NOTE.—Discharge Oct. 31 to Nov. 10 estimated, for lack of gage-height record, from study of recorder graph and comparison with record of flow of Chenango River near Chenango Forks. Discharge Nov. 30 to Mar, 20 estimated, because of ice, from discharge measurements, weather records, study of recorder graph, and comparison with similar studies for Chenango River near Chenango Forks.

*Monthly discharge of Susquehanna River at Conklin, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 2,350 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 28,000 | 470 | 3,840 | 1.63 | 1.88 |
| November | 8,280 | 1,350 | 2,870 | 1.22 | 1.36 |
| December | 1,800 | 950 | 1,230 | .523 | .60 |
| January | 900 | 650 | 782 | .333 | .38 |
| February | 10,000 | 800 | 4,350 | 1.85 | 1.93 |
| March | 16,800 | 4,840 | 9,680 | 4.12 | 4.75 |
| April | 12,800 | 3,590 | 7,130 | 3.03 | 3.38 |
| May | 13,700 | 2,280 | 5,200 | 2.21 | 2.55 |
| June | 5,720 | 1,250 | 2,860 | 1.22 | 1.36 |
| July | 2,510 | 656 | 1,400 | .596 | .69 |
| August | 768 | 488 | 558 | .238 | .27 |
| September | 7,100 | 544 | 1,750 | .744 | 83 |
| The year | 28,000 | 470 | 3,460 | 1.47 | 19.98 |

### CHENANGO RIVER NEAR CHENANGO FORKS, N. Y.

LOCATION.—About 1½ miles below Tioughnioga River, 2 miles by road below Chenango Forks post office, Broome County, and 11½ miles above Binghamton and mouth.

DRAINAGE AREA.—1,380 square miles; area from which water is diverted not included. See "Diversions."

RECORDS AVAILABLE.—November 11, 1912, to September 30, 1918. Records were obtained at Binghamton July 31, 1901, to December 31, 1911.

GAGE.—Stevens water-stage recorder on the left bank on the farm of Erastus Ingraham.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet above the gage or by wading.

CHANNEL AND CONTROL.—Sand, gravel, and small cobble stones; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 10.75 feet at noon May 14 (discharge, about 22,000 second-feet); minimum stage recorded, 2.40 feet at 4 p. m. August 4 and 7 a. m. August 5 (discharge, 170 second-feet).

1901–1918: Maximum stage recorded, 12.18 feet from noon until 1 p. m. April 2, 1916 (discharge, 27,900 second-feet); minimum stage recorded, 4.6 feet at the former station in Binghamton at 8 a. m. August 29, 1909 (discharge, about 10 second-feet).

ICE.—Stage-discharge relation 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 into the Erie canal. The drainage area for Chenango River does not include these two areas.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice (a large part of the period from January to March, inclusive). Rating curve well defined between 120 and 35,000 second-feet. Operation of the water-stage recorder fairly satisfactory throughout the year. Daily discharges ascertained by applying to rating table mean daily gage height, determined by inspecting recorder graph, or for days of considerable fluctuation by averaging the hourly discharge. Open-water records good; winter records fair.

*Discharge measurements of Chenango River near Chenango Forks, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 14 | E. D. Burchard | 4.02 | 1,820 | Mar. 7[a] | E. D. Burchard | 8.93 | 10,600 |
| Dec. 16[a] | C. C. Covert | 3.94 | 838 | 22 | C. C. Covert | 9.08 | 14,800 |
| Jan. 16[b] | do | 5.06 | 640 | Apr. 26 | do | 4.72 | 3,100 |
| Feb. 11[b] | do | 4.29 | 595 | June 3 | J. W. Moulton | 3.87 | 1,680 |
| Mar. 2[a] | do | 9.35 | 8,880 | Aug. 16 | E. D. Burchard | 3.01 | 559 |

[a] Measurement made through incomplete ice cover. [b] Measurement made through complete ice cover.

*Daily discharge, in second-feet, of Chenango River near Chenango Forks, N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 740 | 8,800 | 1,560 | 650 | 380 | 8,000 | 3,550 | 3,260 | 3,160 | 3,160 | 496 | 338 |
| 2 | 750 | 5,920 | 2,180 | 600 | 380 | 9,000 | 3,860 | 2,970 | 2,100 | 1,860 | 414 | 360 |
| 3 | 740 | 4,720 | 1,630 | 550 | 380 | 7,000 | 4,280 | 2,270 | 1,620 | 1,600 | 322 | 360 |
| 4 | 750 | 3,860 | 1,520 | 550 | 400 | 4,200 | 4,500 | 2,360 | 1,700 | 1,400 | 232 | 360 |
| 5 | 1,170 | 3,160 | 1,420 | 480 | 420 | 3,400 | 3,160 | 2,100 | 1,170 | 1,200 | 246 | 360 |
| 6 | 1,430 | 2,790 | 1,280 | 460 | 440 | 6,500 | 2,520 | 1,860 | 1,300 | 950 | 398 | 360 |
| 7 | 1,250 | 2,610 | 1,080 | 440 | 480 | 10,000 | 2,180 | 1,660 | 3,260 | 850 | 398 | 360 |
| 8 | 1,030 | 2,270 | 994 | 420 | 500 | 7,500 | 2,100 | 1,550 | 2,880 | 750 | 446 | 360 |
| 9 | 1,380 | 2,020 | 806 | 400 | 550 | 7,000 | 4,970 | 1,410 | 1,760 | 700 | 338 | 360 |
| 10 | 1,310 | 1,940 | 900 | 400 | 550 | 7,000 | 4,960 | 1,380 | 1,520 | 750 | 487 | 360 |
| 11 | 1,090 | 1,780 | 1,000 | 400 | 600 | 7,500 | 4,060 | 1,570 | 1,560 | 2,000 | 555 | 360 |
| 12 | 1,040 | 1,660 | 1,100 | 420 | 700 | 8,000 | 3,750 | 1,530 | 3,810 | 2,930 | 487 | 360 |
| 13 | 2,790 | 1,520 | 1,200 | 440 | 1,100 | 10,000 | 3,550 | 3,960 | 3,580 | 1,860 | 487 | 414 |
| 14 | 2,020 | 1,380 | 1,100 | 550 | 1,600 | 17,800 | 5,030 | 5,640 | 2,440 | 1,520 | 860 | 574 |
| 15 | 1,670 | 1,280 | 1,000 | 650 | 2,600 | 16,600 | 8,800 | 3,350 | 1,860 | 1,530 | 660 | 740 |
| 16 | 3,160 | 1,270 | 950 | 650 | 3,800 | 11,800 | 7,100 | 2,440 | 1,490 | 1,300 | 438 | 772 |
| 17 | 2,270 | 1,270 | 900 | 500 | 4,200 | 10,900 | 5,430 | 1,940 | 1,270 | 1,200 | 438 | 740 |
| 18 | 1,720 | 1,180 | 850 | 480 | 3,600 | 13,400 | 7,650 | 1,660 | 1,140 | 1,400 | 438 | 882 |
| 19 | 1,670 | 1,170 | 850 | 440 | 5,500 | 11,200 | 6,440 | 1,590 | 1,010 | 1,100 | 438 | 970 |
| 20 | 5,210 | 1,140 | 850 | 360 | 9,500 | 13,000 | 4,500 | 1,300 | 904 | 900 | 438 | 1,780 |
| 21 | 4,180 | 1,120 | 800 | 360 | 9,000 | 14,200 | 4,060 | 5,680 | 827 | 750 | 414 | 2,610 |
| 22 | 2,880 | 1,300 | 850 | 380 | 8,000 | 14,200 | 5,550 | 3,160 | 2,190 | 650 | 360 | 1,600 |
| 23 | 2,360 | 1,260 | 850 | 380 | 8,000 | 12,700 | 5,430 | 3,160 | 1,940 | 574 | 322 | 1,700 |
| 24 | 3,140 | 1,410 | 850 | 380 | 7,000 | 9,400 | 4,720 | 2,520 | 1,570 | 772 | 322 | 2,180 |
| 25 | 7,060 | 1,720 | 850 | 380 | 7,000 | 7,100 | 3,860 | 2,700 | 1,250 | 882 | 322 | 3,160 |
| 26 | 5,070 | 1,340 | 850 | 380 | 10,000 | 5,800 | 3,160 | 2,790 | 1,020 | 700 | 322 | 3,960 |
| 27 | 3,650 | 1,250 | 850 | 380 | 9,500 | 4,840 | 2,790 | 4,170 | 871 | 555 | 322 | 4,060 |
| 28 | 4,900 | 1,250 | 800 | 380 | 8,500 | 3,960 | 2,360 | 3,750 | 761 | 360 | 322 | 2,610 |
| 29 | 4,840 | 1,230 | 800 | 380 | ..... | 3,550 | 2,100 | 3,160 | 710 | 622 | 322 | 1,660 |
| 30 | 11,600 | 1,250 | 750 | 380 | ..... | 3,550 | 2,700 | 2,970 | 982 | 504 | 322 | 1,350 |
| 31 | 14,200 | ..... | 700 | 380 | ..... | 3,550 | ..... | 3,350 | ..... | 504 | 322 | ..... |

NOTE.—Discharge Dec. 9 to Mar. 13 estimated, because of ice, from discharge measurements, weather records, study of recorder graph, and comparison with similar studies for Susquehanna River at Conklin. Discharge May 18 to June 10 and July 23 to Sept. 30 determined from semidaily observations on the staff gage, discharge July 3–7 and 16–22 estimated by comparison of recorder graph with that for the Susquehanna River at Conklin.

*Monthly discharge of Chenango River near Chenango Forks, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 1,380 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 14,200 | 740 | 3,130 | 2.27 | 2.62 |
| November | 8,800 | 1,120 | 2,160 | 1.57 | 1.75 |
| December | 2,180 | 700 | 1,040 | .754 | .87 |
| January | 650 | 360 | 452 | .328 | .38 |
| February | 10,000 | 380 | 3,740 | 2.71 | 2.82 |
| March | 17,800 | 3,400 | 8,790 | 6.37 | 7.34 |
| April | 8,800 | 2,100 | 4,300 | 3.12 | 3.48 |
| May | 5,680 | 1,300 | 2,680 | 1.94 | 2.24 |
| June | 3,810 | 710 | 1,720 | 1.25 | 1.40 |
| July | 3,160 | 360 | 1,160 | .841 | .97 |
| August | 860 | 232 | 409 | .296 | .34 |
| September | 4,060 | 338 | 1,200 | .870 | .97 |
| The year | 17,800 | 232 | 2,560 | 1.86 | 25.18 |

### CHEMUNG RIVER AT CHEMUNG, N. Y.

LOCATION.—At highway bridge about 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 11, 1903, to September 30, 1918.

GAGE.—Tape gage at the upstream side of the right span of the bridge; read by D. L. Orcutt.

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

CHANNEL AND CONTROL.—Sand and gravel; occasionally shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.96 feet at 7 a. m. March 15 (discharge, about 67,000 second-feet); minimum stage recorded 1.64 feet at 6.30 a. m. August 30 (discharge, 146 second-feet).

1903–1918: Maximum stage recorded, that of March 15, 1918; minimum stage recorded, 1.47 feet at 7 a. m. August 14, 1911 (discharge, about 49 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Power is developed above the station, the largest plant being at Elmira, N. Y.

ACCURACY.—Stage-discharge relation probably permanent between dates of shift; affected by ice for a large part of the period from December to March, inclusive. Rating curve well defined between 200 and 45,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water record good; winter record fair.

*Discharge measurements of Chemung River at Chemung, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Oct. 18 | E. D. Burchard | 3.17 | 1,230 | Mar. 20 | C. C. Covert | 5.91 | 5,200 |
| Dec. 24[a] | C. C. Covert | 3.46 | 1,010 | Apr. 28 | do | 4.16 | 2,500 |
| Feb. 10[b] | E. D. Burchard | 3.28 | 344 | June 1 | E. D. Burchard | 4.85 | 3,710 |
| Mar. 6 | do | 5.19 | 4,420 | July 19 | do | 2.03 | 336 |

[a] Measurement made through incomplete ice cover. [b] Measurement made through complete ice cover.

*Daily discharge, in second-feet, of Chemung River at Chemung. N. Y., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 602 | 7,850 | 870 | 700 | 400 | 25,700 | 1,860 | 2,290 | 3,650 | 630 | 299 | 168 |
| 2 | 588 | 5,760 | 960 | 650 | 380 | 18,000 | 1,860 | 2,600 | 2,600 | 581 | 282 | 192 |
| 3 | 588 | 4,650 | 870 | 650 | 360 | 10,400 | 2,000 | 2,140 | 2,000 | 339 | 255 | 208 |
| 4 | 567 | 3,840 | 1,000 | 600 | 340 | 5,760 | 3,100 | 1,860 | 1,540 | 518 | 250 | 227 |
| 5 | 710 | 3,280 | 870 | 600 | 260 | 4,440 | 2,760 | 1,540 | 1,420 | 490 | 343 | 200 |
| 6 | 1,050 | 2,760 | 790 | 600 | 280 | 5,080 | 2,140 | 1,480 | 1,250 | 470 | 288 | 200 |
| 7 | 960 | 2,440 | 750 | 600 | 320 | 10,400 | 1,860 | 1,480 | 2,760 | 451 | 451 | 208 |
| 8 | 870 | 2,290 | 670 | 600 | 320 | 4,860 | 1,730 | 1,300 | 3,100 | 401 | 354 | 338 |
| 9 | 750 | 2,000 | 490 | 550 | 320 | 4,440 | 3,280 | 1,250 | 1,730 | 377 | 321 | 288 |
| 10 | 870 | 1,860 | 500 | 550 | 340 | 7,280 | 4,240 | 1,150 | 1,300 | 377 | 299 | 266 |
| 11 | 830 | 1,730 | 700 | 550 | 380 | 8,440 | 3,460 | 1,200 | 1,200 | 377 | 389 | 208 |
| 12 | 670 | 1,540 | 850 | 650 | 480 | 5,080 | 3,460 | 1,360 | 2,000 | 407 | 630 | 200 |
| 13 | 1,730 | 1,420 | 800 | 500 | 16,800 | 11,400 | 3,280 | 1,420 | 3,100 | 438 | 532 | 232 |
| 14 | 1,860 | 1,300 | 850 | 550 | 12,400 | 38,200 | 5,530 | 2,600 | 1,860 | 389 | 401 | 255 |
| 15 | 1,300 | 1,200 | 1,000 | 600 | 12,400 | 54,900 | 20,400 | 2,440 | 1,360 | 343 | 360 | 525 |
| 16 | 1,420 | 1,150 | 1,000 | 600 | 11,000 | 12,400 | 33,100 | 1,730 | 1,150 | 343 | 302 | 383 |
| 17 | 1,600 | 1,150 | 1,000 | 600 | 3,840 | 8,440 | 23,000 | 1,480 | 960 | 332 | 288 | 432 |
| 18 | 1,200 | 1,150 | 900 | 600 | 2,600 | 6,490 | 22,500 | 1,250 | 830 | 310 | 266 | 870 |
| 19 | 1,050 | 1,050 | 900 | 600 | 2,140 | 5,300 | 12,400 | 1,150 | 750 | 299 | 236 | 1,200 |
| 20 | 16,800 | 1,000 | 850 | 550 | 19,200 | 6,000 | 7,560 | 1,050 | 670 | 299 | 204 | 1,480 |
| 21 | 7,010 | 960 | 800 | 500 | 17,600 | 6,490 | 6,000 | 2,000 | 602 | 288 | 196 | 5,760 |
| 22 | 4,240 | 1,000 | 800 | 500 | 4,440 | 6,490 | 7,560 | 2,760 | 2,000 | 282 | 184 | 2,600 |
| 23 | 3,100 | 1,200 | 850 | 500 | 3,460 | 5,760 | 6,240 | 3,460 | 3,280 | 266 | 184 | 1,730 |
| 24 | 3,650 | 1,300 | 1,000 | 480 | 3,100 | 4,440 | 5,530 | 4,440 | 2,000 | 266 | 184 | 1,300 |
| 25 | 24,300 | 1,100 | 1,100 | 500 | 3,100 | 3,650 | 4,440 | 2,760 | 1,420 | 266 | 172 | 1,050 |
| 26 | 17,200 | 710 | 1,300 | 460 | 9,700 | 3,180 | 3,460 | 3,460 | 1,100 | 432 | 168 | 1,360 |
| 27 | 16,800 | 670 | 1,500 | 460 | 11,400 | 2,760 | 2,930 | 4,860 | 870 | 419 | 154 | 2,140 |
| 28 | 18,000 | 790 | 1,300 | 440 | 6,750 | 2,440 | 2,600 | 5,300 | 750 | 343 | 157 | 1,600 |
| 29 | 13,100 | 790 | 1,000 | 460 | ..... | 2,290 | 2,140 | 3,460 | 790 | 299 | 164 | 1,300 |
| 30 | 17,200 | 830 | 800 | 420 | ..... | 2,000 | 2,140 | 8,440 | 670 | 288 | 154 | 1,000 |
| 31 | 13,800 | ..... | 750 | 400 | ..... | 2,000 | ..... | 6,240 | ..... | 277 | 161 | ..... |

NOTE.—Discharge Dec. 10 to Feb. 12 estimated, because of ice, from discharge measurements, weather records, study of recorder graph, and comparison with similar studies for near-by streams.

*Monthly discharge of Chemung River at Chemung, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 2,440 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 24,300 | 567 | 5,630 | 2.31 | 2.66 |
| November | 7,850 | 670 | 1,960 | .804 | .90 |
| December | 1,500 | 490 | 898 | .368 | .42 |
| January | 700 | 400 | 550 | .225 | .26 |
| February | 19,200 | 260 | 5,150 | 2.11 | 2.20 |
| March | 54,900 | 2,000 | 9,500 | 3.89 | 4.49 |
| April | 33,100 | 1,730 | 6,750 | 2.77 | 3.09 |
| May | 8,440 | 1,050 | 2,580 | 1.06 | 1.22 |
| June | 3,650 | 602 | 1,620 | .663 | .74 |
| July | 630 | 266 | 380 | .156 | .18 |
| August | 630 | 154 | 278 | .114 | .13 |
| September | 5,760 | 168 | 931 | .382 | .43 |
| The year | 54,900 | 154 | 3,000 | 1.23 | 16.72 |

### COHOCTON RIVER NEAR CAMPBELL, N. Y.

LOCATION.—At highway bridge known locally as Red Bridge, nearly 2 miles upstream from Campbell, Steuben County, and midway between Campbell and Savona.

DRAINAGE AREA.—Not determined.

RECORDS AVAILABLE.—July 11, 1918, to Sept. 30, 1918.

GAGE.—Standard chain gage fastened to the downstream handrail of the bridge near the left abutment; read by Miss Dora Wood.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Firmly bedded gravel, not likely to shift.

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

REGULATION.—Seasonal distribution of flow is probably not affected by operation of small reservoirs above.

COOPERATION.—Station established by the Lamoka Electric Power Co. under the direction of the United States Geological Survey; maintained by the Survey in cooperation with the power company and the State of New York.

*Discharge measurements of Cohocton River near Campbell, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| July 17 | E. D. Burchard | 0.82 | 94.2 | July 19 | E. D. Burchard | 0.85 | 106 |
| 17 | do | .82 | 91.3 | Aug. 18 | C. C. Covert | .72 | 68.8 |

*Daily gage height, in feet, of Cohocton River near Campbell, N. Y., for the year ending Sept. 30, 1918.*

| Day. | July. | Aug. | Sept. | Day. | July. | Aug. | Sept. | Day. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0.91 | 0.86 | 11 | 0.95 | 0.84 | 0.74 | 21 | 0.78 | 0.73 | 1.86 |
| 2 | | .81 | .71 | 12 | 1.03 | .83 | .70 | 22 | .75 | .71 | 1.57 |
| 3 | | .81 | .71 | 13 | .97 | .76 | .82 | 23 | .78 | .77 | 1.37 |
| 4 | | .92 | .70 | 14 | .89 | .77 | .88 | 24 | .83 | .72 | 1.31 |
| 5 | | .81 | .70 | 15 | .83 | .80 | .76 | 25 | 1.23 | .70 | 1.26 |
| 6 | | .83 | .82 | 16 | .87 | .76 | .73 | 26 | 1.04 | .72 | 1.46 |
| 7 | | .89 | .91 | 17 | .86 | .76 | .98 | 27 | .88 | .71 | 1.42 |
| 8 | | .84 | .78 | 18 | .84 | .73 | 1.10 | 28 | .91 | .70 | 1.31 |
| 9 | | .81 | .70 | 19 | .85 | .74 | 1.41 | 29 | .84 | .70 | 1.22 |
| 10 | | .85 | .68 | 20 | .83 | .72 | 2.07 | 30 | .99 | .73 | 1.13 |
| | | | | | | | | 31 | .98 | .73 | |

### MUD CREEK AT SAVONA, N. Y.

LOCATION.—On farm of L. R. Travis in Savona, Steuben County, half a mile above mouth.

DRAINAGE AREA.—Not determined.

RECORDS AVAILABLE.—July 8 to September 30, 1918.

GAGE.—Vertical staff fastened to timber planted in concrete at the water's edge on the left bank 150 feet upstream from farm bridge; read by L. R. Travis.

DISCHARGE MEASUREMENTS.—Made by wading at the gage or from farm bridge.

CHANNEL AND CONTROL.—Fairly well compacted gravel; not likely to shift. Considerable grass grows in stream bed. Control probably submerged by backwater from the Cohocton River during extreme floods.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Operation of grist mills at Bradford, 7 miles upstream, causes some diurnal fluctuation in flow.

COOPERATION.—Station established by the Lamoka Electric Power Co. under the direction of the United States Geological Survey; maintained by the Survey in cooperation with the power company and the State of New York.

*Discharge measurements of Mud Creek at Savona, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* |
| July 19 | E. D. Burchard | 3.53 | 18.4 |
| Aug. 18 | C. C. Covert | 3.49 | 14.3 |

*Daily gage height, in feet, of Mud Creek at Savona, N. Y., for the year ending Sept. 30, 1918.*

| Day. | July. | Aug. | Sept. | Day. | July. | Aug. | Sept. | Day. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 3.54 | 3.60 | 11 | 3.59 | 3.52 | 3.47 | 21 | 3.56 | 3.52 | 4.05 |
| 2 | ..... | 3.52 | 3.46 | 12 | 3.66 | 3.50 | 3.47 | 22 | 3.50 | 3.52 | 3.70 |
| 3 | ..... | 3.50 | 3.48 | 13 | 3.60 | 3.50 | 3.58 | 23 | 3.51 | 3.66 | 3.55 |
| 4 | ..... | 3.58 | 3.53 | 14 | 3.62 | 3.62 | 3.48 | 24 | 3.72 | 3.48 | 3.56 |
| 5 | ..... | 3.54 | 3.50 | 15 | 3.54 | 3.51 | 3.42 | 25 | 4.04 | 3.46 | 3.56 |
| 6 | ..... | 3.58 | 3.48 | 16 | 3.54 | 3.60 | 3.40 | 26 | 3.76 | 3.47 | 3.76 |
| 7 | ..... | 3.56 | 3.50 | 17 | 3.54 | 3.63 | 3.50 | 27 | 3.60 | 3.60 | 3.68 |
| 8 | 3.54 | 3.52 | 3.52 | 18 | 3.54 | 3.50 | 3.59 | 28 | 3.54 | 3.49 | 3.59 |
| 9 | 3.56 | 3.54 | 3.47 | 19 | 3.52 | 3.48 | 3.47 | 29 | 3.52 | 3.50 | 3.57 |
| 10 | 3.63 | 3.62 | 3.48 | 20 | 3.58 | 3.50 | 4.26 | 30 | 3.62 | 3.50 | 3.48 |
| | | | | | | | | 31 | 2.62 | 3.48 | ..... |

### TIOGA RIVER NEAR ERWINS, N. Y.

LOCATION.—At highway bridge, a quarter of a mile below mouth of Canisteo River, near village of Erwins, Steuben County, and 3 miles above junction of Tioga and Cohocton rivers to form Chemung River at town of Painted Post.

DRAINAGE AREA.—1,320 square miles (furnished by Robert O. Hayt).

RECORDS AVAILABLE.—July 12, 1918, to September 30, 1918.

GAGE.—Chain near left abutment, downstream side of bridge; graduated and read to quarter-tenths twice daily by Miss Jane Sexton.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading near the control, 100 yards downstream.

CHANNEL AND CONTROL.—Well-compacted gravel, probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 6.00 feet at 5.30 p. m. September 20 (discharge, 6,160 second-feet); minimum stage recorded, 0.92 foot August 30 (discharge, 54 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—There is no considerable storage to interfere with the seasonal flow.

ACCURACY.—Stage-discharge relation believed to be fairly permanent. Rating curve well defined for stages recorded.

COOPERATION.—Station established by the Lamoka Power Co., under the direction of the United States Geological Survey. Maintained by the Survey in cooperation with the power company and the State of New York.

*Discharge measurements of Tioga River near Erwins, N. Y., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* |
| July 17 | E. D. Burchard | 1.15 | 125 |
| 17 | ....do | 1.15 | 124 |
| Aug. 17 | C. C. Covert | 1.28 | 143 |

*Daily discharge, in second-feet, of Tioga River near Erwins, N. Y., for the year ending Sept. 30, 1918.*

| Day. | July. | Aug. | Sept. | Day. | July. | Aug. | Sept. | Day. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 138 | 50 | 11 | ..... | 548 | 106 | 21 | 118 | 106 | 2,340 |
| 2 | ..... | 112 | 90 | 12 | 124 | 513 | 112 | 22 | 127 | 109 | 1,380 |
| 3 | ..... | 82 | 121 | 13 | 142 | 306 | 146 | 23 | 118 | 103 | 980 |
| 4 | ..... | 97 | 100 | 14 | 130 | 265 | 432 | 24 | 112 | 88 | 820 |
| 5 | ..... | 146 | 121 | 15 | 118 | 220 | 294 | 25 | 106 | 80 | 660 |
| 6 | ..... | 562 | 112 | 16 | 100 | 180 | 220 | 26 | 154 | 70 | 980 |
| 7 | ..... | 200 | 240 | 17 | 109 | 180 | 390 | 27 | 138 | 65 | 1,240 |
| 8 | ..... | 190 | 205 | 18 | 118 | 138 | 1,100 | 28 | 112 | 60 | 940 |
| 9 | 79 | 154 | 170 | 19 | 97 | 121 | 900 | 29 | 82 | 60 | 700 |
| 10 | ..... | 230 | 121 | 20 | 106 | 109 | 3,920 | 30 | 94 | 54 | 590 |
| | | | | | | | | 31 | 94 | 50 | ..... |

NOTE.—Daily discharge estimated because of no gage-height record Aug. 25 to 29 and 31 to Sept. 3, inclusive.

*Monthly discharge of Tioga River near Erwins, N. Y., for the year ending Sept. 30, 1918.*

[Drainage area, 1,320 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| August | 562 | 50 | 172 | 0.130 | 0.15 |
| September | 3,920 | 50 | 653 | .495 | .55 |

## PATUXENT RIVER BASIN.

### PATUXENT RIVER NEAR BURTONSVILLE, MD.

LOCATION.—At Columbia turnpike bridge, 1½ miles northeast of Burtonsville, Montgomery County, and about 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, 1918.

GAGE.—Stevens water-stage recorder referred to a staff gage in three sections on left bank about 80 feet below highway bridge; prior to July 23, 1914, a vertical staff fastened to left side of bridge pier; datum of recorder is 1.29 feet below that of gage on pier. Recorder inspected by Columbus Brashears and 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 is a flat gravel bar about 300 feet below bridge. Current is swift under bridge, but sluggish below bridge to control.

EXTREMES OF DISCHARGE.—Maximum stage during year, 8.68 feet at 12.30 a. m. January 14 (discharge, 2,190 second-feet); minimum stage, 1.69 feet August 25, 26, 27, and 28 (discharge, 47 second-feet).

1911–1918: Maximum stage recorded, 14.6 feet about 9 a. m. January 12, 1915 (discharge, from poorly defined rating curve, 5,100 second-feet); minimum stage, 0.18 foot August 25, 1911 (discharge, 6 second-feet).

ICE.—Stage-discharge relation affected by ice during severe winters only.

ACCURACY.—Stage-discharge relation affected by ice December 10 to January 11, January 12–14, and January 20 to February 12. Rating curve well defined between 50 and 200 second-feet and fairly well defined above 200 second-feet. Operation of water-stage recorder satisfactory throughout the year, except for period November 7–10. Daily discharge ascertained by use of discharge integrator, by hourly method, and by use of mean dailyg age height obtained by inspecting recorder graph. Records excellent.

*Discharge measurements of Patuxent River near Burtonsville, Md., during the year ending Sept. 30, 1918.*

| Date. | Made by— | Gage height. | Discharge. | Date. | Made by— | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|
| | | *Feet.* | *Sec.-ft.* | | | *Feet.* | *Sec.-ft.* |
| Nov. 6 | G. C. Stevens | 2.13 | 72.0 | Dec. 17 | G. C. Stevens | [a] 2.66 | 62.3 |
| 12 | Parker and Horton | 2.06 | 63.4 | Apr. 6 | Stevens and Hoyt | 2.20 | 87.3 |

[a] Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Patuxent River near Burtonsville, Md., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 55 | 76 | 75 | 19 | 84 | 117 | 100 | 200 | 103 | 63 | 53 | 162 |
| 2 | 54 | 72 | 55 | 23 | 76 | 103 | 97 | 151 | 144 | 58 | 45 | 49 |
| 3 | 53 | 76 | 50 | 23 | 76 | 98 | 94 | 131 | 162 | 51 | 43 | 41 |
| 4 | 51 | 76 | 48 | 23 | 69 | 92 | 94 | 126 | 92 | 51 | 41 | 39 |
| 5 | 50 | 72 | 45 | 23 | 62 | 177 | 87 | 122 | 83 | 50 | 42 | 38 |
| 6 | 49 | 72 | 43 | 23 | 69 | 130 | 84 | 112 | 78 | 49 | 42 | 43 |
| 7 | 49 | 70 | 42 | 23 | 108 | 153 | 81 | 165 | 89 | 47 | 40 | 43 |
| 8 | 49 | 67 | 55 | 28 | 369 | 117 | 82 | 102 | 80 | 45 | 270 | 38 |
| 9 | 51 | 63 | 62 | 23 | 270 | 107 | 229 | 94 | 72 | 44 | 55 | 42 |
| 10 | 55 | 59 | 92 | 28 | 190 | 126 | 1,050 | 107 | 70 | 41 | 47 | 40 |
| 11 | 55 | 55 | 100 | 49 | 357 | 87 | 607 | 260 | 76 | 41 | 47 | 36 |
| 12 | 53 | 62 | 84 | 1,810 | 844 | 92 | 468 | 108 | 75 | 41 | 95 | 37 |
| 13 | 78 | 65 | 69 | 291 | 1,620 | 121 | 520 | 103 | 68 | 121 | 171 | 37 |
| 14 | 56 | 63 | 69 | 219 | 405 | 312 | 393 | 117 | 63 | 78 | 72 | 37 |
| 15 | 53 | 65 | 69 | 190 | 1,150 | 346 | 270 | 92 | 66 | 53 | 62 | 32 |
| 16 | 50 | 65 | 62 | 190 | 357 | 162 | 219 | 87 | 65 | 47 | 40 | 34 |
| 17 | 49 | 65 | 69 | 200 | 171 | 126 | 200 | 84 | 62 | 43 | 32 | 32 |
| 18 | 47 | 65 | 62 | 200 | 148 | 110 | 180 | 80 | 61 | 44 | 34 | 186 |
| 19 | 49 | 63 | 55 | 190 | 323 | 97 | 162 | 76 | 59 | 47 | 36 | 84 |
| 20 | 121 | 62 | 62 | 171 | 944 | 89 | 157 | 72 | 56 | 47 | 34 | 62 |
| 21 | 89 | 61 | 62 | 171 | 229 | 700 | 638 | 126 | 56 | 41 | 30 | 162 |
| 22 | 69 | 63 | 62 | 162 | 144 | 430 | 393 | 577 | 68 | 38 | 28 | 69 |
| 23 | 82 | 61 | 49 | 171 | 162 | 200 | 239 | 131 | 63 | 35 | 26 | 50 |
| 24 | 468 | 55 | 55 | 162 | 162 | 151 | 200 | 108 | 59 | 35 | 24 | 47 |
| 25 | 135 | 49 | 43 | 144 | 153 | 157 | 201 | 103 | 59 | 38 | 22 | 41 |
| 26 | 76 | 47 | 43 | 126 | 323 | 130 | 177 | 102 | 62 | 36 | 22 | 41 |
| 27 | 92 | 49 | 32 | 108 | 153 | 117 | 162 | 190 | 63 | 35 | 22 | 41 |
| 28 | 323 | 49 | 38 | 108 | 124 | 114 | 153 | 97 | 61 | 35 | 22 | 41 |
| 29 | 108 | 55 | 15 | 92 | ..... | 108 | 146 | 260 | 56 | 36 | 40 | 36 |
| 30 | 507 | 56 | 23 | 100 | ..... | 105 | 149 | 124 | 56 | 74 | 47 | 37 |
| 31 | 153 | ..... | 19 | 92 | ..... | 102 | ..... | 146 | ..... | 76 | 171 | ..... |

NOTE.—Discharge estimated Nov. 7–10, account no record. Dec. 10 to Jan. 11, Jan. 15–17, and Jan. 20 to Feb. 12, discharge estimated as in table, because of ice, from discharge measurement study of gage-height graph, and weather records.

*Monthly discharge of Patuxent River near Burtonsville, Md., for the year ending Sept. 30, 1918.*

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 507 | 47 | 104 | 0.819 | 0.94 |
| November | 76 | 47 | 62.6 | .494 | .55 |
| December | 100 | 15 | 55.1 | .434 | .50 |
| January | 1,810 | 19 | 167 | 1.31 | 1.51 |
| February | 1,620 | 62 | 326 | 2.57 | 2.68 |
| March | 700 | 87 | 164 | 1.29 | 1.49 |
| April | 1,050 | 81 | 254 | 2.00 | 2.23 |
| May | 577 | 72 | 136 | 1.07 | 1.23 |
| June | 162 | 56 | 74.2 | .584 | .65 |
| July | 121 | 35 | 49.7 | .391 | .45 |
| August | 270 | 22 | 56.6 | .446 | .51 |
| September | 186 | 32 | 55.9 | .440 | .49 |
| The year | 1,810 | 15 | 124 | .976 | 13.23 |

## POTOMAC RIVER BASIN.

### POTOMAC RIVER AT POINT OF ROCKS, MD.

LOCATION.—At steel highway bridge at Point of Rocks, Frederick County, about 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, 1918.

GAGE.—Chain, attached to downstream side of left span of bridge; read by G. H. Hickman. 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 the bridge.

CHANNEL AND CONTROL.—Practically permanent. The control is a ledge a few hundred feet below the station, the ledge extending completely across the river except for one relatively unimportant channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.1 feet at 6 p. m. April 22 (discharge, 115,000 second-feet); minimum stage recorded, 0.49 foot at 3 p. m. October 1 (discharge, 770 second-feet).

1895–1918: 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).

The crest of the flood of June 2, 1889, as determined by the U. S. 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. The average discharge of the canal is 75 to 100 second-feet. The discharge in not included in the following tables:

REGULATION.—Fluctuation at extremely low stages has been noted and is probably caused by the operation of power plants on the upper Potomac and tributaries.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice from December 12 to February 11. Rating curve well defined except at extremely low water. Gage read to hundredths once daily; during high water read oftener. Daily discharge ascertained by applying daily gage height to rating table. Records excellent except those for extremely low stages, which are fair.

The following discharge measurement was made by G. C. Stevens and M. I. Walters:
October 3, 1918: Gage height, 0.70 foot; discharge, 1,120 second-feet.

*Daily discharge, in second-feet, of Potomac River at Point of Rocks, Md., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 770 | 18,600 | 1,990 | ..... | 20,400 | 5,020 | 16,300 | 5,020 | 2,940 | 3,240 | 2,940 |
| 2 | 1,030 | 12,500 | 2,250 | ..... | 19,800 | 6,520 | 14,600 | 5,750 | 2,660 | 2,940 | 2,800 |
| 3 | 1,190 | 9,070 | 2,250 | ..... | 14,100 | 5,750 | 11,000 | 5,020 | 3,240 | 3,540 | 2,380 |
| 4 | 1,060 | 6,920 | 2,520 | ..... | 16,300 | 5,750 | 9,070 | 4,840 | 4,040 | 3,390 | 3,700 |
| 5 | 945 | 5,380 | 2,660 | ..... | 15,200 | 5,380 | 8,620 | 4,840 | 4,840 | 3,240 | 3,240 |
| 6 | 835 | 4,840 | 2,380 | ..... | 15,700 | 4,500 | 8,180 | 5,380 | 4,500 | 2,520 | 2,940 |
| 7 | 1,510 | 4,500 | 2,250 | ..... | 10,000 | 4,170 | 7,330 | 4,500 | 4,670 | 2,800 | 3,700 |
| 8 | 1,290 | 4,010 | 2,120 | ..... | 9,070 | 4,010 | 6,520 | 4,170 | 4,500 | 3,090 | 3,640 |
| 9 | 1,190 | 4,010 | 2,120 | ..... | 9,070 | 7,330 | 6,130 | 2,520 | 4,170 | 3,390 | 3,590 |
| 10 | 1,100 | 3,090 | 2,250 | ..... | 9,530 | 29,400 | 5,750 | 2,380 | 4,010 | 2,660 | 3,090 |
| 11 | 835 | 3,090 | 2,250 | ..... | 12,000 | 60,600 | 6,520 | 2,520 | 4,010 | 2,250 | 2,940 |
| 12 | 945 | 3,540 | ..... | 63,900 | 11,000 | 50,800 | 6,130 | 2,940 | 3,860 | 2,120 | 2,800 |
| 13 | 1,220 | 2,940 | ..... | 105,000 | 13,500 | 27,500 | 5,380 | 2,800 | 3,090 | 2,940 | 2,380 |
| 14 | 1,260 | 2,800 | ..... | 80,500 | 15,700 | 35,600 | 6,920 | 2,660 | 3,240 | 3,090 | 2,120 |
| 15 | 1,060 | 2,660 | ..... | 68,000 | 43,000 | 93,000 | 5,750 | 2,520 | 3,700 | 3,540 | 1,990 |
| 16 | 900 | 2,800 | ..... | 48,400 | 28,800 | 111,000 | 5,750 | 2,380 | 3,390 | 3,090 | 2,120 |
| 17 | 1,260 | 2,940 | ..... | 40,000 | 26,100 | 97,100 | 5,380 | 2,250 | 3,240 | 3,240 | 2,250 |
| 18 | 1,220 | 1,910 | ..... | 33,500 | 19,800 | 93,800 | 4,840 | 2,520 | 2,940 | 2,940 | 2,520 |
| 19 | 1,100 | 1,540 | ..... | 23,600 | 13,500 | 80,500 | 4,190 | 2,520 | 2,800 | 2,800 | 4,500 |
| 20 | 1,340 | 1,390 | ..... | 30,100 | 10,500 | 54,000 | 3,540 | 2,940 | 2,520 | 2,660 | 6,520 |
| 21 | 1,030 | 1,260 | ..... | 64,700 | 9,530 | 37,100 | 3,240 | 2,800 | 2,940 | 2,940 | 6,920 |
| 22 | 945 | 1,510 | ..... | 55,600 | 11,000 | 110,000 | 2,940 | 3,240 | 2,520 | 2,520 | 6,720 |
| 23 | 965 | 1,680 | ..... | 38,500 | 8,620 | 95,400 | 3,540 | 3,860 | 2,520 | 2,380 | 6,520 |
| 24 | 11,500 | 1,790 | ..... | 21,100 | 9,070 | 35,600 | 3,090 | 3,090 | 2,380 | 2,520 | 5,380 |
| 25 | 22,900 | 2,120 | ..... | 9,530 | 12,000 | 33,500 | 2,660 | 2,800 | 2,120 | 2,380 | 5,020 |
| 26 | 18,600 | 1,940 | ..... | 22,300 | 6,520 | 28,800 | 3,540 | 2,660 | 2,940 | 2,250 | 5,750 |
| 27 | 9,530 | 1,540 | ..... | 33,500 | 6,520 | 20,400 | 3,090 | 2,520 | 3,240 | 2,660 | 5,380 |
| 28 | 7,750 | 1,290 | ..... | 19,800 | 9,070 | 22,900 | 2,940 | 2,660 | 2,940 | 2,940 | 5,020 |
| 29 | 7,330 | 1,480 | ..... | ..... | 6,520 | 15,700 | 3,090 | 2,520 | 3,090 | 3,240 | 4,760 |
| 30 | 15,200 | 1,760 | ..... | ..... | 4,500 | 14,100 | 4,330 | 2,730 | 4,330 | 3,240 | 4,500 |
| 31 | 30,100 | ..... | ..... | ..... | 5,750 | ..... | 5,380 | ..... | 2,660 | 3,700 | ..... |

NOTE.—Discharge estimated, on account of ice, from a study of weather records and daily gage-height graph as follows: Dec. 12–31, 2,700 second-feet; Jan. 1–31, 2,500 second-feet; Feb. 1–11, 3,200 second-feet. Discharge interpolated May 5 and 19, June 30, July 4, and Sept. 8, 22, and 29; discharge estimated Apr. 9.

*Monthly discharge of Potomac River at Point of Rocks, Md., for the year ending Sept. 30, 1918.*

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 30,100 | 770 | 4,770 | 0.494 | 0.57 |
| November | 18,600 | 1,260 | 3,830 | .397 | .44 |
| December | ..... | ..... | 2,550 | .264 | .30 |
| January | ..... | ..... | 2,500 | .259 | .30 |
| February | ..... | ..... | 28,300 | 2.93 | 3.05 |
| March | 43,000 | 4,500 | 13,600 | 1.41 | 1.63 |
| April | 111,000 | 4,010 | 39,800 | 4.12 | 4.60 |
| May | 16,300 | 2,660 | 5,990 | .621 | .72 |
| June | 5,750 | 2,250 | 3,310 | .343 | .38 |
| July | 4,840 | 2,120 | 3,360 | .348 | .40 |
| August | 3,700 | 2,120 | 2,910 | .302 | .35 |
| September | 6,920 | 1,990 | 3,940 | .408 | .46 |
| The year | 111,000 | 770 | 9,390 | .973 | 13.20 |

### MONOCACY RIVER NEAR FREDERICK, MD.

LOCATION.—At Ceresville bridge on toll road leading from Frederick, Frederick County, to Mount Pleasant, about 3,000 feet below Tuscarora Creek (entering from right), 2,000 feet above Israel Creek (entering from left), and 3 miles northeast of Frederick.

DRAINAGE AREA.—660 square miles.

RECORDS AVAILABLE.—August 4, 1896, to September 30, 1918.

GAGE.—Chain attached to downstream side of right span of bridge; read by Eugene L. Derr.

DISCHARGE MEASUREMENTS.—Made from the 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 the year, 22.1 feet at 5.20 p. m. February 20 (discharge, 14,300 second-feet); minimum stage recorded, 3.85 feet September 16 and 17 (discharge, 54 second-feet).

1896–1918: 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 from December 9 to February 11. Rating curve well defined between 200 and 15,000 second-feet. Discharge measurements made during high water of March, 1917, indicate that rating curves used prior to 1916 gave results about 20 per cent too large at high stages. Gage read to half-tenths once daily; oftener during high water. Daily discharge ascertained by applying gage height to rating table. Records good.

The following discharge measurement was made by G. C. Stevens:

January 3, 1918: Gage height, 5.45 feet; discharge, 166 second-feet. Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Monocacy River near Frederick, Md., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 204 | 3,060 | 326 | ..... | 2,560 | 454 | 932 | 494 | 218 | 310 | 247 |
| 2 | 178 | 1,640 | 326 | ..... | 1,910 | 415 | 882 | 415 | 218 | 191 | 165 |
| 3 | 178 | 1,260 | 310 | ..... | 1,710 | 378 | 784 | 882 | 191 | 128 | 140 |
| 4 | 178 | 1,030 | 294 | ..... | 1,320 | 343 | 667 | 474 | 178 | 116 | 128 |
| 5 | 178 | 882 | 262 | ..... | 1,710 | 415 | 600 | 343 | 165 | 191 | 116 |
| 6 | 178 | 784 | 262 | ..... | 1,640 | 378 | 535 | 343 | 152 | 1,200 | 116 |
| 7 | 178 | 736 | 262 | ..... | 1,450 | 415 | 535 | 310 | 140 | 578 | 140 |
| 8 | 165 | 644 | 262 | ..... | 1,320 | 982 | 494 | 310 | 152 | 191 | 140 |
| 9 | 152 | 600 | ..... | ..... | 1,450 | 3,060 | 474 | 278 | 128 | 165 | 93 |
| 10 | 152 | 514 | ..... | ..... | 1,570 | 7,010 | 434 | 278 | 140 | 152 | 93 |
| 11 | 152 | 494 | ..... | ..... | 1,450 | 8,830 | 434 | 247 | 128 | 204 | 93 |
| 12 | 152 | 474 | ..... | 1,320 | 1,260 | 3,590 | 415 | 247 | 128 | 191 | 93 |
| 13 | 232 | 454 | ..... | 4,820 | 982 | 5,580 | 434 | 218 | 191 | 165 | 93 |
| 14 | 232 | 434 | ..... | 9,390 | 3,440 | 4,390 | 434 | 232 | 326 | 152 | 72 |
| 15 | 218 | 396 | ..... | 8,010 | 3,590 | 3,830 | 415 | 218 | 218 | 140 | 63 |
| 16 | 204 | 378 | ..... | 9,480 | 1,570 | 2,700 | 494 | 218 | 191 | 128 | 54 |
| 17 | 178 | 360 | ..... | 3,140 | 1,320 | 2,270 | 415 | 191 | 152 | 116 | 54 |
| 18 | 178 | 343 | ..... | 2,920 | 1,140 | 1,570 | 378 | 204 | 152 | 128 | 116 |
| 19 | 165 | 326 | ..... | 2,120 | 982 | 1,570 | 360 | 191 | 140 | 93 | 116 |
| 20 | 360 | 294 | ..... | 13,700 | 882 | 1,450 | 310 | 204 | 140 | 72 | 165 |
| 21 | 474 | 294 | ..... | 8,830 | 832 | 5,410 | 326 | 191 | 140 | 72 | 278 |
| 22 | 474 | 343 | ..... | 5,500 | 982 | 5,240 | 5,580 | 360 | 128 | 93 | 378 |
| 23 | 474 | 326 | ..... | 1,840 | 832 | 2,410 | 1,030 | 310 | 116 | 72 | 310 |
| 24 | 4,730 | 326 | ..... | 1,570 | 736 | 1,710 | 622 | 262 | 116 | 72 | 218 |
| 25 | 8,280 | 326 | ..... | 2,990 | 713 | 1,640 | 556 | 218 | 140 | 72 | 165 |
| 26 | 3,060 | 310 | ..... | 11,800 | 600 | 1,200 | 494 | 204 | 535 | 72 | 140 |
| 27 | 1,030 | 294 | ..... | 4,070 | 535 | 1,090 | 434 | 178 | 378 | 72 | 93 |
| 28 | 4,150 | 278 | ..... | 2,990 | 556 | 982 | 378 | 191 | 165 | 93 | 93 |
| 29 | 1,450 | 262 | ..... | ..... | 494 | 882 | 600 | 165 | 140 | 128 | 93 |
| 30 | 12,400 | 262 | ..... | ..... | 494 | 784 | 415 | 218 | 116 | 191 | 72 |
| 31 | 4,310 | ..... | ..... | ..... | 454 | ..... | 982 | ..... | 713 | 191 | ..... |

NOTE.—Discharge estimated, on account of ice, from discharge measurement, weather records, and a study of gage-height graph, as follows: Dec. 9–31, 270 second-feet; Jan. 1–12, 185 second-feet; Jan. 13–25, 590 second-feet; Jan. 26–Feb. 11, 460 second-feet.

*Monthly discharge of Monocacy River near Frederick, Md., for the year ending Sept. 30, 1918.*

| Month. | Discharge in second-feet. | | | | Run-off in inches. |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 12,400 | 152 | 1,440 | 2.18 | 2.51 |
| November | 3,060 | 262 | 604 | .915 | 1.02 |
| December | ..... | ..... | 275 | .417 | .48 |
| January | ..... | ..... | 408 | .618 | .71 |
| February | 13,700 | ..... | 3,560 | 5.39 | 5.61 |
| March | 3,590 | 454 | 1,310 | 1.98 | 2.28 |
| April | 8,830 | 343 | 2,370 | 3.59 | 4.00 |
| May | 5,580 | 310 | 705 | 1.07 | 1.23 |
| June | 882 | 165 | 286 | .433 | .48 |
| July | 713 | 116 | 198 | .300 | .35 |
| August | 1,200 | 72 | 185 | .280 | .32 |
| September | 378 | 54 | 138 | .209 | .23 |
| The year | 13,700 | 54 | 935 | 1.42 | 19.22 |

## 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, 1918.

GAGE.—Vertical staff on right bank; 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 the cable. All three gages at practically the same location and referred to same datum. Gage read by Charles Perry.

DISCHARGE MEASUREMENTS.—Made from cable at gage. At extremely low water measurements can be made by wading or from a bridge over the power canal below the dam.

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 during the year, 11.45 feet at noon April 11 (discharge, 38,500 second-feet); minimum stage recorded, 0.73 foot at 3 p. m. September 17 (discharge, 191 second-feet).

1907–1918: Maximum stage recorded, 11.45 feet at noon April 11, 1918 (discharge, 38,500 second-feet); minimum stage recorded, 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. Rating curve well defined except for extremely high and low stages. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for winter months. Comparison with records for other stations indicates that the winter records of the Rappahannock are not subject to large errors.

*Daily discharge, in second-feet, of Rappahannock River near Fredericksburg, Va., for the year ending Sept. 30, 1918.*

| Day. | Oct. | Nov. | Dec. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 342 | 2,920 | 1,040 | ..... | 2,080 | 1,220 | 3,100 | 1,480 | 1,420 | 729 | 2,400 |
| 2 | 282 | 2,080 | 860 | ..... | 1,920 | 1,220 | 2,740 | 1,560 | 1,220 | 494 | ..... |
| 3 | 270 | 1,770 | 616 | ..... | 1,920 | 1,220 | 2,570 | 2,570 | 750 | 410 | ..... |
| 4 | 260 | 1,420 | 569 | ..... | 1,700 | 1,220 | 2,080 | 2,920 | 687 | 440 | ..... |
| 5 | 245 | 1,280 | 518 | ..... | 1,770 | 1,220 | 1,920 | 2,570 | 645 | 470 | ..... |
| 6 | 276 | 1,160 | 502 | ..... | 2,740 | 1,160 | 1,770 | 1,840 | 578 | 395 | ..... |
| 7 | 282 | 975 | 470 | ..... | 3,100 | 1,100 | 1,700 | 1,560 | 598 | 355 | ..... |
| 8 | 250 | 918 | 534 | ..... | 2,570 | 1,040 | 1,480 | 1,420 | 560 | 2,920 | ..... |
| 9 | 294 | 918 | 1,420 | ..... | 2,920 | 1,220 | 1,480 | 1,420 | 502 | 2,080 | ..... |
| 10 | 329 | 750 | 918 | ..... | 2,400 | 32,500 | 1,480 | 729 | 502 | 750 | ..... |
| 11 | 455 | 740 | 510 | ..... | 2,000 | 38,500 | 1,420 | 636 | 440 | 1,280 | 355 |
| 12 | 410 | 708 | 425 | ..... | 1,770 | 15,900 | 1,480 | 740 | 425 | 2,740 | 342 |
| 13 | 329 | 698 | ..... | ..... | 1,840 | 6,770 | 1,480 | 645 | 455 | 2,570 | 329 |
| 14 | 369 | 656 | ..... | ..... | 5,910 | 5,630 | 1,770 | 607 | 626 | 2,920 | 311 |
| 15 | 342 | 645 | ..... | ..... | 4,610 | 5,630 | 1,700 | 550 | 805 | 1,620 | 355 |
| 16 | 329 | 626 | ..... | ..... | 3,290 | 4,610 | 1,560 | 588 | 542 | 975 | 311 |
| 17 | 305 | 626 | ..... | ..... | 2,920 | 3,920 | 1,420 | 542 | 455 | 750 | 195 |
| 18 | 305 | 588 | ..... | ..... | 2,400 | 3,920 | 1,420 | 502 | 425 | 750 | 369 |
| 19 | 276 | 569 | ..... | ..... | 2,240 | 3,920 | 1,420 | 486 | 494 | 349 | 1,770 |
| 20 | 478 | 550 | ..... | ..... | 1,920 | 4,140 | 1,350 | 470 | 502 | 676 | 2,240 |
| 21 | 666 | 534 | ..... | ..... | 1,920 | 21,600 | 1,100 | 470 | 470 | 607 | 2,920 |
| 22 | 534 | 550 | ..... | ..... | 2,740 | 23,100 | 975 | 502 | 470 | 486 | 2,570 |
| 23 | 418 | 569 | ..... | ..... | 2,240 | 8,010 | 918 | 542 | 425 | 382 | 2,080 |
| 24 | 2,240 | 550 | ..... | ..... | 2,000 | 4,140 | 860 | 636 | 355 | 362 | 1,560 |
| 25 | 2,570 | 569 | ..... | ..... | 2,080 | 4,370 | 918 | 687 | 395 | 480 | 1,350 |
| 26 | 1,350 | 494 | ..... | ..... | 2,080 | 4,370 | 860 | 805 | 410 | 598 | 1,220 |
| 27 | 918 | 462 | ..... | 2,740 | 1,620 | 3,700 | 860 | 2,080 | 329 | 455 | 1,160 |
| 28 | 3,920 | 486 | ..... | 918 | 1,480 | 3,290 | 805 | 2,000 | 362 | 349 | 831 |
| 29 | 2,080 | 588 | ..... | ..... | 1,350 | 3,100 | 918 | 2,000 | 230 | 3,290 | 502 |
| 30 | 4,850 | 598 | ..... | ..... | 1,280 | 2,920 | 1,350 | 1,840 | 204 | 2,240 | 369 |
| 31 | 8,340 | ..... | ..... | ..... | 1,280 | ..... | 1,420 | ..... | 1,480 | 1,920 | ..... |

NOTE.—Daily discharge estimated, on account of ice, from a study of gage heights, weather records, and comparison with near-by streams, as follows: Dec. 13–31, 400 second-feet; Jan. 1–31, 1,200 second-feet; Feb. 1–11, 3,300 second-feet; and on account of no gage readings, Feb. 12–26, 6,800 second-feet, and Sept. 2–10, 800 second-feet. Discharge interpolated Aug. 25 and Sept. 28.

*Monthly discharge of Rappahannock River near Fredericksburg, Va., for the year ending Sept. 30, 1918.*

| Month. | Discharge in second-feet. | | | | Run-off (depth in inches on drainage area). |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | |
| October | 8,340 | 245 | 1,110 | 0.698 | 0.80 |
| November | 2,920 | 462 | 866 | .545 | .61 |
| December | ..... | ..... | 516 | .325 | .37 |
| January | ..... | ..... | 1,200 | .755 | .87 |
| February | ..... | ..... | 5,200 | 3.27 | 3.40 |
| March | 5,910 | 1,280 | 2,320 | 1.46 | 1.68 |
| April | 38,500 | 1,040 | 7,160 | 4.50 | 5.02 |
| May | 3,100 | 805 | 1,490 | .937 | 1.08 |
| June | 2,920 | 470 | 1,180 | .742 | .83 |
| July | 1,480 | 204 | 573 | .360 | .42 |
| August | 3,290 | 349 | 1,120 | .704 | .81 |
| September | 2,920 | 195 | 1,020 | .642 | .72 |
| The year | 38,500 | 195 | 1,950 | 1.23 | 16.61 |

## MISCELLANEOUS MEASUREMENTS.

*Miscellaneous discharge measurements in north Atlantic coast drainage basin during the year ending Sept. 30, 1918.*

| Date. | Stream. | Tributary to— | Locality. | Discharge. |
|---|---|---|---|---|
| | | | | *Sec.-ft.* |
| May 19 | Pond Brook | Pemigewasset River (via Bakers River). | Outlet of lower Baker Pond. | 37.9 |
| July 19 | Canal | Diversion from East branch of Tully River. | Above Packard Pond | 10.5 |

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# 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.
II. South Atlantic slope and eastern Gulf of Mexico basins.
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.

This appendix contains, in addition to the list of gaging stations and the annotated list of publications relating specifically to the section, a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects; also brief references to reports published by State and other organizations (p. XXIV).

## 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 obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. 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.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. 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.
Harrisburg, Pa., care of Water Supply Commission.
Asheville, N. C., 32–35 Broadway.
Chattanooga, Tenn., Temple Court Building.
Madison, Wis., c/o Railroad Commission of Wisconsin.
Chicago, Ill., 1404 Kimball Building.
Ames, Iowa, care of State Highway Commission.
Topeka, Kans., 25 Federal Building.
Austin, Tex., Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 403 New Post Office Building.
Tucson, Ariz., University of Arizona.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho 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., 619 Federal Building.
Honolulu, Hawaii, 14 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 more than 4,510 points in the United States, and the data obtained have been published in the reports indicated in the following table:

*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 146 | 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 | 1905. |
| 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. |

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-Supply Paper 119.

The following table gives, by years and drainage basin, the numbers of papers on surface-water supply published from 1899 to 1918. 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 1902 to 1918 for any station in the area covered by Part III are published in Water-Supply Papers 83, 98, 128, 169. 205, 243, 263, 283, 303, 323, 353, 383, 403, 433, 453, and 473, which contain records for the Ohio River basin for those years.

*Numbers of water-supply papers containing results of stream measurements, 1899–1918.*

| Year. | I North Atlantic slope basins (St. John River to York River). | II South Atlantic and eastern Gulf of Mexico basins (James River to the Mississippi). | III Ohio River basin. | IV St. Lawrence River and Great Lakes basins. | V Hudson Bay and upper Mississippi River basin. | 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. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Pacific slope basins in Washington and upper Columbia River. | Snake River basin. | Lower Columbia River and Pacific slope basins in Oregon. |
| 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 | [k] 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 | 332A | 332B | 332C |
| 1913 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362A | 362B | 362C |
| 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 |

[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 of St. Lawrence River.
[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 III, 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.[1]

NOTE.—Dash after date indicates that station was being maintained September 30, 1918. 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, 1903–1910.

### ST. CROIX RIVER BASIN.

St. Croix River near Woodland (Sprague Falls), Maine, 1902–1911.
St. Croix River at Baring, Maine, 1914.
West Branch of St. Criox River at Baileyville, Maine, 1910–1912.

### MACHIAS RIVER BASIN.

Machias River at Whitneyville, Maine, 1903–

[1] St. John River to York River, inclusive.

UNION RIVER BASIN.

Union River, West Branch (head of Union River), at Amherst, Maine, 1909–
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, 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–
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–
Orland River:
Phillips Lake outlet near East Holden, 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.
Moosehead Lake (on Kennebec River) at Greenville, Maine, 1903–1906 (stage only).
Moosehead Lake at east outlet, Maine (stage only), 1895–
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, 1785–1910 (record of opening and closing of navigation).
Roach River at Roach River, Maine, 1901–1908.
Dead River near The Forks, Maine, 1901–1907; 1910–
Carrabassett River at North Anson, Maine, 1901–1907.
Sandy River near Farmington, Maine, 1910–1915.
Sandy River near Madison, Maine, 1904–1908.
Sebasticook River at Pittsfield, Maine, 1908–
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, 1890–1915.

ANDROSCOGGIN RIVER BASIN.

Rangeley Lake (head of Androscoggin River), Maine, 1879–1911 (dates of opening and closing).
Androscoggin River at Errol dam, N. H., 1905–
Androscoggin River at Berlin, N. H., 1913–
Androscoggin River at Gorham, N. H., 1903 (fragmentary).
Androscoggin River at Shelburne, N. H., 1903–1907; 1910.
Androscoggin River at Rumford Falls, 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–
Ossipee River at Cornish, Maine, 1916–

MERRIMACK RIVER BASIN.

Pemigewasset River (head of Merrimack River) at Plymouth, N. H., 1886–1913.
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 at Elmwood, N. H., 1918–
Contoocook River at West Hopkinton, N. H., 1903–1907.
Blackwater River near Contoocook, N. H., 1918–
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.
Satucket River near Elmwood, Mass., 1909–10.

PROVIDENCE RIVER BASIN.

Providence River:
Seekonk River:
Tenmile River near Rumford, R. I., 1909.
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.
Woonasquatucket River at Olneyville, R. I., 1910.

PAWTUXET RIVER BASIN.

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:
Shetucket River at Willimantic, Conn., 1904–5.

CONNECTICUT RIVER BASIN.

Connecticut River at First Lake, near Pittsburg, N. H., 1917–
Connecticut River at Orford, N. H., 1900–
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–
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.
White River at West Hartford, Vt., 1915–
Ashuelot River at Winchester, N. H., 1903–1904.
Ashuelot River at Hinsdale, N. H., 1907–1909; 1914–
Millers River at Wendell Depot, Mass., 1909–1913.
Millers River near Winchenden, Mass., 1916–
Millers River at Erving, Mass., 1914–
Sip Pond Brook near Winchenden, Mass., 1916–
Priest Brook near Winchenden, Mass., 1916–
Otter River near Gardner, Mass., 1916–1917.
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.

Connecticut River tributaries—Continued.
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–
Borden Brook near Westfield, Mass., 1910–
Farmington River near New Boston, Mass., 1913–
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.

MIANUS RIVER BASIN.

Mianus River at Bedford, N. Y., 1903.
Mianus River near Stamford, Conn., 1903.

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 near Indian Lake, N. Y., 1916–
Hudson River at North Creek, N. Y., 1907–
Hudson River at Thurman, N. Y., 1907–
Hudson River at Corinth, N. Y., 1904–1912.
Hudson River at Spier Falls, N. Y., 1912–
Hudson River at Fort Edward, N. Y., 1899–1908.
Hudson River at Mechanicville, N. Y., 1890–
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–

Hudson River tributaries—Continued.
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., 1911–1916.
Batten Kill at Battenville, N. Y., 1908.
Fish Creek at Burgoyne, N. Y., 1905; 1908.
Hoosic River near Eagle Bridge, N. Y., 1910–
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., 1918–
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.
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 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., 1905–1909; 1912–13.
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.
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.

Hudson River tributaries—Continued.
Rondout 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 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.

PASSAIC RIVER BASIN.

Passaic River at Millington, N. J., 1903–1906.
Passaic River near Chatham, N. J., 1902–1911.
Passaic River at Two Bridges (Mountain View), N. J., 1901–1903.
Rockaway River at Boonton, N. J., 1903–4.
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.
Wanaque River at Wanaque, N. J., 1903–1905.

RARITAN RIVER BASIN.

Raritan River, South Branch (head of Raritan River), at Stanton, N. J., 1903–1906.
Raritan River at Finderne, N. J., 1903–1907.
Raritan River at Boundbrook, N. J., 1903–1909.
North Branch of Raritan River at Pluckemin, N. J., 1903–1906.
Millstone River at Millstone, N. J., 1903–4.

DELAWARE RIVER BASIN.

Delaware River, East Branch (head of Delaware River), at Fish 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 Riegelsville, N. J., 1906–
Delaware River at Lambertville, N. J., 1897–1908.
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.
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.
Paulins Kill at Columbia, N. J., 1908–9.
Lehigh River at South Bethlehem, Pa., 1902–1905; 1909–1913.
Lehigh River at Easton, Pa., 1909.
Musconetcong River at Asbury, N. J., 1903.
Musconetcong River near Bloomsbury, N. J., 1903–1907.
Tohickon Creek at Point Pleasant, Pa., 1883–1889; 1901–1913.
Neshaminy Creek below Forks, Pa., 1884–1913.
Schuylkill River near Philadelphia, Pa., 1898–1912.
Perkiomen Creek near Frederick, Pa., 1884–1913.
Wissahickon Creek near Philadelphia, Pa., 1897–1902; 1905–6.

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 Wysox, Pa., 1908–9.
Susquehanna River at Wilkes-Barre, Pa., 1899–1913.
Susquehanna River at Danville, Pa., 1899–1913.
Susquehanna River at Harrisburg, Pa., 1891–1913.
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 $109_3$ only.)
Chemung River at Chemung, N. Y., 1903– (Data for period prior to 1905 published in Water-Supply Paper 109.)
Cohocton River near Campbell, N. Y., 1918–
Mud Creek at Savona, N. Y., 1918–
Tioga River near Erwins, N. Y., 1918–
West Branch of Susquehanna River at Williamsport, Pa., 1895–1913.
West Branch of Susquehanna River at Allenwood, Pa., 1899–1902.
Juniata River at Newport, Pa., 1899–1913.
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.
Opequan Creek near Martinsburg, W. Va., 1905–6.
Tuscarora Creek at Martinsburg, W. Va., 1905.
Antietam Creek near Sharpsburg, Md., 1897–1905.

Potomac River tributaries—Continued.
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.

RAPPAHANNOCK RIVER BASIN.

Rappahannock River near Fredericksburg, Va., 1907–

## REPORTS ON WATER RESOURCES OF NORTH ATLANTIC COAST.[1]

### PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

#### WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. 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. 15c.

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.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11, pls. 15c.

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.) 5c.

*61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" given 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.

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[1] For stream-measurement reports see tables on pages IV, V, VI.

79. Normal and polluted waters in northeastern United States, by M. O. Leighton. 1903. 192 pp. 10c.

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. 15c.

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. 30c.

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 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. 15c.

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 sufficiently 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. 10c.

Contains brief reports on water resources, surface and underground, of districts in the North Atlantic slope drainage basins, as shown by the following list:

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 municipal 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 municipal 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. 25c.

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. 5c.

Cites legislative acts relating to ground waters in New Jersey.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

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. 10c.

Contains several brief reports relating chiefly to areas in the North Atlantic slope drainage basins, 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. 10c.

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 fluctuation due to rainfall and evaporation, barometric changes, temperature changes, changes in rivers, changes in lake level, tidal changes, effects 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. 15c.

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 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 wastes on fishes), by H. N. Parker, Bailey Willis, R. H. Bolster, W. W. Ashe, and M. C. Marsh. 1907. 364 pp., 10 pls. 60c.

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 waters by springs, collecting galleries and tunnels, and wells; discusses well-drilling methods, municipal water supplies, and the chemical composition of the ground waters; 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. 20c.

Describes physiographic features, drainage, forests, 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 meridan, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, method 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. 15c.

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 Costal 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.

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.

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.

A compilation of available stream-flow data; prepared in cooperation with the Commonwealth of Vermont. Contains a gazetteer of streams, lakes, and ponds.

## ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*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:

* Seacoast 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 to 47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

## PROFESSIONAL PAPERS.

Professional papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. 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. $1.25.

Describes the geologic 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.

## BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*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 waters.

*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. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in Connecticut, Delaware, Maine, Maryland, Massachusetts, 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. 45c.

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.[2] 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 shapes 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 usable 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 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. 5c.

*23. Nomini, Maryland-Virginia. 1896. 5c.

*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. 5c.
Discusses artesian wells.

*137. Dover, Delaware-Maryland-New Jersey. 1906. 5c.
Describes the shallow and deep wells used as sources of water supply; gives section of well at Middletown, Del.

[2] 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.

*149. **Penobscot Bay, Maine.** 1907. 5c.
Describes the wells and springs; gives analysis of spring water from North Bluehill.

152. **Patuxent, Maryland-District of Columbia.** 1907. 5c.
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. 5c.
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. 5c.
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.**[3] 1909. 5c.
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. 5c.
Describes the rivers, which include tributaries of the Susquehanna and the St. Lawrence, the lakes and swamps, and, under "Economic geology," springs and shallow and deep wells; discusses also water supply at Ithaca.

*170. **Mercersburg-Chambersburg, Pennsylvania.**[4] 1909. 5c.
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.[4] 5c.
The Choptank quadrangle includes the entire width of Chesapeake Bay and portions of many large estuaries.

189. **Barnesboro-Patton, Pennsylvania.** 1913. 25c.
Discusses the water supply of various towns in the quadrangle.

191. **Raritan, New Jersey.**[5] 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.

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[3] Octavo edition only.

[4] Issued in two editions—library (18 by 22 inches) and octavo (6 by 9 inches). Specify edition desired.

[5] Issued in two editions—library (18 by 22 inches), 25c., and octavo (6 by 9 inches), 50c. Specify edition desired.

## 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), 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.

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.

## GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports that are not readily classifiable by drainage basins and that cover a wide range of hydrologic investigations:

### WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.
Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. 10c. (See Water-Supply Paper 22.)
Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.
Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kans.; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl. 10c.
Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.
Includes tables and descriptions of wind wheels, compares wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.
Gives résumé of Water-Supply Paper No. 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill: Its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls.

*42. The windmill: Its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp., 2 pls. 10c.
Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.
Describes the methods used by the Survey in 1901–2. See also Nos. 64, 94, and 95.

*64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.
Describes methods of measuring velocity of water and of measuring and computing stream flow and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.
Discusses origin, depth, and amount of underground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of underground water; surface and deep zones of flow, and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing wells; describes artesian wells at Savannah, Ga.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.
Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effect of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.
First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c.
Contains the following papers of more or less general interest:
Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by Geo. Y. Wisner.
Irrigation surveys and the use of the plane table, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas H. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.
Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.

*95. Accuracy of stream measurements (second enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.
Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)
Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

*110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.
Contains the following reports of general interest. The scope of each paper is indicated by its title.
Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.
The California or "stovepipe" method of well construction, by Charles S. Slichter.
Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.
Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.
Experiments relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.
The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard, and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., and the contamination of rock wells and of streams by waste oil and brine.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.
Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential condition of artesian flows and general conditions affecting underground waters in eastern United States.

115. River surveys and profiles made during 1903, arranged by W. C. Hall and J. C. Hoyt. 1905. 115 pp., 4 pls. 10c.
Contains results of surveys made to determine location of undeveloped power sites.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.
Scope indicated by title.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.
Scope indicated by title.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.
Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.
Discusses the capacity of sand to transmit water, describes measurements of underflow in Rio Hondo, San Gabriel, and Mohave River valleys, Calif., and on Long Island, N. Y.; gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls.
Scope indicated by title.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.
Contains brief reports of general interest as follows:
Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells, and gives statistics of such wells in southern Michigan.
Construction of so-called fountain and geyser springs, by Myron L. Fuller.
A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c.
Contains brief account of the organization of the hydrographic [water-resources] branch and the Reclamation Service, reports of conferences and committees, circulars of instruction, and many brief reports on subjects closely related to reclamation, and a bibliography of techincal papers by members of the service. Of the papers read at the conference those listed below (scope indicated by title) are of more or less general interest:
Proposed State code of water laws, by Morris Bien.
Power engineering applied to irrigation problems, by O. H. Ensign.
Estimates on tunneling in irrigation projects, by A. L. Fellows.
Collection of stream-gaging data, by N. C. Grover.
Diamond-drill methods, by G. A. Hammond.
Mean-velocity and area curves, by F. W. Hanna.
Importance of general hydrographic data concerning basins of streams gaged, by R. E. Horton.
Effect of aquatic vegetation on stream flow, by R. E. Horton.
Sanitary regulations governing construction camps, by M. O. Leighton.
Necessity of draining irrigated land, by Thos. H. Means.
Alkali soils, by Thos. H. Means.
Cost of stream-gaging work, by E. C. Murphy.
Equipment of a cable gaging station, by E. C. Murphy.
Silting of reservoirs, by W. M. Reed.
Farm-unit classification, by D. W. Ross.
Cost of power for pumping irrigating water, by H. A. Storrs.
Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in United States in 1904, by E. C. Murphy and others. 206 pp., 18 pls. 15c.
Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and area of cross section.

*150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.
Scope indicated by title.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls. 10c.
Dicusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness, in connection with studies of the quality of water in various parts of the United States.

*152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.
Scope indicated by title.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.
Gives account of work in 1905, lists of publications relating to underground waters, and contains the following brief reports of general interest:
Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*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. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.
Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.
Describes grain distillation, treatment of slop, sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.
Scope indicated by title.

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.
Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid-iron wastes, and other processes for disposal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.
Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls. 5c.
Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri *v.* the State of Illinois and the Sanitary district of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls. 40c.
Scope indicated by amplification of title.

*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.
Scope indicated by title.

*226. The pollution of streams by sulphite pulp waste, a study of possible remedies, by E. B. Phelps. 1909. 37 pp., 1 pl. 10c.
Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.
Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall, by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole, and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

*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. 10c.

Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French parliament; reviews work of bureau of hydraulics and agricultural improvement of the French department of agriculture, and gives résumé of Federal and State water-power legislation in the United States.

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs, and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of underground water and artesian conditions, and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties; contamination of well waters and methods of prevention; tests of capacity and measurement of depth; and costs of sinking wells.

*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. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

259. The underground waters of southwestern Ohio, by M. L. Fuller and F. G. Clapp, with a discussion of the chemical character of the waters, by R. B. Dole. 1912. 228 pp., 9 pls. 35c.

Describes the topography, climate, and geology of the region, the water-bearing formations, the source, mode of occurrence, and head of the waters, and municipal supplies; gives details by counties; discusses in supplement, under chemical character, method of analysis and expression of results, mineral constituents, effect of the constituents on waters for domestic, industrial, or medicinal uses, methods of purification, and chemical composition; many analyses and field assays. The matter in the supplement was also published in Water-Supply Paper 254 (The underground waters of north-central Indiana).

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation.

280. Gaging stations maintained by the United States Geological Survey, 1888–1910, and Survey publications relating to water resources, compiled by B. D. Wood. 1912. 102 pp. 10c.

315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water and municipal water softening.

334. The Ohio Valley flood of March–April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

*(e) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65. 5c. Scope indicated by title.

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 waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing recording and other gages and of constructing gage wells, shelters, and structures for making discharge measurements and artificial controls.

375. Contributions to the hydrology of the United States, 1915. N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. Contains:

(c) Relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

(e) A method for correcting river discharge for changing stage, by B. E. Jones, pp. 117–130.

(f) Conditions requiring the use of automatic gages in obtaining stream-flow records, by C. H. Pierce, pp. 131–139.

*400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer. Contains:

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.

*(c) The measurement of silt-laden streams, by Raymond C. Pierce, pp. 39–51.

(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53–59.

416. The divining rod, a history of water witching, with a bibliography, by Arthur J. Ellis. 1917. 39 pp. 10c.

A brief paper published "merely to furnish a reply to the numerous inquiries that are continually being received from all parts of the country" as to the efficacy of the divining rod for locating underground water.

*425. Contributions to the hydrology of the United States, 1917. N. C. Grover, chief hydraulic engineer. 1918. Contains:

(c) Hydraulic conversion tables and convenient equivalents, pp. 71–94. 1917.

427. Bibliography and index of the publications of the United States Geological Survey relating to ground water, by O. E. Meinzer. 1918. 169 pp., 1 pl.

Includes publications prepared, in whole or part, by the Geological Survey that treat any phase of the subject of ground water or any subject directly applicable to ground water. Illustrated by maps showing reports that cover specific areas more or less thoroughly.

### PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate, population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee river basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

*86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Calif., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream's slope and discharge and to the degree of comminution of the débris."

A highly technical report.

105. Hydraulic mining débris in the Sierra Nevada, by G. K. Gilbert. 1917. 154 pp., 34 pls.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy loads of débris.

### BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of analyses so far as available.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Bulletins 264 and 298 discuss 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 by States, and detailed records selected as affording valuable stratigraphic information.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller. 1908. 44 pp., 7 pls. 10c.

Describes underground reservoirs, the sources of underground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water, and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

*616. The data of geochemistry (third edition), by F. W. Clarke. 1916. 821 pp. 45c.

Earlier editions were published as Bulletins 330 and 491. Contains a discussion of the statement and interpretation of water analyses and a chapter on "Mineral wells and springs" (pp. 179–216). Discusses the definition and classification of mineral waters, changes in the composition of water, deposits of calcareous, ocherous and siliceous materials made by water, vadose and juvenile waters, and thermal springs in relation to volcanism. Describes the different kinds of ground water and gives typical analyses. Includes a brief bibliography of papers containing water analyses.

ANNUAL REPORTS.

*Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlain, pp. 125 to 173, Pl. 21. Scope indicated by title.

*Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. *Pt. II—Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363–561, Pls. 107 to 146. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III—Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, C. E., pp. 101–349, Pls. 111 to 146. Discusses the economic aspects of irrigation, alkaline drainage, silt, and sedimentation; gives brief history and legislation; describes canals; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

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. $2.10. Contains:

*The potable waters of the eastern United States, by W. J. McGee, pp. 1 to 47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, Pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II—Papers chiefly of a theoretic nature, v. 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, Pls. 6 to 16. Discusses the amount of water stored in sandstone, in soil, and in other rocks; the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through rigid porous media and through sands, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, Pl. 17. Scope indicated by title.

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[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; GF=Geologic folio. For titles see preceding pages.]


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[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

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