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DEPARTMENT OF THE INTERIOR  
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY  
George Otis Smith, Director

WATER-SUPPLY PAPER 584

SURFACE WATER SUPPLY OF THE  
UNITED STATES  
1924

PART IV. ST. LAWRENCE RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer  
S. B. SOULÉ, A. H. HORTON, LASLEY LEE, A. W. HARRINGTON  
and C. H. PIERCE, District Engineers

Prepared in cooperation with the States of  
WISCONSIN, OHIO, and NEW YORK



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Water Resources Branch,  
Geological Survey,  
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Oklahoma City, Okla.

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# SURFACE WATER SUPPLY OF ST. LAWRENCE RIVER BASIN, 1924

## AUTHORIZATION AND SCOPE OF WORK

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the year ending September 30, 1924.

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 appropriation bills passed by Congress have carried the following item:

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, 1895-1925*

1895 .....	\$12, 500. 00
1896 .....	20, 000. 00
1897 to 1900, inclusive.....	50, 000. 00
1901 to 1902, inclusive.....	100, 000. 00
1903 to 1906, inclusive.....	200, 000. 00
1907 .....	150, 000. 00
1908 to 1910, inclusive.....	100, 000. 00
1911 to 1917, inclusive.....	150, 000. 00
1918 .....	175, 000. 00
1919 .....	148, 244. 10
1920 .....	175, 000. 00
1921 to 1923, inclusive.....	180, 000. 00
1924 to 1925, inclusive.....	170, 000. 00

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 9.

Measurements of stream flow have been made at about 4,990 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1924, 1,670 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

### 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-foot, gallons per minute, miners’ inches, and discharge in second-foot per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-foot, second-foot per square mile, run-off in inches, and acre-feet. They may be defined as follows:

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

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

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

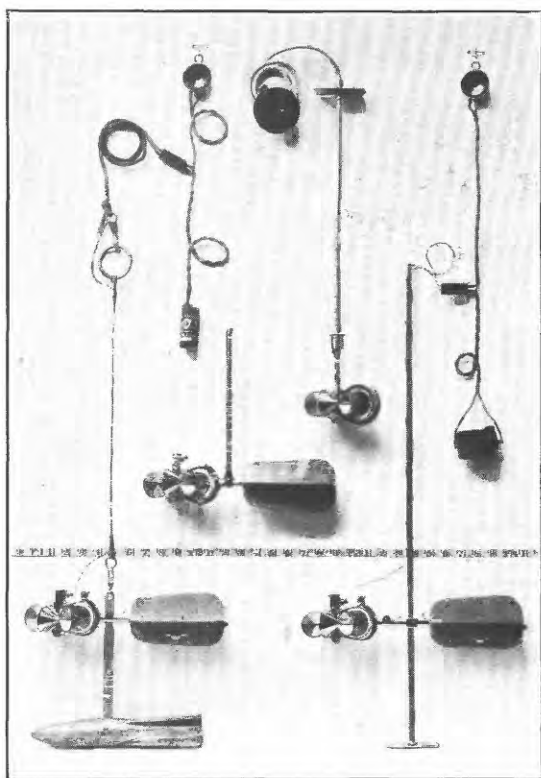
An “acre-foot,” equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

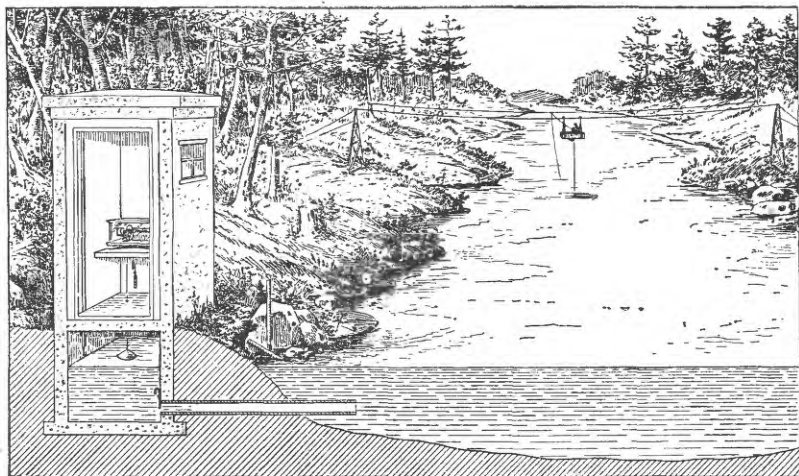
“Stage-discharge relation,” an abbreviation for the term “relation of gage height to discharge.”

“Control,” a term used to designate the section or sections of the stream channel below the gage which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.





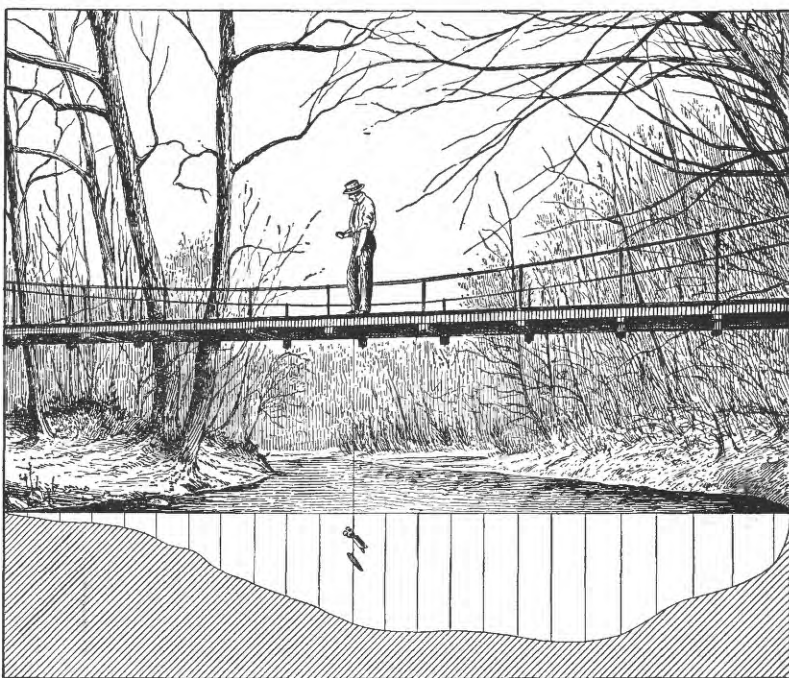
A. PRICE CURRENT METERS



B. TYPICAL GAGING STATION



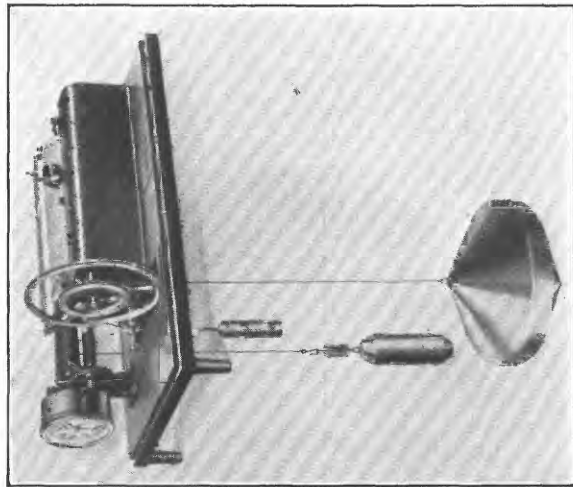
A



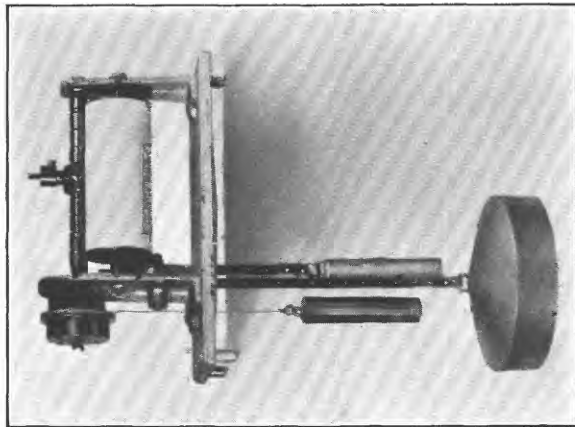
B

TYPICAL GAGING STATIONS

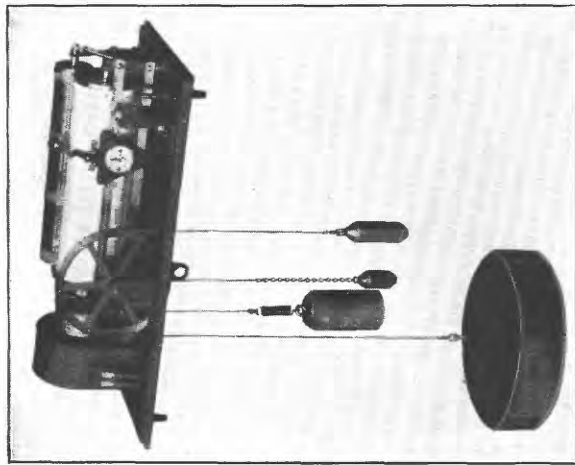
A, For wading measurement; B, for bridge measurement



A



B



C

WATER-STAGE RECORDERS

A, Au; B, Gurley; C, Stevens

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

### EXPLANATION OF DATA

The data presented in this report cover the year beginning October 1, 1923, and ending September 30, 1924. 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 or chain gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I-III.) The general methods are outlined in standard textbooks on the measurement of river discharge.

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

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

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

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the streams for log driving, shifting of control, and the cause and effect of back-water; 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 per second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 2, are based.

#### ACCURACY OF FIELD DATA AND COMPUTED RESULTS

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

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

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

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

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

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

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

## PUBLICATIONS

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, ground 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 monographs, bulletins, professional papers, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins (St. John River to York River).

II. South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).

III. Ohio River basin.

IV. St. Lawrence River basin.

V. Upper Mississippi River and Hudson Bay basins.

VI. Missouri River basin.

VII. Lower Mississippi River basin.

VIII. Western Gulf of Mexico basins.

## Part IX. Colorado River basin.

## X. Great Basin.

## XI. Pacific slope basins in California.

## XII. North Pacific slope basins, in three parts:

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.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will, on application, furnish lists giving prices.

2. Sets of the reports may be consulted in the libraries of the principal cities of the United States.

3. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.

Albany, N. Y., 704 Journal Building.

Trenton, N. J., Statehouse.

Charlottesville, Va., in care of University of Virginia.

Asheville, N. C., 316 Jackson Building.

Chattanooga, Tenn., 37 Municipal Building.

Columbus, Ohio, Engineering Experiment Station, Ohio State University.

Chicago, Ill., 450 Transportation Building.

Madison, Wis., care of Railroad Commission of Wisconsin.

Ames, Iowa, State Highway Commission Building.

Rolla, Mo., Rolla Building, School of Mines and Metallurgy.

Topeka, Kans., 23 Federal Building.

Helena, Mont., 45-46 Federal Building.

Denver, Colo., 403 Post Office Building.

Salt Lake City, Utah, 313 Federal Building.

Idaho Falls, Idaho, 228 Federal Building.

Boise, Idaho, Federal Building.

Tacoma, Wash., 404 Federal Building.

Portland, Oreg., 606 Post Office Building.

San Francisco, Calif., 303 Customhouse.

Los Angeles, Calif., 600 Federal Building.

Tucson, Ariz., 210 Agricultural Building, University of Arizona.

Austin, Tex., State Capitol.

Honolulu, Hawaii, 25 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director, United States Geological Survey, Washington, D. C.

Stream-flow records have been obtained at about 4,990 points in the United States, and the data obtained have been published in the reports tabulated:

*Stream-flow data in reports of the United States Geological Survey*

[A=Annual Report; B=Bulletin; W=Water-Supply Paper]

Report	Character of data	Year
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years).	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River, and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings.	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings.	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	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.
W 501 to 514	do	1919-20.
W 521 to 534	do	1921.
W 541 to 554	do	1922.
W 561 to 574	do	1923.
W 581 to 594	do	1924.

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 basins, the numbers of the papers on surface-water supply published from 1899 to 1924. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1921, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, 451, 471, 501, and 521, which contain records for the New England streams from 1903 to 1921. Results of miscellaneous measurements are published by drainage basins.



*Numbers of water-supply papers containing results of stream measurements, 1899-1924*  
 [For basins included see pp. 5-6]

Year	I		II		III		IV		V		VI		VII		VIII		IX		X		XI		XII		
1899 a	35		b 35, 36	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		65, 75	48, i 49	49		49		49		49, 50		50		50		50		51		51		51	51	51
1901	65, 75		65, 75	65, 75	65, 75		65, 75		65, 75		65, 75		65, 75		65, 75		65, 75		66, 75		66, 75		66, 75	66, 75	66, 75
1902	82		b 82, 83	82	82		82		82		82		82		82		82		85		85		85	85	85
1903	97		b 97, 98	98	98		98		98		98		98		98		98		100		100		100	100	100
1904	n 124, o 125, p 126		p 126, 127	128	128		128		128		130, q 131		k 128, 130		132		133		133, r 134		134		135	135	135
1905	a 165, o 166, p 167		p 167, 168	169	169		170		171		172		k 169, 173		174		175, r 177		176, r 177		177		178	178	178
1906	n 201, o 202, p 203		p 203, 204	205	205		206		207		208		k 205, 209		210		211		212, r 213		213		214	214	214
1907-8	242		242	243	243		244		245		246		247		248		249		250, r 251		251		252	252	252
1909	261		262	263	263		264		265		266		267		268		269		270, r 271		271		272	272	272
1910	281		282	283	283		284		285		286		287		288		289		290		291		292	292	292
1911	301		302	303	303		304		305		306		307		308		309		310		311		312	312	312
1912	321		322	323	323		324		325		326		327		328		329		330		331		332-A	332-B	332-C
1913	351		352	353	353		354		355		356		357		358		359		360		361		362-A	362-B	362-C
1914	381		382	383	383		384		385		386		387		388		389		390		391		392	393	394
1915	401		402	403	403		404		405		406		407		408		409		410		411		412	413	414
1916	431		432	433	433		434		435		436		437		438		439		440		441		442	443	444
1917	461		462	463	463		464		465		466		467		468		469		470		471		472	473	474
1918	471		472	473	473		474		475		476		477		478		479		480		481		482	483	484
1919-20	501		502	503	503		504		505		506		507		508		509		510		511		512	513	514
1921	521		522	523	523		524		525		526		527		528		529		530		531		532	533	534
1922	541		542	543	543		544		545		546		547		548		549		550		551		552	553	554
1923	561		562	563	563		564		565		566		567		568		569		570		571		572	573	574
1924	581		582	583	583		584		585		586		587		588		589		590		591		592	593	594

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.

h Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.

i Wisconsin and Schuykill rivers to James River.

j Salado River.

k Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

l Tributaries of Mississippi from east.

m Lake Ontario and tributaries to St. Lawrence River proper.

n Hudson Bay only.

o New England rivers only.

p Hudson River to Delaware River, inclusive.

q Susquehanna River to Yadkin River, inclusive.

r Platte and Kansas rivers.

s Great Basin in California, except Truckee and Carson River basins.

t Below junction with Gila.

u Rogue, Umpqua, and Siletz rivers only.

## COOPERATION

The work in Wisconsin during the year ending September 30, 1924, was done in cooperation with the Railroad Commission of Wisconsin, C. M. Larson, chief engineer. The United States Engineer Corps cooperated in maintaining the stations on Fox River at Berlin and at Rapide Croche Dam, and on Wolf River at New London. Financial cooperation was also rendered by the Castile Mining Co.

The station on Little Calumet River at Harvey, Ill., was maintained in cooperation with the Illinois Department of Public Works and Buildings, Division of Waterways, W. L. Sackett, superintendent; gage reader was paid by the Sanitary District of Chicago.

The work in Ohio was done in cooperation with the Ohio Cooperative Topographic Survey, C. E. Sherman, inspector.

The work in New York was carried on in cooperation with the State of New York and at certain stations with the following organizations: Rochester Gas & Electric Corporation (Genesee River at Driving Park Avenue, Rochester, N. Y.); the city of Rochester (Conesus Creek near Lakeville, N. Y., and Canadice Lake outlet near Hemlock, N. Y.); Utica Gas & Electric Co. (East Branch of Fish Creek at Taberg, N. Y.); Black River Regulating District (Black River at Watertown, N. Y., Moose River at McKeever, N. Y., and Beaver River below Stillwater Dam near Beaver River, N. Y.); Otter Creek Power Corporation (Otter Creek near Glenfield, N. Y.); Northern New York Utilities, Inc. (Beaver River at Eagle Falls near Number Four, N. Y., and North Branch of Grass River at Gleasons Mill near Colton, N. Y.); DeGrasse Paper Co. (Grass River at Pyrites, N. Y.); International Paper Co. (Raquette River at Piercefield, N. Y., and Lake George at Rogers Rock, N. Y.); New York & Pennsylvania Co. (Bouquet River at Willsboro, N. Y.); J. & J. Rogers Co. (East Branch of Ausable River at Ausable Forks, N. Y., Ausable River near Ausable Forks, N. Y., and Black Brook at Black Brook near Ausable Forks, N. Y.); Plattsburg Gas & Electric Co. (Saranac River near Plattsburg, N. Y.).

The stations on Green River at Garfield, Vt., and Clyde River at West Derby, Vt., were maintained in cooperation with Charles T. Middlebrook and the Newport Electric Light Co., respectively.

## DIVISION OF WORK

Data for stations in the Lake Superior and Lake Michigan drainage basins in Wisconsin and Michigan, were collected and prepared for publication under the direction of S. B. Soulé, district engineer, assisted by F. C. Christopherson, E. E. Foster, and George Steinmetz.

Data for the station in Illinois were collected and prepared for publication by H. E. Grosbach, district engineer.

Data for stations on Huron River at Barton, Mich., and Tittabawasee River at Freeland, Mich., were prepared for publication by A. H. Horton, district engineer.

Data for the station on St. Joseph River at Mottville, Mich., and for stations in the Lake Erie drainage basin in Ohio were collected and prepared for publication under the direction of Lasley Lee, district engineer, assisted by E. E. R. Dornbach, F. R. Morgan, W. W. Perrin, W. A. Werner, F. A. English, L. L. Dickson, and W. P. Ansley.

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

Data for stations in Vermont were collected and prepared for publication under the direction of C. H. Pierce, district engineer, assisted by H. F. Hill, jr., Lillian H. McCarthy, and E. W. Downs.

The manuscript was assembled and reviewed by H. C. Troxell.

### GAGING-STATION RECORDS

#### STREAMS TRIBUTARY TO LAKE SUPERIOR

##### WEST BRANCH OF MONTREAL RIVER AT GILE, WIS.

**LOCATION.**—In sec. 27, T. 46 N., R. 2 E., 800 feet upstream from highway bridge at Gile, Iron County,  $2\frac{1}{2}$  miles southwest of Hurley, Wis., and 4 miles upstream from mouth.

**DRAINAGE AREA.**—78 square miles<sup>1</sup> (measured from map of Wisconsin Soil Survey; scale 1 inch = 3 miles).

**RECORDS AVAILABLE.**—April 26, 1918, to September 30, 1924.

**GAGE.**—Sloping gage bolted to rock ledge on left bank of river a few hundred feet upstream from pump house of Ottawa mine; read by Carl Long and Lyle Slender.

**DISCHARGE MEASUREMENTS.**—Made from downstream side of highway bridge 800 feet below gage or by wading.

**CHANNEL AND CONTROL.**—Control formed by permanent rock ledge across narrow section of stream about 15 feet downstream from gage. Fall at control about 4 feet.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.40 feet April 18 (discharge, 920 second-feet); minimum stage recorded, 1.50 feet January 29 (discharge, 4.4 second-feet).

1918-1924: Maximum stage recorded, 7.20 feet April 21, 1923 (discharge, 1,480 second-feet); minimum stage, 1.32 feet July 23, 1918, and September 7, 1921 (discharge, about 2.4 second-feet).

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation permanent; not seriously affected by ice during year. Rating curve used well defined throughout range of stage occurring during year. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating curve. On days when gage was not read (generally only Sundays) discharge was interpolated and is subject to small errors. Records excellent.

The following discharge measurements were made by F. C. Christopherson:

June 26: Gage height, 2.18 feet; discharge, 18.1 second-feet.

July 18: Gage height, 2.40 feet; discharge, 27.8 second-feet.

<sup>1</sup> Supersedes figures published in previous reports.

*Daily discharge, in second-feet, of West Branch of Montreal River at Gile, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	6.0	32	24	12	5.1	5.0	11	270	58	48	41	39
2.....	6.8	30	21	12	5.2	5.1	11	232	54	38	44	29
3.....	6.2	28	18	11	5.2	5.2	19	198	51	34	101	26
4.....	5.8	27	17	9.8	5.2	5.4	51	178	48	32	158	20
5.....	5.6	26	16	8.1	5.1	5.3	102	158	46	31	214	18
6.....	5.5	26	14	8.0	5.1	5.2	176	136	71	30	214	17
7.....	5.5	22	13	7.8	5.0	5.1	250	147	85	28	184	16
8.....	6.5	20	9.3	6.9	5.0	5.0	250	198	78	24	147	14
9.....	5.5	20	9.0	6.5	5.0	5.0	214	415	71	24	121	14
10.....	5.0	18	8.8	6.2	4.9	5.0	184	530	68	23	100	14
11.....	6.0	18	8.6	5.8	4.8	5.0	184	655	59	24	78	13
12.....	5.2	17	8.3	5.5	4.7	4.8	158	780	54	26	62	16
13.....	5.0	17	7.8	5.5	4.7	4.8	158	716	48	28	56	24
14.....	5.0	17	7.6	5.5	4.7	5.0	158	530	41	30	54	27
15.....	5.0	20	7.4	5.5	4.7	5.0	214	415	48	28	41	30
16.....	6.2	22	7.2	5.4	4.8	5.0	290	335	56	24	36	28
17.....	12	24	6.9	5.2	4.8	5.0	530	290	68	30	36	24
18.....	32	24	7.6	5.1	4.8	5.0	920	237	65	24	36	18
19.....	36	24	8.6	5.0	4.8	5.1	710	184	56	24	30	16
20.....	41	24	11	5.0	4.8	5.2	522	158	89	23	26	16
21.....	41	24	11	5.0	5.0	5.3	385	136	48	22	32	21
22.....	41	20	14	5.0	5.0	5.4	290	120	44	24	196	26
23.....	41	20	14	4.8	5.0	5.6	290	136	41	26	32	46
24.....	41	20	14	4.7	5.0	5.8	335	136	34	24	09	48
25.....	41	24	14	4.6	5.0	8.1	450	131	18	22	106	44
26.....	38	28	14	4.6	5.0	9.8	530	126	17	20	89	36
27.....	38	30	14	4.6	5.0	9.8	472	111	22	17	65	34
28.....	42	30	14	4.5	5.0	10	415	93	24	14	48	48
29.....	46	28	14	4.4	5.0	11	360	74	29	22	36	62
30.....	38	26	14	4.6	-----	11	310	68	34	24	38	56
31.....	34	-----	13	4.8	-----	11	-----	62	-----	36	35	-----

*Monthly discharge of West Branch of Montreal River at Gile, Wis., for the year ending September 30, 1924*

[Drainage area, 78 square miles]

Month	Discharge in second-feet				Run-off in inches
			Mean	Per square mile	
October.....	46	5.0	21.0	0.269	0.31
November.....	32	17	23.5	.301	.34
December.....	24	6.9	12.3	.158	.18
January.....	12	4.4	6.24	.080	.09
February.....	5.2	4.7	4.94	.063	.07
March.....	11	4.8	6.26	.080	.09
April.....	920	11	297	3.81	4.25
May.....	780	62	257	3.29	3.79
June.....	85	17	49.8	.638	.71
July.....	48	14	26.6	.341	.39
August.....	214	26	79.5	1.02	1.18
September.....	62	13	27.8	.356	.40
The year.....	920	4.4	67.6	.867	11.80

## BLACK RIVER AT RAMSAY, MICH.

**LOCATION.**—In sec. 13, T. 47 N., R. 46 W., at highway bridge 100 feet downstream from Chicago & North Western Railway in Ramsay, Gogebic County, Mich.

**DRAINAGE AREA.**—82 square miles.

**RECORDS AVAILABLE.**—April 1 to September 30, 1924.

**GAGE.**—Chain gage attached to upstream guardrail of bridge; read by engineers of Castile Mining Co.

**DISCHARGE MEASUREMENTS.**—Made by wading near gage.

**CHANNEL AND CONTROL.**—Bed composed of large rock and cobblestones; probably permanent. Considerable rubbish is thrown into river from time to time which, during periods of low water, lodges and obstructs channel causing backwater.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during period, 6.40 feet at 7.30 a. m. April 26 (discharge, 392 second-feet); minimum stage, 3.68 feet at noon and 5.30 p. m. April 1 (discharge, 5 second-feet).

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

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation permanent, except as affected by rubbish thrown into river near control. Rating curve well defined below 103 second-feet, fairly well defined between 103 and 192 second-feet; above 192 second-feet it is an extension. Gage read to hundredths twice daily; no diurnal fluctuation. Records fair.

*Discharge measurements of Black River at Ramsay, Mich., during the year ending September 30, 1924*

[Made by F. C. Christopherson]

Date	Gage height	Discharge
June 27	Feet 4.16	Sec.-ft. 24.0
July 18	4.09	21.1
Aug. 6	5.25	181

*Daily discharge, in second-feet, of Black River at Ramsay, Mich., for the year ending September 30, 1924*

Day.	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1	5	192	55	39	20	24	16	192	234	40	20	23	27
2	8	162	54	36	19	18	17	369	213	62	22	20	23
3	12	135	56	28	96	16	18	323	166	80	21	18	20
4	28	116	52	23	172	14	19	323	119	68	19	15	16
5	59	96	48	18	162	12	20	268	111	80	17	14	16
6	96	87	74	16	153	10	21	213	96	67	15	35	22
7	103	90	90	14	103	10	22	182	90	60	17	66	29
8	98	192	82	21	85	10	23	224	103	53	17	127	29
9	81	278	75	20	73	10	24	267	119	48	16	98	28
10	56	293	70	18	61	9	25	369	104	36	15	69	26
11	48	308	68	15	49	8	26	392	90	37	13	53	23
12	51	323	61	15	38	16	27	380	87	24	11	38	32
13	64	323	60	14	34	21	28	369	77	24	9	36	41
14	76	323	53	13	25	24	29	323	64	39	10	44	50
15	162	300	47	13	25	27	30	234	60	54	11	48	48
							31		56		28	36	

NOTE.—Gage not read Apr. 13, 20, 27, May 4, 10, 11, 18, 25, 30, June 1, 8, 14, 15, 22, 29, July 4, 6, 13, 19, 20, 26, 27, 29, Aug. 3, 10, 15, 16, 24, 31, Sept. 7, 14, 21, 27, 28, and 30 discharge interpolated.

*Monthly discharge of Black River at Ramsay, Mich., for the year ending September 30, 1924*

[Drainage area, 82 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
April.....	392	5	179	2.18	2.43
May.....	323	56	162	1.98	2.28
June.....	90	24	57.2	.698	.78
July.....	39	9	18.2	.222	.26
August.....	172	14	59.8	.729	.84
September.....	50	8	22.0	.268	.30

**STREAMS TRIBUTARY TO LAKE MICHIGAN****MENOMINEE RIVER AT TWIN FALLS, NEAR IRON MOUNTAIN, MICH.**

**LOCATION.**—In sec. 12, T. 40 N., R. 31 W., at power plant of Peninsular Power Co.,  $3\frac{1}{2}$  miles north of Iron Mountain, Mich., and 3 miles above mouth of of Pine River.

**DRAINAGE AREA.**—1,790 square miles.

**RECORDS AVAILABLE.**—January 1, 1914, to September 30, 1924.

**GAGES.**—Staff and float gages used to determine effective head on water wheels.

**DISCHARGE.**—Daily discharge is computed from hourly determinations of flow through turbines computed from a record of number of wheels in operation, kilowatt output, and effective head. To average flow through turbines is added water passing over spillway, through gates, down log sluice, and leakage through idle wheels and through dam.

**EXTREMES OF DISCHARGE.**—Maximum mean daily discharge during year, 5,050 second-feet May 17; minimum mean daily discharge, 471 second-feet March 5.

1914-1924: Maximum mean daily discharge, 16,700 second-feet April 23 and 24, 1916; minimum mean daily discharge, 274 second-feet, August 10, 1919.

**REGULATION.**—Besides regulation at this power plant flow is regulated by power plant on Brule River about 5 miles above station; plants owned by same company. Owing to variations in demand daily discharge will bear no relation to natural flow, the monthly mean discharges probably correspond closely to natural flow.

**ACCURACY.**—Discharge records published in following tables were obtained by adding 10 per cent to discharge as computed from power-plant records. This correction is based upon results of four current-meter measurements made in May and September, 1919, and one in September, 1922, by the United States Geological Survey at a point about 1 mile downstream from power plant.

**COOPERATION.**—Daily-discharge records furnished by Mead & Seastone, consulting engineers, Madison, Wis.

*Daily discharge, in second-feet, of Menominee River at Twin Falls, near Iron Mountain, Mich., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	829	855	1,080	640	597	679	965	4,930	1,470	1,210	949	708
2.....	729	842	935	806	662	554	869	4,090	1,740	1,270	868	1,000
3.....	756	823	909	783	556	637	880	4,330	2,100	1,250	1,480	1,120
4.....	836	707	824	752	695	540	1,040	3,630	1,470	821	1,750	1,120
5.....	825	675	746	735	622	471	1,170	3,280	1,160	776	1,710	1,120
6.....	785	822	840	826	658	546	832	3,190	1,770	975	2,180	1,120
7.....	820	861	823	609	700	656	1,350	3,640	2,330	1,300	2,240	970
8.....	650	774	821	747	638	668	1,280	3,290	1,800	2,210	2,070	887
9.....	710	686	779	720	685	607	1,840	3,310	2,540	1,370	1,920	917
10.....	730	1,120	904	739	730	668	1,900	4,040	1,860	1,210	1,400	923
11.....	706	691	839	684	736	581	1,010	4,040	1,590	1,320	1,040	793
12.....	715	716	827	680	694	758	1,520	4,900	1,800	1,220	1,220	918
13.....	707	770	836	828	650	872	1,420	5,000	1,440	849	1,100	993
14.....	651	836	928	640	672	785	1,670	4,680	1,450	967	945	871
15.....	686	862	892	756	656	867	2,170	4,400	1,390	913	1,080	893
16.....	753	1,170	777	806	658	726	2,320	4,690	1,870	992	1,320	914
17.....	770	892	722	842	692	654	3,320	5,050	1,360	1,270	799	860
18.....	755	871	818	716	700	778	4,470	3,400	1,140	1,350	961	788
19.....	737	752	826	653	663	793	4,010	2,830	1,560	1,120	1,170	756
20.....	548	726	825	776	682	833	3,210	2,910	1,510	606	1,020	773
21.....	645	795	751	575	661	800	3,810	2,760	1,430	967	1,020	622
22.....	639	824	882	616	662	814	2,960	3,160	1,160	1,040	2,150	798
23.....	728	877	802	608	650	798	2,650	2,710	1,720	972	3,270	1,000
24.....	622	830	833	632	715	774	2,790	2,170	1,200	947	3,430	2,370
25.....	765	810	680	664	693	786	3,440	2,390	1,190	966	2,590	1,920
26.....	688	680	678	661	688	830	4,070	1,610	1,210	871	2,120	2,060
27.....	714	692	784	508	605	815	4,010	2,170	1,180	632	1,100	1,450
28.....	807	946	782	641	674	805	4,410	2,320	1,130	1,060	1,390	1,310
29.....	684	987	755	571	673	960	4,700	2,330	1,300	870	1,430	1,420
30.....	845	773	770	578	-----	817	4,740	2,060	1,190	866	1,560	1,120
31.....	885	-----	836	578	-----	864	-----	1,800	-----	1,040	1,130	-----

*Monthly discharge of Menominee River at Twin Falls, near Iron Mountain, Mich., for the year ending September 30, 1924*

[ Drainage area, 1,790 square miles ]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	885	548	733	0.409	0.47
November.....	1,170	675	834	.466	.52
December.....	1,080	678	826	.461	.53
January.....	842	508	691	.386	.44
February.....	736	556	668	.373	.40
March.....	960	471	733	.409	.47
April.....	4,740	832	2,510	1.40	1.56
May.....	5,050	1,610	3,410	1.91	2.20
June.....	2,540	1,130	1,540	.860	.96
July.....	2,210	606	1,070	.598	.69
August.....	3,430	799	1,560	.872	1.01
September.....	2,370	628	1,080	.603	.67
The year.....	5,050	471	1,310	.732	9.92

#### MENOMINEE RIVER BELOW KOSS, MICH.

**LOCATION.**—In sec. 9, T. 34 N., R. 27 W. at power plant of Menominee & Marinette Light & Traction Co., 4 miles below Koss, Marinette County, Mich., and 3 miles west of Ingalls, Mich. Little Cedar River, draining an area entirely in Michigan, enters from left half a mile below station.

**DRAINAGE AREA.**—3,790 square miles.

**RECORDS AVAILABLE.**—July 1, 1913, to September 30, 1924.

**DISCHARGE.**—Daily discharge was computed from hourly determinations of flow through turbines (from kilowatt output and effective head) plus discharge through gates and over spillway. No account was taken of the water passing through the exciter turbine, nor waste over the "trash gate" at power house. This amount was, however, relatively small.

**EXTREMES OF DISCHARGE.**—Maximum mean daily discharge during year, 11,800 second-feet May 11; minimum mean daily discharge, 764 second-feet January 1.

1913-1924: Maximum mean daily discharge, 23,200 second-feet April 23 and 25, 1916; minimum mean daily discharge, that of January 1, 1924.

**REGULATION.**—Above station are the following power plants: Sturgeon Falls, owned by Pennsylvania Iron Mining Co., 50 miles; Little Quinnesec, owned by Kimberly Clark, 57 miles; Upper Quinnesec, owned by Oliver Iron Mining Co., 62 miles; Ford plant owned by Ford Hydro-Electric Co., 68 miles; Twin Falls, owned by Peninsular Power Co., 75 miles. With the exception of the Kimberly Clark Dam at Little Quinnesec and the Ford Dam, the dams furnish power for utility and mining uses so that the flow past the dams is comparatively uniform. The Kimberly Clark Dam is used for paper mills and the Ford Dam for operating a sawmill, and they regulate the flow on Sundays and holidays. The effect of this regulation is generally felt at the station on Tuesdays. The monthly flow probably represents the natural flow.

**ACCURACY.**—September 12, 1922, a discharge measurement was made at highway bridge about 4 miles below station which checks the discharge as computed from power-plant records within 4 per cent. See Water-Supply Paper 524 for statement regarding earlier measurements. Records good.

**COOPERATION.**—Daily-discharge records furnished monthly by Edward Daniell, general manager of Menominee & Marinette Light & Traction Co.

*Daily discharge, in second-feet, of Menominee River below Kass, Mich., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept
1-----	1,790	1,630	1,750	764	1,160	1,200	1,420	9,340	3,110	2,820	1,740	2,490
2-----	1,410	1,350	1,560	926	1,100	1,230	1,880	8,400	2,450	2,550	1,880	2,430
3-----	1,420	1,920	1,790	995	1,160	1,280	1,880	7,920	1,940	2,100	1,310	1,770
4-----	1,630	1,280	1,770	1,030	1,110	1,160	2,070	7,350	1,920	2,650	1,780	2,050
5-----	1,620	1,640	1,670	1,100	1,190	1,200	2,490	6,650	2,280	2,270	2,520	2,300
6-----	1,590	1,350	1,580	1,060	1,180	1,200	2,760	6,340	2,410	2,090	2,960	1,630
7-----	1,240	1,440	1,580	1,120	1,250	1,080	3,240	5,890	2,750	1,570	3,070	1,480
8-----	1,350	1,480	1,660	1,050	1,180	1,100	3,300	5,830	2,220	1,970	2,740	2,070
9-----	1,190	1,700	1,710	1,230	1,280	1,030	3,680	7,350	2,930	2,400	1,920	1,610
10-----	914	1,720	1,410	1,250	1,220	1,120	3,530	8,750	3,120	2,740	1,220	1,850
11-----	1,070	1,410	937	1,190	1,220	1,150	3,970	11,800	3,160	2,600	2,500	1,600
12-----	1,230	1,410	1,170	1,170	1,140	1,150	4,630	11,200	2,600	3,320	2,840	1,740
13-----	1,490	1,470	1,350	1,160	1,260	1,260	4,070	11,000	2,560	1,680	2,420	1,860
14-----	1,270	1,480	1,080	1,170	1,300	1,230	2,980	11,100	2,470	2,270	2,410	1,330
15-----	1,350	1,670	1,170	1,160	1,250	1,520	3,670	10,700	2,850	1,890	2,440	1,850
16-----	1,170	1,620	1,470	1,170	1,250	1,160	4,880	10,100	2,580	1,930	2,460	1,450
17-----	1,220	1,750	1,670	1,280	1,300	1,280	6,240	9,710	2,460	2,150	2,500	1,720
18-----	1,670	1,330	1,480	1,260	1,260	1,270	6,660	9,580	2,770	1,500	2,770	1,810
19-----	1,750	1,760	1,680	1,220	1,200	1,270	9,040	8,700	2,600	2,180	2,700	1,760
20-----	1,670	1,520	1,560	1,170	1,340	1,300	10,400	7,040	2,600	2,060	3,010	1,690
21-----	1,760	1,670	1,670	1,180	1,300	1,420	8,780	5,370	1,670	2,180	2,600	1,390
22-----	1,500	1,500	1,660	1,130	1,220	1,520	8,440	5,700	2,500	1,880	3,430	1,630
23-----	1,390	1,520	1,390	1,170	1,320	1,350	7,670	5,050	2,160	2,100	4,100	1,530
24-----	1,530	1,670	1,500	1,220	1,250	1,400	7,420	4,940	2,330	1,760	6,390	1,640
25-----	1,670	1,370	1,080	1,200	1,240	1,250	6,650	5,240	2,700	1,850	6,810	1,810
26-----	1,630	1,410	1,400	1,170	1,130	1,530	6,810	4,250	2,330	1,770	6,220	2,870
27-----	1,500	1,460	1,100	1,120	1,280	1,580	7,920	5,330	2,330	1,780	4,800	2,380
28-----	1,560	1,540	1,600	1,160	1,300	1,660	8,330	3,470	2,140	1,530	3,260	1,980
29-----	1,450	1,060	1,350	995	1,230	1,620	9,200	4,120	2,000	1,820	2,980	2,320
30-----	1,380	2,000	1,180	1,120	1,420	1,420	9,650	4,030	2,570	1,900	2,610	2,130
31-----	1,390	-----	1,270	1,200	-----	1,260	-----	3,600	-----	1,850	2,730	-----



*Monthly discharge of Menominee River below Koss, Mich., for the year ending September 30, 1924*

[Drainage area, 3,790 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....	1,790	914	1,450	0.383	0.44
November .....	2,000	1,060	1,540	.406	.45
December .....	1,790	937	1,460	.385	.44
January .....	1,280	764	1,130	.298	.34
February .....	1,340	1,100	1,230	.325	.35
March .....	1,660	1,030	1,300	.343	.40
April .....	10,400	1,420	5,460	1.44	1.61
May .....	11,800	3,470	7,290	1.92	2.21
June .....	3,160	1,670	2,490	.657	.73
July .....	2,900	1,530	2,080	.549	.63
August .....	6,810	1,220	3,030	.799	.92
September .....	2,870	1,330	1,880	.496	.55
The year .....	11,800	764	2,530	.668	0.07

NOTE.—Monthly discharge computed by U. S. Geol. Survey from daily-discharge records furnished by Menominee & Marinette Light & Traction Co.

**PINE RIVER AT PINE RIVER POWER PLANT, NEAR FLORENCE, WIS.**

**LOCATION.**—In sec. 28, T. 39 N., R. 18 E. at power plant of Peninsular Power Co. near Florence, Florence County.

**DRAINAGE AREA.**—520 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale 1 inch=6 miles).

**RECORDS AVAILABLE.**—October 1, 1923, to September 30, 1924. January 22, 1914, to September 30, 1923, records were obtained at a station about 4 miles upstream where drainage area is 488 square miles.

**DISCHARGE.**—The daily discharge is computed from hourly determinations of the flow through the turbines based on kilowatt output; to which is added the quantity wasted.

**EXTREMES OF DISCHARGE.**—Maximum mean daily discharge during year, 1,870 second-feet May 11; minimum mean daily discharge, zero on January 20. The extremes of discharge are the result of regulation.

**REGULATION.**—Discharge is subject to diurnal fluctuation by operation of plant at which the station is situated but the pondage at the plant is not large and the monthly discharge is very nearly the natural flow. There are no power plants above.

**ACCURACY.**—The rating of the wheels and development of curves was done by Mead & Seastone, hydraulic engineers. Records at plant are carefully taken, and results are considered reliable. Medium and low water records good; high-water records fair.

**COOPERATION.**—Records of daily discharge are furnished by Peninsular Power Co.

*Daily discharge, in second-feet, of Pine River at Pine River power plant, near Florence, Wis., for the year ending September 30, 1924*

Date	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	221	183	221	258	177	137	83	1,530	427	608	519	248
2.....	214	189	154	159	108	213	196	1,500	401	528	530	266
3.....	200	208	282	166	185	107	200	1,410	403	532	425	289
4.....	137	258	271	156	114	169	272	1,100	407	543	582	285
5.....	148	263	182	165	175	162	399	984	401	463	574	293

*Daily discharge, in second-feet, of Pine River at Pine River power plant, near Florence, Wis., for the year ending September 30, 1924—Continued*

Date	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
6.....	133	191	179	73	167	181	347	854	273	508	596	297
7.....	98	197	180	248	165	133	468	1,100	635	390	577	274
8.....	266	199	188	155	163	126	505	1,080	669	293	614	280
9.....	184	275	173	156	196	190	470	1,560	608	386	758	212
10.....	191	130	101	159	131	129	435	1,820	514	332	604	170
11.....	188	273	273	184	134	195	386	1,870	517	290	510	209
12.....	195	258	251	188	122	149	405	1,740	514	295	507	296
13.....	200	187	194	75	165	118	432	1,610	460	234	345	278
14.....	202	191	101	232	149	201	569	1,780	521	277	409	242
15.....	248	185	101	162	159	106	687	1,790	488	291	470	240
16.....	185	88	177	168	159	113	781	1,780	426	292	595	255
17.....	188	294	253	156	191	226	1,410	1,650	492	293	588	248
18.....	213	211	184	228	127	153	1,450	1,540	288	305	713	204
19.....	191	277	105	189	123	170	1,420	1,390	528	350	467	201
20.....	360	268	184	0	125	114	1,320	1,150	583	271	589	171
21.....	255	195	263	207	152	167	1,240	1,040	602	284	874	260
22.....	248	191	269	195	148	146	1,140	956	485	254	1,290	453
23.....	197	191	189	156	201	138	1,150	831	511	242	1,470	489
24.....	275	191	110	104	111	181	1,180	920	390	240	1,300	467
25.....	199	173	252	121	118	190	1,370	846	326	246	1,170	410
26.....	208	353	268	112	130	149	1,400	735	290	300	984	298
27.....	212	209	187	147	203	196	1,490	379	290	265	850	367
28.....	134	287	191	144	114	285	1,590	603	238	238	778	417
29.....	290	59	192	172	132	177	1,660	559	390	291	602	278
30.....	171	319	190	172	-----	131	1,600	404	395	411	507	296
31.....	270	-----	105	174	-----	175	-----	465	-----	530	560	-----

*Monthly discharge of Pine River at Pine River power plant, near Florence, Wis., for the year ending September 30, 1924*

[Drainage area, 520 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	360	98	207	0.398	0.46
November.....	353	59	216	.415	.46
December.....	282	101	192	.369	.43
January.....	258	0	160	.308	.36
February.....	203	108	150	.288	.31
March.....	285	106	162	.312	.36
April.....	1,660	83	868	1.67	1.86
May.....	1,870	379	1,190	2.29	2.64
June.....	669	273	451	.867	.97
July.....	608	234	348	.669	.77
August.....	1,470	345	691	1.33	1.53
September.....	489	170	290	.558	.62
The year.....	1,870	0	412	.792	10.77

#### PIKE RIVER AT AMBERG, WIS.

**LOCATION.**—In sec. 15, T. 35 N., R. 21 E., at Chicago, Milwaukee & St. Paul Railway bridge half a mile south of Amberg, Marinette County, 1 mile below junction of two branches of Pike River, and 11 miles above mouth.

**DRAINAGE AREA.**—240 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911, scale 1 inch=6 miles).

**RECORDS AVAILABLE.**—February 26, 1914, to September 30, 1924.

**GAGE.**—Chain gage fastened to guardrail on upstream side of bridge; read by Frank Bunce.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge a quarter of a mile downstream from bridge to which gage is attached or by wading.

**CHANNEL and CONTROL.**—Bed composed of solid rock and some loose granite boulders; channel permanent but very rough at gage. Banks medium high; not subject to overflow.

**EXTREMES of DISCHARGE.**—Maximum stage recorded during year, 4.65 feet at 9.45 a. m. May 11 (discharge, 1,160 second-feet); minimum stage, 1.35 feet on December 14 and 31 (discharge, 74 second-feet).

1914-1924: Maximum stage recorded, 7.68 feet at 5 p. m. April 10, 1922 (discharge 2,730 second-feet); estimated minimum discharge, 65 second-feet January 27, 1922.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation permanent except when affected by ice. Rating curve well defined between 118 and 1,120 second-feet. Gage read to quarter-tenths once daily. Discharge ascertained by applying daily gage height to rating curve, except as indicated in footnote to table of daily discharge. Records excellent, except during winter, for which they are fair.

*Discharge measurements of Pike River at Amberg, Wis., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
Jan. 12	G. P. Steinmetz.....	<i>Feet</i> • 1.65	<i>Sec.-ft.</i> 122	Mar. 18	F. C. Christopherson..	<i>Feet</i> • 1.70	<i>Sec.-ft.</i> 120
Feb. 24	F. C. Christopherson..	• 1.90	108	May 26	do .....	2.74	415

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Pike River at Amberg, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	118	128	134	75	115	120	180	476	303	348	230	162
2	118	138	138	75	130	120	190	460	288	318	204	155
3	118	142	142	80	145	120	190	428	303	258	204	148
4	118	148	148	80	160	140	217	333	288	238	244	169
5	118	142	148	90	150	160	273	326	288	217	258	162
6	114	140	109	90	140	165	364	318	318	258	303	158
7	114	138	134	90	130	170	460	396	380	258	348	158
8	109	134	138	100	125	150	510	582	348	273	333	158
9	114	134	158	109	120	130	493	820	318	333	303	154
10	114	134	134	115	110	120	460	1,120	303	326	273	148
11	118	128	109	122	110	110	412	1,160	288	318	244	142
12	118	125	176	128	110	100	412	949	273	288	204	162
13	114	122	109	118	105	90	444	738	258	204	204	180
14	114	118	74	109	100	85	493	738	258	192	199	185
15	114	114	204	100	100	80	620	778	258	176	244	162
16	109	118	180	103	100	75	698	738	333	192	288	162
17	134	122	138	106	100	90	862	658	318	273	348	160
18	158	122	128	109	100	110	698	582	318	204	318	158
19	192	122	109	114	105	95	658	460	303	192	230	154
20	204	122	138	118	110	80	820	428	303	169	258	148
21	185	128	134	100	110	90	759	380	288	174	351	154
22	169	128	138	100	110	100	698	318	217	180	444	192
23	158	134	128	100	105	110	582	258	288	192	546	204
24	154	138	104	100	100	105	620	428	288	170	455	204
25	148	138	109	100	110	100	582	444	273	148	364	185
26	142	138	128	100	120	110	582	412	230	142	318	180
27	138	142	148	100	125	125	582	396	204	140	273	176
28	143	154	138	100	130	140	582	380	192	138	244	192
29	148	169	114	100	125	150	546	348	273	138	204	185
30	148	148	86	100	-----	160	510	333	348	180	192	180
31	100	-----	74	100	-----	160	-----	318	-----	217	180	-----

**NOTE.**—Stage-discharge relation affected by ice Jan. 1-8 and Jan. 21 to Apr. 2; discharge ascertained by applying to rating table daily gage heights corrected for ice effect based on three discharge measurements, observer's notes, and weather records. Gage not read; discharge interpolated Oct. 17, 28, Nov. 6, 12, 13, Dec. 10, Jan. 10, 11, 14, 16, 17, 21, 23, 25, 26, 28, 30, Feb. 1, 3, 5, 7, 8, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, Mar. 2, 4, 6, 10, 12, 14, 17, 18, 21, 24, 26, 27, 30, Apr. 1, 21, 29, May 5, 12, July 3, 10, 21, 24, 27, Aug. 15, 21, 24, Sept. 2 and 17.

*Monthly discharge of Pike River at Amberg, Wis.; for the year ending September 30, 1924*

[Drainage area, 240 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	204	100	134	0.558	0.64
November.....	169	114	134	.558	.62
December.....	204	74	131	.546	.63
January.....	128	75	101	.421	.49
February.....	160	100	117	.488	.53
March.....	170	75	118	.492	.57
April.....	862	180	517	2.15	2.40
May.....	1,160	258	532	2.22	2.56
June.....	380	192	288	1.20	1.34
July.....	348	138	221	.921	1.06
August.....	546	180	284	1.18	1.36
September.....	204	142	168	.700	.78
The year.....	1,160	74	229	.954	12.98

**PESHTIGO RIVER AT HIGH FALLS, NEAR CRIVITZ, WIS.**

**LOCATION.**—In sec. 1, T. 32 N., R. 18 E., at High Falls, near Crivitz, Marinette County, at power house of Wisconsin Public Service Corporation, 1 mile upstream from Thunder River (coming in from right) and 15 miles by road northwest of Crivitz.

**DRAINAGE AREA.**—520 square miles (measured on Wisconsin Geological and Natural History Survey map, edition of 1911; scale 1 inch=6 miles).

**RECORDS AVAILABLE.**—August 3, 1912, to September 30, 1924.

**DISCHARGE.**—The daily discharge, subsequent to September 30, 1922, is computed from the hourly flow through the turbines based on load on generators, head on turbines, and overall efficiency of the plant; to which is added the quantity wasted. Prior to October 1, 1922, Gurley graph water-stage recorder on left bank, one-fourth of a mile downstream, was used.

**EXTREMES OF DISCHARGE.**—Maximum mean daily discharge during year, 2,430 second-feet May 15; minimum mean daily discharge, 51 second-feet November 25; December 9, 16, 25, 30, January 6, 13, 20, 27, February 3, 10, 17, 24, March 2, and 9.

1912-1924: Maximum stage from water-stage recorder, 7.80 feet at 4.30 p. m. April 11, 1922 (discharge, 3,860 second-feet); minimum stage, 0.97 foot from midnight to 7.20 a. m. October 27, 1919 (discharge, 43 second-feet). Owing to artificial regulation, extremes given do not represent natural flow.

**REGULATION.**—Considerable diurnal fluctuation caused by operation of power plant and during log-driving season by the manipulation of the gates. The mean monthly flow does not represent the natural flow because of storage in the service reservoir.

**ACCURACY.**—Daily discharge was computed from hourly records at the power plant, and results are considered fair.

**COOPERATION.**—Records of daily discharge furnished by the Wisconsin Public Service Corporation; monthly and yearly discharge computed by engineers of the United States Geological Survey.

*Daily discharge, in second-feet, of Peshtigo River at High Falls, near Crivitz, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	263	266	116	73	234	127	334	1,480	694	657	356	544
2	399	320	152	313	207	51	386	1,570	596	550	403	338
3	249	160	289	290	51	213	782	1,440	453	604	708	309
4	283	74	248	293	271	241	697	1,410	672	643	437	378
5	212	218	260	115	241	237	561	1,140	619	472	837	333
6	207	297	265	51	213	287	373	1,730	537	480	626	371
7	168	289	293	252	206	317	639	1,090	653	321	637	347
8	328	249	141	302	212	193	785	1,160	735	366	893	346
9	279	252	51	275	177	51	695	1,650	712	676	857	343
10	321	250	261	241	51	346	805	1,910	696	343	498	299
11	361	61	358	189	205	342	696	2,050	567	486	457	311
12	281	224	347	104	228	285	631	1,960	660	509	571	307
13	240	338	272	51	239	285	218	1,940	569	409	630	293
14	65	324	290	276	175	280	716	1,950	506	375	344	231
15	267	264	156	294	227	137	737	2,430	711	244	515	365
16	361	266	51	275	115	244	692	2,130	454	198	480	295
17	410	199	255	262	51	361	1,730	2,250	649	328	576	273
18	222	55	313	203	97	415	2,170	1,890	549	296	655	284
19	276	230	266	169	247	546	1,990	1,520	663	329	549	382
20	248	284	222	51	247	570	1,910	1,350	621	315	503	236
21	53	258	218	174	209	747	1,820	1,100	605	462	685	361
22	213	246	185	191	149	896	1,590	980	478	264	797	298
23	314	275	52	139	144	408	1,540	981	643	337	1,010	399
24	277	147	52	174	51	688	1,510	921	378	363	888	470
25	290	51	51	256	230	539	1,620	946	503	232	1,000	407
26	248	412	302	213	291	418	1,700	876	404	230	953	485
27	230	335	321	51	226	781	1,640	875	421	384	890	387
28	79	411	217	386	176	612	1,780	665	566	285	818	364
29	312	118	178	287	230	230	1,720	702	516	325	581	361
30	283	114	51	250	-----	140	1,790	804	522	259	421	391
31	387	-----	187	238	-----	281	-----	691	-----	282	432	-----

*Monthly discharge of Peshtigo River at High Falls, near Crivitz, Wis., for the year ending September 30, 1924*

[Drainage area, 520 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	410	53	262	0.504	0.58
November	412	51	233	.448	.50
December	358	51	207	.398	.46
January	386	51	208	.400	.46
February	291	51	186	.358	.39
March	596	51	363	.698	.80
April	2,170	218	1,140	2.19	2.44
May	2,430	665	1,410	2.71	3.12
June	735	378	578	1.11	1.24
July	676	198	388	.746	.86
August	1,010	344	645	1.24	1.43
September	544	231	350	.673	.75
The year	2,430	51	498	.958	13.03

## OCONTO RIVER NEAR GILLETT, WIS.

**LOCATION.**—In sec. 34, T. 28 N., R. 18 E., at highway bridge,  $2\frac{1}{2}$  miles southeast of Gillett, Oconto County, and 27 miles above mouth of river.

**DRAINAGE AREA.**—678 square miles (measured on Wisconsin Geological and Natural History Survey map, edition of 1911; scale 1 inch=6 miles).

**RECORDS AVAILABLE.**—June 7, 1906, to March 30, 1909; January 6, 1914, to September 30, 1924.

**GAGE.**—Chain gage attached to iron railing on upstream side of bridge; read by Harvey Gilbertson. Zero of gage was raised 4 feet January 6, 1914.

**DISCHARGE MEASUREMENTS.**—Made from bridge to which gage is attached.

**CHANNEL AND CONTROL.**—Gravel; permanent. Left bank of medium height and not subject to overflow. During extremely high stages water may overflow around right end of bridge.

**EXTREMES OF DISCHARGE.**—Maximum stage during year, 5.35 feet at 9 a. m. April 19 (discharge, 3,280 second-feet); minimum discharge estimated 235 second-feet January 23-29.

1906-1924: Maximum stage recorded, 9.1 feet at 3 p. m. April 11, 1922 (discharge, 6,470 second-feet); minimum stage, 0.1 foot June 3 and 6, 1907 (discharge, 95 second-feet). The maximum stage of April 11, 1922, was result of the failure of a dam at Pulcifer about 4 miles above station.

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

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation practically permanent, except as affected by ice. Rating curve well defined between 295 and 1,850 second-feet, and fairly well defined above 1,850 second-feet. Gage read to quarter-tenths once daily. Daily discharge obtained by applying daily gage height to rating table, except for period when stage-discharge relation was affected by ice, for which it was obtained as indicated in footnote to table of daily discharge. Open-water records excellent, except for extremely high stages for which they are good; winter records fair.

*Discharge measurements of Oconto River near Gillett, Wis., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Jan. 14	G. P. Steinmetz .....	* 1.96	320	Mar. 18	F. C. Christopherson..	* 2.30	308
Feb. 25	F. C. Christopherson..	* 2.10	267	May 27	-----do-----	2.97	1,360

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Oconto River near Gillett, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	387	370	406	350	260	310	415	1,850	1,290	659	406	466
2	387	370	488	350	265	300	415	1,920	1,640	659	425	466
3	370	352	406	350	270	295	460	1,430	1,430	633	534	446
4	352	352	446	350	280	295	560	1,290	425	667	510	406
5	352	370	425	350	280	295	635	1,260	425	557	488	425
6	352	352	425	350	280	300	740	1,290	406	557	466	425
7	352	370	387	330	295	310	820	1,260	387	557	510	425
8	352	352	425	330	310	310	1,080	2,000	425	638	633	406
9	352	352	406	330	300	310	1,570	2,080	406	638	607	406
10	352	352	406	330	295	310	1,430	2,640	557	633	607	387
11	352	336	276	330	320	310	1,360	2,800	659	659	582	387
12	336	352	262	310	350	310	1,220	2,880	769	638	597	406
13	352	352	387	310	340	310	1,150	2,880	607	582	534	406
14	352	352	370	310	330	320	1,150	2,960	557	510	534	425
15	352	370	370	295	320	330	1,570	2,960	607	510	510	387
16	352	370	370	260	310	320	1,430	2,800	659	466	446	406
17	336	352	370	280	320	310	2,080	2,640	659	466	446	406
18	387	352	370	270	330	310	2,320	2,400	633	446	425	406
19	446	352	370	265	330	310	3,280	1,850	488	425	488	387
20	466	352	387	260	330	330	3,120	1,710	534	425	466	387
21	466	352	387	250	310	330	2,800	1,570	557	305	510	387
22	446	352	387	240	295	350	2,640	1,260	510	336	510	387
23	425	352	387	235	295	350	2,320	1,260	557	387	827	387
24	406	370	370	235	295	370	2,320	1,020	488	466	769	387
25	387	387	320	235	295	390	2,480	1,290	510	387	769	387
26	387	370	336	235	295	390	2,400	1,360	488	387	607	406
27	352	352	387	235	300	415	2,320	1,780	488	370	510	425
28	397	370	370	235	310	415	2,320	1,150	466	370	488	425
29	387	3.0	370	235	310	415	2,000	887	510	387	488	406
30	387	415	370	240	-----	415	1,710	887	582	425	488	406
31	387	-----	370	250	-----	415	-----	827	-----	406	488	-----

NOTE.—Stage-discharge relation affected by ice Nov. 23, 30, Dec. 14-19, and Dec. 28 to Apr. 8; discharge ascertained from gage heights, three discharge measurements, observer's notes, and weather records.

*Monthly discharge of Oconto River at Gillett, Wis., for the year ending September 30, 1924*

[Drainage area, 678 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	466	336	379	0.559	0.64
November	415	336	361	.532	.59
December	488	262	389	.574	.66
January	350	235	289	.426	.49
February	350	260	304	.448	.48
March	415	295	337	.497	.57
April	3,280	415	1,670	2.46	2.74
May	2,960	827	1,820	2.68	3.09
June	1,640	387	624	.920	1.03
July	659	305	499	.736	.85
August	827	406	536	.791	.91
September	466	387	409	.603	.67
The year	3,280	235	635	.937	12.72

#### FOX RIVER AT BERLIN, WIS.

LOCATION.—In sec. 16, T. 17 N., R. 13 E., at Government lock and dam  $2\frac{1}{3}$  miles upstream from Berlin, Green Lake County.

DRAINAGE AREA.—1,430 square miles (measured on map issued by the Wisconsin Geological and Natural History Survey, edition of 1911; scale 1 inch = 6 miles).

RECORDS AVAILABLE.—January 1, 1898, to September 30, 1924.

GAGE.—Staff gage in pool immediately below dam; read by lock tender for United States Engineer Corps.

CHANNEL AND CONTROL.—Sand and gravel, one channel at all stages; banks low and subject to overflow.

DISCHARGE MEASUREMENTS.—Made from downstream side of Huron Street highway bridge in Berlin about  $2\frac{1}{2}$  miles downstream from gage. Rating curves at gage corrected for any small inflow between gage and measuring section.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 4,020 second-feet April 9 and 10; minimum mean daily discharge, 380 second-feet, January 22 and 23.

1898-1924. Maximum mean daily discharge, 6,400 second-feet, March 28 and 30, 1916; minimum mean daily discharge, 250 second-feet, February 1-4, 1900.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation practically permanent except for effect of ice. Rating curve well defined between 800 and 6,000 second-feet. Gage read three times daily; in general, however, noon reading alone is used in determination of daily discharge. Daily discharge ascertained by applying mean daily gage height to rating table, corrected for period when stage-discharge relation was affected by ice by means of curves based on discharge measurements and observer's notes. Open-water records good; winter records roughly approximate.

COOPERATION.—Records have been collected and computations of daily discharge made by United States Engineer Corps. Open-water records obtained from rating curves based on discharge measurements made by United States Geological Survey.

*Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	535	645	645	645	445	535	1,800	2,670	1,060	1,460	765	2,520
2	535	645	645	735	465	560	1,850	2,600	1,020	1,420	765	2,450
3	535	645	645	735	465	560	1,980	2,520	975	1,360	800	2,310
4	535	675	645	735	465	615	2,600	2,380	1,020	1,270	1,220	2,170
5	535	615	615	705	445	615	3,440	2,310	975	1,220	1,460	2,100
6	535	645	560	645	445	645	3,620	2,170	940	1,140	1,620	1,980
7	560	675	645	590	420	705	3,720	2,100	940	1,100	1,800	1,800
8	560	645	645	510	420	675	3,820	2,100	905	1,060	1,910	1,740
9	560	645	645	510	445	645	4,020	2,310	830	1,060	2,100	1,620
10	560	645	615	535	445	705	4,020	2,450	830	1,060	2,240	1,570
11	560	645	590	560	445	705	3,920	2,520	865	1,090	2,450	1,460
12	560	615	615	535	445	705	3,820	2,520	865	1,060	2,520	1,520
13	590	615	645	490	465	706	3,720	2,670	940	1,060	2,600	1,460
14	615	615	615	465	465	735	3,530	2,670	1,020	1,020	2,600	1,460
15	590	645	510	465	465	735	3,440	2,600	1,100	940	2,670	1,460
16	560	615	560	465	490	735	3,260	2,520	1,100	940	2,830	1,420
17	590	615	590	445	490	735	3,360	2,450	1,100	905	2,830	1,360
18	615	645	560	445	410	765	3,260	2,310	1,220	865	2,830	1,320
19	615	615	590	445	490	765	3,080	2,170	1,270	830	3,000	1,270
20	675	615	560	445	490	765	3,080	2,100	1,320	800	3,080	1,270
21	675	615	590	420	490	800	3,000	1,980	1,360	765	3,370	1,360
22	645	705	615	380	490	800	3,080	1,850	1,360	800	3,350	1,520
23	645	645	590	380	490	800	3,000	1,680	1,420	800	3,350	1,570
24	645	615	615	400	490	830	2,910	1,570	1,460	830	3,350	1,570
25	645	645	615	420	510	940	2,910	1,460	1,460	830	3,260	1,570
26	615	590	615	420	510	975	2,910	1,420	1,460	830	3,170	1,570
27	645	615	615	420	510	1,100	2,830	1,360	1,460	800	3,080	1,570
28	645	590	615	420	535	1,220	2,830	1,320	1,460	800	3,000	1,570
29	645	615	535	420	535	1,570	2,830	1,220	1,460	765	2,910	1,520
30	615	645	590	445	-----	1,910	2,750	1,180	1,460	800	2,750	1,460
31	645	-----	705	445	-----	1,910	-----	1,100	-----	800	2,670	-----



*Monthly discharge of Fox River at Berlin, Wis., for the year ending September 30, 1924*

[Drainage area, 1,430 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	675	535	596	0.417	0.48
November.....	705	590	633	.443	.49
December.....	705	510	608	.425	.49
January.....	735	380	506	.354	.41
February.....	535	420	474	.331	.36
March.....	1,910	535	854	.597	.69
April.....	4,070	1,800	3,150	2.20	2.46
May.....	2,670	1,100	2,070	1.45	1.67
June.....	1,460	830	1,160	.811	.90
July.....	1,460	765	982	.687	.79
August.....	3,350	765	2,460	1.72	1.98
September.....	2,520	1,270	1,650	1.15	1.28
The year.....	4,020	380	1,260	.881	12.00

**FOX RIVER AT RAPIDE CROCHE DAM, NEAR WRIGHTSTOWN, WIS.**

**LOCATION.**—At Rapide Croche Dam, in sec. 4, T. 21 N., R. 19 E., 2 miles from Wrightstown, Brown County, 19 miles downstream from Lake Winnebago and 20 miles upstream from mouth of river at Green Bay.

**RECORDS AVAILABLE.**—March 3, 1896, to September 30, 1924.

**DRAINAGE AREA.**—6,150 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale 1 inch=6 miles.

**DETERMINATION OF DISCHARGE.**—The dam, owned by the Federal Government and operated by the United States Engineer Corps to aid navigation, is made of timber and is equipped with four needle sluice gates which are used only in times of high water. A vertical staff gage at the lower end of the canal leading to the lock and about a quarter of a mile below the dam is read five times daily at 7 a. m., 9 a. m., noon, 3 p. m., and 6 p. m. The mean flow for the day is computed from a formula, using the five gage heights for the day, assuming gradual changes in gage height between the readings and weighting the different gage heights by elapsed time.

**EXTREMES OF DISCHARGE.**—Maximum mean daily discharge during year, 15,500 second-feet, May 13; minimum mean daily discharge, 1,280 second-feet October 14.

1918-1924: Maximum mean daily discharge, 20,100 second-feet, April 23, 1922; minimum mean daily discharge, 742 second-feet, August 15, 1921.

**REGULATION.**—Flow past station is controlled by regulation in Lake Winnebago, which has an area of 215 square miles, and to some extent by dams between the outlet of Lake Winnebago and the station. The dams are operated for power purposes and in the interests of navigation. The same storage conditions have existed throughout the period covered by the records.

**ACCURACY.**—Records good.

**COOPERATION.**—Records were collected and computations of daily discharge made by the United States Engineer Corps, based on curves which were developed by current-meter measurements made by engineers of the United States Geological Survey.

No discharge measurements were made at this station during the year.

*Daily discharge, in second-feet, of Fox River at Rapide Croche Dam, near Wrightstown, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	2,020	3,110	2,130	3,110	4,460	4,230	4,870	14,400	4,110	5,320	4,560	10,800
2.....	2,240	3,200	1,390	3,680	4,460	3,420	4,870	14,300	4,810	5,600	4,040	10,800
3.....	2,340	2,830	1,980	3,820	3,610	4,070	5,060	14,300	6,230	5,090	2,800	8,990
4.....	2,480	1,760	3,770	3,150	3,570	4,500	4,960	13,500	6,410	3,680	5,150	7,970
5.....	2,200	1,780	4,000	3,850	3,180	4,270	4,580	13,500	6,510	3,900	9,230	7,300
6.....	2,160	2,960	3,890	2,640	3,240	3,980	3,300	12,100	6,220	3,830	10,900	7,060
7.....	1,600	3,030	3,820	2,910	4,370	4,210	4,110	10,100	5,770	4,340	11,100	4,320
8.....	1,800	3,080	3,290	3,900	4,480	4,100	4,650	11,000	3,880	5,080	11,200	3,960
9.....	2,350	2,980	2,030	4,080	4,330	3,360	4,940	12,600	4,490	5,450	11,000	4,850
10.....	2,340	2,810	2,140	4,030	3,530	3,610	4,440	14,400	5,840	5,340	10,000	5,270
11.....	2,420	1,580	3,930	3,910	3,970	4,270	4,490	14,400	5,990	5,230	10,300	5,570
12.....	2,100	1,900	4,180	4,010	4,450	4,520	4,610	14,200	6,090	4,870	10,900	5,430
13.....	2,150	2,920	3,300	2,960	4,390	4,470	3,810	15,500	6,010	2,880	10,600	5,260
14.....	1,280	3,120	3,630	3,130	4,370	4,370	4,340	15,000	5,640	3,800	9,220	3,620
15.....	1,620	2,940	3,960	4,010	4,280	4,460	4,930	14,500	4,470	4,980	7,780	4,340
16.....	2,330	2,800	2,900	4,180	4,100	3,890	5,010	14,700	5,210	5,110	8,190	5,300
17.....	2,400	2,690	2,390	4,290	3,720	4,280	5,660	14,400	6,190	4,920	6,960	5,430
18.....	2,420	1,810	4,150	4,150	3,680	4,710	7,210	13,000	6,040	4,810	6,760	5,360
19.....	2,360	1,500	4,060	3,950	4,590	4,660	9,080	13,300	6,170	4,070	8,600	5,360
20.....	2,130	2,440	4,170	3,090	3,740	4,470	8,980	14,100	5,740	2,720	8,230	4,810
21.....	1,570	2,420	4,110	3,040	4,080	4,620	9,810	13,800	5,250	3,850	9,740	3,590
22.....	1,930	2,580	4,150	4,120	3,920	4,570	12,500	13,900	4,110	4,640	14,800	4,070
23.....	2,850	2,550	3,110	4,220	4,560	3,810	14,000	12,300	4,950	4,660	12,100	5,170
24.....	3,130	2,470	2,240	4,250	3,660	4,360	13,300	11,300	6,060	4,840	11,900	5,400
25.....	3,150	1,700	2,900	4,100	4,000	4,950	9,860	9,430	5,890	4,820	12,100	5,420
26.....	3,010	1,720	3,880	4,000	4,540	4,360	13,700	8,940	5,730	4,530	12,800	5,610
27.....	2,780	2,650	3,930	3,410	4,510	4,480	13,500	8,460	5,560	2,940	11,900	5,440
28.....	1,730	2,640	2,800	3,850	4,390	5,090	14,300	8,450	5,520	3,550	9,850	3,890
29.....	2,100	2,350	3,220	4,470	4,310	4,650	14,700	6,040	4,100	4,550	12,100	3,800
30.....	3,030	1,920	2,790	4,650	-----	3,260	14,500	5,660	4,380	4,660	12,300	4,660
31.....	3,110	-----	2,400	4,430	-----	4,350	-----	5,010	-----	4,570	11,200	-----

*Monthly discharge of Fox River at Rapide Croche Dam, near Wrightstown, Wis., for the year ending September 30, 1924*

[Drainage area, 6,150 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	3,150	1,280	2,290	0.372	0.43
November.....	3,200	1,500	2,470	.402	.45
December.....	4,180	1,390	3,250	.528	.61
January.....	4,650	2,640	3,790	.616	.71
February.....	4,540	3,180	4,090	.665	.72
March.....	5,090	3,290	4,270	.694	.80
April.....	14,700	3,300	7,810	1.27	1.42
May.....	15,500	5,010	12,100	1.97	2.27
June.....	6,510	3,880	5,450	.886	.99
July.....	5,600	2,720	4,470	.727	.84
August.....	14,800	2,800	9,620	1.56	1.80
September.....	10,800	3,590	5,640	.917	1.02
The year.....	15,500	1,280	5,450	.886	12.06

## WOLF RIVER AT KESHENA, WIS.

**LOCATION.**—In sec. 26, T. 28 N., R. 15 E., at highway bridge at Keshena, Shawano County, 3 miles below junction with West Branch of Wolf River, which enters from right.

**DRAINAGE AREA.**—840 square miles.

**RECORDS AVAILABLE.**—May 9, 1907, to March 31, 1909; February 10, 1911, to September 30, 1924.

**GAGE.**—Chain gage fastened to downstream side of bridge December 9, 1914; May 9, 1907, to November 29, 1914, vertical staff gage fastened to downstream abutment; both gages at same datum; read by G. Sloniker.

**DISCHARGE MEASUREMENTS.**—Made from bridge to which gage is attached.

**CHANNEL AND CONTROL.**—Gravel; smooth and practically permanent. Banks of medium height; overflow improbable.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 5.78 feet at 7 a. m. May 15 (discharge, 3,320 second-feet); minimum discharge estimated, 415 second-feet for several days in January.

1907-1909; 1911-1924: Maximum stage recorded, 7.30 feet at 6.30 p. m. April 10, 1922 (discharge, 4,390 second-feet); minimum discharge during open-water periods 275 second-feet, September 26, 1908.

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

**REGULATION.**—The river and its main tributaries above Keshena are controlled to some extent by logging dams.

**ACCURACY.**—Stage-discharge relation permanent except as affected by ice. Rating curve well defined throughout. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for period when stage-discharge relation was affected by ice, for which it was ascertained as indicated in footnote to table of daily discharge. Open-water records excellent; winter records fair.

*Discharge measurements of Wolf River at Keshena, Wis., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by	Gage height	Discharge
Jan. 15	G. P. Steinmetz.....	<i>Feet</i> 2.30	<i>Sec.-ft.</i> 440	Mar. 19	F. C. Christopherson..	<i>Feet</i> 2.38	<i>Sec.-ft.</i> 511
Feb. 26	F. C. Christopherson..	2.30	450	May 27	Do .....	3.30	1,420

• Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Wolf River at Keshena, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	565	565	565	565	440	470	640	2,070	1,130	860	1,010	680
2	565	565	640	565	440	470	640	1,930	1,130	815	860	680
3	565	565	530	565	440	470	640	1,720	1,130	860	960	640
4	565	565	530	565	470	500	680	1,580	1,130	815	1,070	640
5	530	565	565	565	500	530	815	1,580	1,070	860	1,130	640
6	530	565	565	530	500	530	960	1,720	1,190	860	1,010	640
7	530	565	530	500	500	565	1,130	2,000	1,250	860	910	640
8	530	565	530	500	500	530	1,190	2,140	960	1,010	910	640
9	565	565	530	500	500	530	1,130	2,460	960	1,130	910	640
10	565	565	530	500	500	530	1,130	2,700	1,070	1,010	860	600
11	565	530	565	500	500	565	1,130	2,540	1,070	860	815	600
12	565	530	530	500	530	565	1,130	2,300	1,070	770	815	640
13	530	565	530	470	565	565	1,070	2,540	1,010	680	770	725
14	530	565	565	440	565	565	1,190	3,100	1,070	680	725	680
15	530	565	565	440	500	565	1,510	3,260	1,010	640	725	640
16	565	565	600	440	530	530	1,860	2,940	960	725	815	640
17	600	565	680	440	500	500	2,540	2,620	1,010	640	860	640
18	640	565	640	440	500	500	2,860	2,300	1,010	640	815	600
19	680	565	600	440	500	500	2,620	2,070	960	600	815	600
20	640	565	680	440	500	500	2,380	1,930	910	640	815	600
21	640	565	640	415	500	500	2,460	1,790	910	600	770	640
22	565	530	600	415	500	500	2,220	1,650	860	600	1,250	680
23	565	530	565	440	470	500	2,140	1,580	860	565	1,510	815
24	565	530	565	415	440	500	2,140	1,720	725	600	1,370	815
25	565	530	600	415	440	500	2,460	1,650	680	640	1,130	815
26	565	530	565	415	440	530	2,540	1,580	725	640	1,010	725
27	565	530	600	415	440	500	2,540	1,440	815	640	860	725
28	600	500	600	415	470	640	2,460	1,370	815	600	860	680
29	600	470	600	440	470	530	2,380	1,250	960	600	815	680
30	565	565	600	440	-----	500	2,220	1,250	910	725	770	680
31	565	-----	565	440	-----	565	-----	1,190	-----	960	725	-----

NOTE.—Stage-discharge relation affected by ice Dec. 14-16, Dec. 30 to Apr. 6; discharge ascertained by applying to rating table gage heights corrected for ice effect by means of three discharge measurements, observer's notes, and weather records.

*Monthly discharge of Wolf River at Keshena, Wis., for the year ending September 30, 1924*

[Drainage area, 840 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	680	530	571	0.680	0.78
November	565	470	550	.655	.73
December	680	530	580	.690	.80
January	565	415	470	.560	.65
February	565	440	488	.581	.63
March	640	470	524	.624	.72
April	2,860	640	1,690	2.01	2.24
May	3,260	1,190	2,000	2.38	2.74
June	1,250	680	979	1.17	1.30
July	1,130	565	746	.888	1.02
August	1,510	725	928	1.10	1.27
September	815	600	669	.796	.89
The year	3,260	415	850	1.01	13.77

## WOLF RIVER AT NEW LONDON, WIS.

**LOCATION.**—In sec. 12, T. 22 N., R. 14 E., at Pearl Street highway bridge, New London, Waupaca County. Embarrass River enters from right three-fourths of a mile above station; Little Wolf River, also from right, enters 5 miles below.

**DRAINAGE AREA.**—2,240 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale 1 inch=6 miles).

**RECORDS AVAILABLE.**—October 1, 1913, to September 30, 1924. Unpublished gage heights March 1, 1899, to September 30, 1913, are in files of office of United States Engineer Corps, Milwaukee, Wis.

**GAGE.**—Staff gage fastened to right hand downstream pier of Pearl Street Bridge. Datum of gage raised 0.641 foot on March 1, 1911, according to the United States Engineer Corps; zero of gage is at an elevation of 748.874 feet above mean sea level, New York City datum.

**DISCHARGE MEASUREMENTS.**—Made from Shawano Street Bridge four blocks below gage.

**CHANNEL AND CONTROL.**—Sand, hardpan, and mud; not permanent. Control not well defined. Banks at gage fairly high. During flood stages water from Embarrass River flows across New London into channel of Wolf River below the gage.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 9.3 feet at 8 a. m. May 16, 17, and 18 (discharge, 7,280 second-feet); minimum stage, 0.8 foot at 8 a. m. November 29 (discharge, 720 second-feet).

1914-1924: Maximum stage recorded, 11.4 feet at 8 a. m. April 13, 1922 (discharge, 15,500 second-feet); minimum discharge 700 second-feet February 6-9, 1918. The office of the United States Engineer Corps reports a stage of 11.6 feet on April 16, 1888.

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

**REGULATION.**—Little, if any, diurnal fluctuation, owing to operation of power plants above station, has been observed at gage; monthly flow natural.

**ACCURACY.**—Stage-discharge relation not permanent; rating curve fairly well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating curve, except for period when stage-discharge relation was affected by ice, for which it was obtained as indicated in footnote to table of daily discharge. Open-water records fair; winter records poor.

*Discharge measurements of Wolf River at New London, Wis., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 10	E. E. Foster.....	1.28	868	Mar. 20	F. C. Christopherson..	3.20	887
Jan. 16	G. P. Steinmetz.....	2.10	862	May 29	do .....	6.93	3,810
Feb. 28	F. C. Christopherson..	2.47	750	29	do .....	6.87	3,770

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Wolf River at New London Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	945	980	910	910	780	750	2,160	5,770	3,360	1,760	1,530	3,150
2	945	980	945	910	780	750	2,260	5,290	3,220	1,910	1,620	2,960
3	945	980	875	910	780	750	2,160	5,440	3,020	1,910	1,530	2,720
4	945	945	945	910	780	750	2,720	5,150	2,900	1,910	1,440	2,160
5	910	945	980	910	780	750	3,500	4,900	2,840	1,760	2,900	1,960
6	875	945	945	910	780	780	3,740	4,570	2,720	1,710	3,080	1,860
7	875	945	875	910	780	780	4,270	4,370	2,600	1,660	3,220	1,530
8	840	945	945	910	780	780	4,900	4,270	2,480	1,620	3,220	1,480
9	840	945	980	910	780	780	5,440	4,470	2,480	1,760	3,150	1,480
10	875	945	980	910	780	780	5,770	4,680	2,480	1,860	2,960	1,480
11	875	910	945	875	780	780	5,950	4,900	2,480	1,960	2,720	1,440
12	875	810	910	875	780	810	5,770	5,440	2,480	2,060	2,540	1,440
13	910	875	945	875	780	810	5,770	5,950	2,420	2,060	2,110	1,480
14	910	910	945	875	780	810	5,440	6,790	2,420	2,060	2,010	1,530
15	875	945	840	875	780	810	5,150	7,030	2,420	1,810	1,860	1,530
16	875	945	840	862	780	840	5,020	7,280	2,540	1,660	1,910	1,530
17	875	945	910	840	780	840	4,900	7,280	2,600	1,660	1,860	1,480
18	945	910	875	840	780	840	4,900	7,280	2,600	1,400	1,910	1,440
19	1,020	840	910	840	780	875	5,020	6,790	2,540	1,360	1,910	1,400
20	1,020	840	980	840	780	887	5,600	6,560	1,860	1,280	2,060	1,440
21	1,020	910	945	840	780	910	6,140	6,140	2,360	1,280	2,310	1,710
22	1,020	875	980	810	780	945	6,560	5,600	2,160	1,240	3,080	2,720
23	1,020	840	910	810	750	1,020	6,790	5,150	2,210	1,200	3,990	2,900
24	1,050	840	875	810	750	1,120	6,560	4,900	2,060	1,050	4,570	2,900
25	1,020	910	875	810	750	1,320	6,560	4,680	1,910	1,160	4,680	2,780
26	980	910	875	810	750	1,530	6,140	4,470	1,810	1,120	4,680	2,540
27	980	840	875	810	750	1,760	5,950	4,270	1,710	1,120	4,470	2,420
28	945	810	945	810	750	2,160	5,770	4,080	1,530	1,160	4,370	2,260
29	945	720	980	810	750	2,480	5,770	3,900	1,660	1,120	2,720	2,160
30	945	810	945	810	750	2,540	5,770	3,660	1,710	1,320	3,900	2,010
31	945	910	910	810	750	2,160	3,500	3,500	1,480	3,900	2,010	1,960

NOTE.—Stage-discharge relation affected by ice Dec. 17-31 and Jan. 8 to Mar. 26; daily discharge ascertained by applying to rating table gage heights corrected for ice effect by means of three discharge measurements, observer's notes, and weather records.

*Monthly discharge of Wolf River at New London, Wis., for the year ending September 30, 1924*

[Drainage area, 2,240 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,050	840	937	0.418	0.48
November	980	720	898	.401	.45
December	980	840	922	.412	.48
January	910	810	859	.383	.44
February	780	750	773	.345	.37
March	2,540	750	1,090	.487	.56
April	6,790	2,160	5,080	2.27	2.53
May	7,280	3,500	5,310	2.37	2.73
June	3,360	1,530	2,410	1.08	1.20
July	2,060	1,050	1,560	.696	.80
August	4,680	1,440	2,850	1.27	1.46
September	3,150	1,400	2,000	.893	1.00
The year	7,280	720	2,060	.920	12.50

## EMBARRASS RIVER NEAR EMBARRASS, WIS.

**LOCATION.**—At highway bridge on line between T. 26 N., R. 14 E., and T. 26 N., R. 15 E., in Shawano County, about 1 mile downstream from mouth of Mill Creek which enters from left, 4 miles upstream from Embarrass, Wau-paca County.

**DRAINAGE AREA.**—395 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale 1 inch=6 miles).

**RECORDS AVAILABLE.**—June 5, 1919, to September 30, 1924.

**GAGE.**—Chain gage fastened to downstream handrail of bridge; read by Charles Murawski.

**CHANNEL AND CONTROL.**—Bed of channel at gage and downstream heavy gravel. Riffle 100 feet downstream forms control. Right bank not subject to overflow; left bank of medium height and will be overflowed at a stage of about 9 feet.

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

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.25 feet at 8 a. m. April 18 (discharge, 2,540 second-feet); minimum discharge, 70 second-feet February 22.

1919-1924: Maximum stage recorded, 11.50 feet at 4 p. m. April 10, 1922 (discharge, 6,760 second-feet); minimum stage, 2.38 feet at 7 a. m. July 23, 1923 (discharge, 34 second-feet).

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

**REGULATION.**—Several dams above station create head for the development of power, but they do not have enough storage to cause any but a slight daily fluctuation.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined between 114 and 2,800 second-feet; extended above 2,800 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for period when stage-discharge relation was affected by ice, for which it was obtained as indicated in footnote to table of daily discharge. Open-water records excellent; winter records fair.

*Discharge measurements of Embarrass River near Embarrass, Wis., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Jan. 15	G. P. Steinmetz.....	3.51	134	May 28	F. C. Christopherson..	3.69	416
Feb. 27	F. C. Christopherson..	3.58	103	28	do .....	3.75	455
Mar. 19	do .....	2.84	117				

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Embarrass River near Embarrass, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	158	161	138	140	100	140	311	855	353	420	375	224
2	152	161	149	115	100	115	311	800	353	397	353	220
3	166	166	166	115	100	125	311	693	353	353	353	197
4	158	152	172	115	115	125	397	590	291	271	420	191
5	141	108	144	115	100	140	397	516	291	271	590	207
6	110	91	138	115	125	115	910	590	353	291	540	203
7	108	110	118	115	185	125	1,020	641	443	375	443	200
8	101	155	125	125	125	205	1,240	855	491	467	375	291
9	149	136	115	115	170	155	1,420	1,300	443	491	353	227
10	158	118	158	100	125	185	1,240	1,600	420	516	332	207
11	149	149	158	90	90	170	1,130	1,480	353	443	271	207
12	138	152	131	100	155	185	965	1,300	353	375	252	224
13	123	161	138	100	140	140	1,020	1,480	420	332	224	252
14	128	158	217	90	155	140	1,020	1,780	565	311	220	271
15	147	166	175	140	115	220	1,300	1,720	516	271	217	234
16	161	123	131	115	140	185	1,540	1,480	443	252	311	234
17	158	115	113	100	100	185	2,220	1,240	397	200	353	234
18	155	110	125	90	115	170	2,500	1,020	443	197	353	234
19	175	149	155	115	90	117	2,080	800	443	194	207	200
20	169	161	110	125	125	188	1,720	667	491	191	311	234
21	169	123	138	115	80	123	1,420	565	375	197	332	227
22	252	110	163	100	70	144	1,240	332	271	178	693	291
23	191	166	138	115	100	155	1,240	491	252	172	1,080	332
24	175	181	147	115	90	158	1,360	590	252	191	1,240	353
25	166	83	163	115	125	172	1,540	667	291	197	1,080	291
26	118	131	147	115	100	200	1,660	616	271	188	693	291
27	118	141	141	125	90	234	1,600	540	252	175	565	231
28	152	125	161	100	90	291	1,420	491	234	203	271	271
29	166	175	158	100	80	214	1,240	467	271	203	311	234
30	169	136	136	140	-----	271	1,080	420	397	291	271	232
31	163	-----	140	125	-----	311	-----	375	-----	311	234	-----

NOTE.—Stage-discharge relation affected by ice Dec. 31 to Mar. 19; daily discharge ascertained by applying to rating table gage heights corrected for ice effect by means of three discharge measurements, observer's notes, and weather records.

*Monthly discharge of Embarrass River near Embarrass, Wis., for the year ending September 30, 1924*

[Drainage area, 395 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	252	101	153	0.387	0.45
November	181	83	139	.352	.39
December	217	110	145	.367	.42
January	140	90	113	.286	.33
February	185	70	114	.289	.31
March	311	115	174	.441	.51
April	2,500	311	1,230	3.11	3.47
May	1,780	332	870	2.20	2.54
June	565	234	369	.934	1.04
July	516	172	288	.729	.84
August	1,240	207	439	1.11	1.28
September	353	191	242	.613	.68
The year	2,500	70	356	.901	12.26



## LITTLE WOLF RIVER AT ROYALTON, WIS.

**LOCATION.**—In sec. 1, T. 22 N., R. 13 E., at highway bridge at Royalton, Wau-paca County, 4 miles above mouth of river.

**DRAINAGE AREA.**—485 square miles (measured on Wisconsin Geological and Natural History Survey map, edition of 1911; scale 1 inch = 6 miles).

**RECORDS AVAILABLE.**—January 13, 1914, to September 30, 1924.

**GAGE.**—Sloping gage on left bank 150 feet upstream from highway bridge; read by J. C. Jensen. Prior to August 20, 1915, a chain gage fastened to upstream side of highway bridge was used. Datum of sloping gage is 0.75 foot higher than that of chain gage; owing to change in slope, however, difference between readings on slope gage and chain gage is not constant.

**DISCHARGE MEASUREMENTS.**—Made from a cable 500 feet upstream from gage or by wading.

**CHANNEL AND CONTROL.**—Stream bed at gage section consists of heavy gravel and rock; fairly permanent. At the measuring section bed is fine, smooth gravel. Neither bank is overflowed to any extent at flood stages.

**EXTREMES OF DISCHARGE.**—Maximum discharge occurred at a stage of 5.9 feet at 7.30 a. m. August 22 (discharge, 4,340 second-feet); minimum discharge, estimated 140 second-feet for several days in February.

1914–1924: Maximum discharge 5,780 second-feet at 7 a. m. April 10 and 5 p. m. April 11, 1922; minimum discharge, 120 second-feet January 20, 1922.

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

**REGULATION.**—The few power plants above station have little storage, and no diurnal fluctuation has been observed at gage.

**ACCURACY.**—Stage-discharge relation permanent throughout year. Rating curves used well defined below 3,220 second-feet; gage read to half-tenths twice daily. Discharge obtained by applying mean daily gage height to rating curve, except for period when stage-discharge relation was affected by ice, for which period it was obtained by applying to rating curve mean daily gage heights corrected for ice effect by means of discharge measurements, observer's notes, and weather records. Open-water records good; winter records fair.

*Discharge measurements of Little Wolf River at Royalton, Wis., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 10	E. E. Foster.....	1.31	206	Mar. 20	F. C. Christopherson..	<sup>a</sup> 2.10	170
Jan. 16	C. P. Steinmetz.....	<sup>a</sup> 1.63	196	May 30	.....do.....	2.06	522
Feb. 28	F. C. Christopherson..	<sup>a</sup> 2.05	150				

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Little Wolf River at Royalton, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July.	Aug.	Sept.
1	260	241	251	205	160	155	235	970	560	501	590	501
2	241	234	241	205	160	155	275	900	450	472	590	450
3	227	241	241	205	160	155	590	770	461	401	590	501
4	223	241	241	205	160	155	1,130	740	501	450	935	450
5	219	234	245	205	160	155	1,390	680	501	417	1,300	397
6	213	245	245	205	160	155	1,870	680	530	417	1,480	301
7	219	241	245	215	160	155	2,400	770	530	450	1,390	347
8	207	251	241	225	160	155	2,620	1,050	580	461	1,300	301
9	227	260	227	225	155	155	3,100	1,390	620	530	1,130	310
10	227	251	200	235	155	155	2,980	1,670	650	472	865	318
11	227	213	234	245	155	155	2,620	1,670	620	501	770	366
12	219	203	245	235	155	155	2,180	1,480	620	560	590	501
13	223	227	260	215	155	155	1,670	1,480	800	501	397	501
14	219	223	260	215	150	155	1,870	1,300	970	501	264	530
15	251	241	241	205	150	155	1,870	1,300	900	366	366	356
16	270	245	223	195	140	155	1,870	1,130	770	318	356	332
17	251	245	189	195	140	155	1,970	900	688	289	381	366
18	245	189	227	185	140	155	1,870	865	620	301	450	347
19	270	263	241	180	140	160	1,870	650	650	276	560	347
20	241	227	260	180	140	170	1,670	680	620	276	530	450
21	251	227	245	170	140	170	1,770	680	501	254	501	1,060
22	227	241	241	170	150	170	1,570	620	530	254	4,210	1,210
23	241	227	219	170	150	180	1,570	680	620	236	2,680	1,050
24	245	234	213	180	150	185	1,570	680	501	245	2,070	865
25	234	241	234	185	150	185	1,670	800	501	254	1,480	820
26	245	245	223	185	150	185	1,570	680	450	264	1,300	770
27	241	219	241	180	150	195	1,480	620	434	276	1,010	740
28	245	207	225	170	150	205	1,480	650	472	254	740	501
29	241	219	225	170	150	215	1,300	690	501	356	680	530
30	234	241	225	170	-----	225	1,130	560	501	770	590	530
31	245	-----	215	160	-----	225	-----	560	-----	740	560	-----

NOTE.—Stage-discharge relation affected by ice Dec. 28 to Apr. 8.

*Monthly discharge of Little Wolf River at Royalton, Wis., for the year ending September 30, 1924*

[Drainage area, 485 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	270	207	236	0.487	0.56
November	260	189	232	.478	.58
December	260	189	234	.482	.56
January	245	160	196	.404	.47
February	160	140	152	.313	.34
March	225	155	170	.351	.40
April	3,100	235	1,710	3.53	3.94
May	1,670	560	910	1.88	2.17
June	970	434	588	1.21	1.35
July	770	236	401	.827	.95
August	4,210	264	1,010	2.08	2.40
September	1,210	301	536	1.11	1.24
The year	4,210	140	530	1.09	14.91

## WAUPACA RIVER NEAR WAUPACA, WIS.

**LOCATION.**—Near north line sec. 1, T. 21 N., R. 12 E. at Waupaca County highway bridge, 4 miles downstream from Waupaca, Waupaca County.

**DRAINAGE AREA.**—305 square miles (measured on Wisconsin Geological and Natural History Survey map, edition of 1911; scale 1 inch=6 miles).

**RECORDS AVAILABLE.**—October 18, 1917, to September 30, 1924. June 28, 1916, to October 18, 1917, records were obtained at a station near Weyauwega, 1 mile downstream from present site.

**GAGE.**—Chain gage, bolted to upstream handrail of bridge; read by George Radtke.

**DISCHARGE MEASUREMENTS.**—Made from upstream side of bridge or by wading.

**CHANNEL AND CONTROL.**—Bed consists of fine gravel and clay; free from vegetation. Control not well defined and is not permanent. Right bank is high and is seldom overflowed; left bank of medium height and is overflowed at a stage of about 6 feet.

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

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year 4.47 feet at 8.30 a. m. August 22 (discharge, 1,560 second-feet); minimum stage, 1.38 feet at 8.30 a. m. December 18 (discharge, 110 second-feet).

1918-1924: Maximum stage recorded, 5.6 feet March 17, 1919 (discharge, 2,600 second-feet); minimum stage, 1.28 feet November 21, 1920 (discharge, 96 second-feet).

**REGULATION.**—Power plants at Waupaca and above on the main stream and also several on Crystal River may cause slight fluctuation during low stages. Pondage at various plants is small so that mean monthly discharge represents closely the natural flow.

**ACCURACY.**—Stage-discharge relation changed during winter; rating curve used October 1 to December 27 well defined; curve used March 23 to September 30 between 180 and 585 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except for period when stage-discharge relation was affected by ice, for which it was determined as indicated in footnote to table of daily discharge. Records fair.

*Discharge measurements of Waupaca River near Waupaca, Wis., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 9	E. E. Foster.....	1.86	221	Mar. 21	F. C. Christopherson..	* 3.42	218
Jan. 17	G. P. Steinmetz .....	2.52	123	May 30	.....do.....	1.97	284
Feb. 29	F. C. Christopherson..	3.40	208	May 30	.....do.....	1.93	271

\* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Waupaca River near Waupaca, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	209	144	196	145	145	210	265	310	278	248	342	278
2	183	144	196	135	160	210	294	294	263	248	359	294
3	183	158	183	135	160	220	294	294	294	263	376	294
4	170	170	183	125	160	220	502	310	294	263	679	294
5	170	170	183	125	170	220	631	326	263	248	730	263
6	183	170	222	125	170	220	1,020	326	248	248	655	234
7	196	158	209	135	185	220	1,080	310	294	248	464	278
8	196	158	209	135	185	220	1,020	428	278	263	376	294
9	183	170	183	135	185	220	900	631	278	263	359	294
10	158	170	183	135	185	220	900	585	294	248	326	263
11	158	183	170	135	195	220	631	542	263	220	326	263
12	158	183	160	135	195	235	608	464	263	294	294	278
13	183	170	160	135	195	235	542	428	278	263	263	294
14	183	158	160	135	195	235	522	446	278	263	248	326
15	170	158	160	135	210	235	522	464	294	248	234	310
16	170	170	160	125	210	235	522	410	294	248	248	294
17	183	170	160	125	210	235	564	376	294	234	248	294
18	183	183	110	125	210	235	522	359	310	220	248	294
19	236	183	170	125	210	235	502	359	294	234	312	294
20	196	153	183	125	210	220	542	310	294	234	376	278
21	183	135	183	115	210	220	564	294	294	220	326	326
22	183	140	183	115	210	210	564	326	294	206	1,560	655
23	183	153	183	115	210	183	542	310	294	206	1,380	428
24	170	158	183	115	210	196	502	310	294	206	730	359
25	170	183	183	115	210	236	542	310	278	206	542	359
26	170	183	183	115	210	250	542	310	278	206	410	342
27	209	209	183	115	210	222	542	310	234	220	359	310
28	209	222	185	125	210	222	542	294	248	206	342	342
29	209	209	170	125	210	235	428	294	326	263	263	326
30	170	196	160	135	-----	235	376	286	310	263	294	294
31	153	-----	160	135	-----	235	-----	278	-----	342	294	-----

NOTE.—Stage-discharge relation affected by ice Dec. 12-17, Dec. 28 to Mar. 22, and Mar. 29 to Apr. 1; discharge ascertained by means of daily gage heights, three discharge measurements, observer's notes, and weather records.

Monthly discharge of Waupaca River near Waupaca, Wis., for the year ending September 30, 1924

[Drainage area, 305 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	236	153	183	0.600	0.69
November	222	135	170	.557	.62
December	222	110	177	.580	.67
January	145	115	128	.420	.48
February	210	145	194	.636	.69
March	250	183	224	.734	.85
April	1,080	265	584	1.91	2.13
May	631	278	364	1.19	1.37
June	326	234	283	.928	1.04
July	342	206	243	.797	.92
August	1,560	234	450	1.48	1.71
September	655	234	315	1.03	1.15
The year	1,560	110	276	.905	12.32

## SHEBOYGAN RIVER NEAR SHEBOYGAN, WIS.

**LOCATION.**—In sec. 28, T. 15 N., R. 23 E., 2 miles west of Sheboygan, Sheboygan County, and  $2\frac{1}{2}$  miles above mouth.

**DRAINAGE AREA.**—403 square miles (measured on Wisconsin and Geological and Natural History Survey map, edition of 1911; scale 1 inch = 6 miles).

**RECORDS AVAILABLE.**—June 30, 1916, to June 30, 1924, when station was discontinued.

**GAGE.**—Chain gage fastened to upstream side of bridge; read by Wilma Oppenorth.

**DISCHARGE MEASUREMENTS.**—From highway bridge or by wading. At extreme flood stages measurements may be made from Chicago & Northwestern Railway bridge one-third mile downstream.

**CHANNEL AND CONTROL.**—Control is a well-defined riffle about 200 feet below bridge. Stream bed composed of heavy gravel; free from aquatic grass. Banks are of medium height and are seldom overflowed.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.24 feet at 8.30 a. m. April 5 (discharge, 3,540 second-feet); minimum discharge, estimated 8 second-feet December 31.

1916-1924: Maximum stage recorded, 9.40 feet at 7 a. m. March 26, 1920 (discharge, 7,140 second-feet); minimum stage, 1.48 feet at 4.30 p. m. August 27, 1922, caused by shut down of power plants (discharge, about 1 second-foot).

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

**REGULATION.**—At low stages there is a small amount of diurnal fluctuation due to operation of small power plants above.

**ACCURACY.**—Stage-discharge relation fairly permanent. Rating curve well developed throughout range of stage occurring during the period. Gage read to hundredths twice daily. Slight diurnal fluctuation during low-water periods probably impairs accuracy of daily mean gage height. Daily discharge ascertained by applying mean daily gage height to rating table except when stage-discharge relation was affected by ice, for which it was obtained as indicated in footnote to table of daily discharge. Open-water records fair; winter records poor.

*Daily measurements of Sheboygan River near Sheboygan, Wis., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>
Jan. 25	S. B. Soulé	* 3.43	42.5
Mar. 12	do	2.48	170
Apr. 6	Soulé and Christopherson	6.45	2,970

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Sheboygan River near Sheboygan, Wis., for the period ending June 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	30	70	52			115	665	540	182
2	46	60	74			101	960	518	196
3	35	62	74			98	1,220	405	220
4	32	52	62			126	3,120	338	268
5	28	64	72			338	3,500	289	256
6	41	162	79			270	3,030	306	264
7	49	62	58			270	2,850	828	298
8	37	76	62			250	3,120	2,130	264
9	44	62	62			160	3,210	3,330	264
10	40	58	56			235	2,400	2,400	285
11	25	66	54			220	1,670	1,860	289
12	66	66	52			136	1,670	1,150	243
13	37	66	66			220	960	1,080	243
14	43	66	48		67	268	715	1,070	324
15	28	81	46			142	615	1,150	285
16	168	66	66	36		186	328	540	268
17	51	76	46			190	518	450	289
18	79	48	51			96	540	382	311
19	179	70	51			302	472	328	264
20	148	54	76			294	518	294	276
21	86	56	68			168	640	256	268
22	74	70	62			162	703	272	450
23	66	74	104			346	766	268	338
24	62	74	72			565	829	320	302
25	70	70	74			1,020	892	285	162
26	49	193	41			1,080	954	272	252
27	64	46	70			1,220	1,020	272	320
28	68	72	46			2,220	1,080	272	311
29	51	58	45		86	2,040	960	239	285
30	54	76	40		64	850	590	212	302
31	52		8			1,020		201	

NOTE.—Stage-discharge relation affected by ice Dec. 29 to Feb. 27; discharge ascertained by applying to rating table daily gage height corrected for ice effect by means of one discharge measurement, observer's notes, and weather records. Gage not read Nov. 12-13, Jan. 12, and Apr. 22-27; discharge interpolated.

*Monthly discharge of Sheboygan River near Sheboygan, Wis., for the year ending September 30, 1924*

[Drainage area, 403 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	179	25	61.4	0.152	0.18
November	193	46	72.5	.180	.20
December	104	8	59.3	.147	.17
January			36.0	.089	.10
February			67.6	.168	.18
March	2,220	96	474	1.18	1.36
April	3,500	328	1,350	3.35	3.74
May	3,300	201	720	1.79	2.06
June	450	162	276	.685	.76
The period	3,500	8	346	.859	8.75

## MILWAUKEE RIVER NEAR MILWAUKEE, WIS.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 5, T. 7 N., R. 22 E., immediately above an old quarry near north limits of Milwaukee, Milwaukee County, half a mile below concrete highway bridge, 1 mile above Mineral Spring Road, and  $5\frac{1}{2}$  miles above confluence of Milwaukee and Menominee rivers.

**DRAINAGE AREA.**—661 square miles (measured on Wisconsin Geological and Natural History Survey map, edition of 1911; scale 1 inch=6 miles).

**RECORDS AVAILABLE.**—April 30, 1914, to September 30, 1924.

**GAGE.**—Slope gage set in concrete foundations on left bank of river; prior to April 18, 1918, chain gage fastened to cantilever arms supported by posts; read by Mrs. Richard Kuehl. Both gages same datum.

**CHANNEL AND CONTROL.**—Bed of channel at gage heavy gravel. About 200 feet below gage is a rock outcrop with a 4-foot fall, which forms control and is fairly permanent. Below control river flows in an artificial channel, which at one time was a quarry. Left bank above and below control high and not subject to overflow; right bank of medium height; seldom overflows.

**DISCHARGE MEASUREMENTS.**—Made by wading immediately above gage, from a railroad bridge one-fourth of a mile below gage, or at Folsom Street Bridge; 2 miles below gage.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 8.85 feet at 12.50 p. m. August 6 (discharge, 14,800 second-feet); minimum estimated discharge, 65 second-feet for several days during January.

1914-1924: Maximum discharge<sup>2</sup> March 20, 1918, 15,100 second-feet; minimum discharge, about 26 second-feet August 2, 1916.

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

**REGULATION.**—No diurnal fluctuation at gage resulting from operation of small plants above.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve fairly well defined, except at flood stages. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records at medium and low stages excellent; winter records, and those for a few days during flood in August, fair.

*Discharge measurements of Milwaukee River near Milwaukee, Wis., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge
Jan. 26	S. B. Soule.....	Feet	Sec.-ft.
Aug. 6	do.....	1.25	82
8	do.....	8.79	14,600
		4.92	6,460

\* Stage-discharge relation affected by ice.

<sup>2</sup> Revised; revision based on discharge measurement made during the year.

*Daily discharge, in second-feet, of Milwaukee River near Milwaukee, Wis., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	105	160	208	150	100	520	1,430	620	243	261	114	348
2.....	94	167	248	190	130	552	1,430	490	252	248	124	328
3.....	82	160	230	190	115	810	1,670	460	261	217	105	289
4.....	80	179	208	100	130	1,490	2,420	460	243	183	4,880	280
5.....	111	152	208	85	150	1,430	2,710	420	212	167	10,700	275
6.....	82	145	179	100	190	1,200	2,420	289	212	160	14,700	261
7.....	71	188	167	65	165	950	2,710	392	230	137	10,900	289
8.....	75	134	152	85	210	900	2,710	1,050	243	94	8,770	289
9.....	80	134	152	75	150	810	2,710	3,850	261	94	6,400	328
10.....	80	152	152	85	190	770	2,150	3,050	270	121	3,850	364
11.....	71	152	118	115	210	730	1,790	2,710	289	490	2,710	298
12.....	87	167	118	85	165	655	1,310	1,550	252	381	2,150	289
13.....	94	105	80	100	165	620	1,000	1,430	490	289	1,670	313
14.....	118	118	118	85	165	520	855	1,310	460	243	1,260	289
15.....	105	179	134	85	190	460	692	1,200	403	179	1,050	261
16.....	102	208	167	85	165	364	655	1,000	381	145	1,000	293
17.....	111	196	152	75	190	313	620	900	289	114	950	245
18.....	280	188	145	100	210	293	620	770	289	134	1,100	261
19.....	1,100	134	152	100	165	270	585	585	261	92	1,050	275
20.....	730	167	167	75	165	293	552	392	252	73	950	217
21.....	520	167	152	65	230	248	620	364	217	73	950	212
22.....	409	160	152	85	210	293	770	348	226	145	1,050	252
23.....	261	152	167	85	230	313	730	490	243	171	1,050	289
24.....	221	152	490	85	250	900	692	460	381	156	1,000	270
25.....	196	152	338	85	250	1,430	692	460	328	145	950	208
26.....	167	134	313	85	275	1,430	692	392	275	124	810	208
27.....	171	118	293	75	250	2,030	730	364	420	124	692	183
28.....	156	134	364	65	460	2,560	900	338	520	121	585	217
29.....	152	105	354	85	520	4,600	770	298	289	105	520	275
30.....	167	221	208	65	-----	2,150	730	338	275	108	420	261
31.....	163	-----	105	65	-----	1,790	-----	289	-----	167	460	-----

NOTE.—Stage-discharge relation affected by ice Jan. 1 to Feb. 27.

*Monthly discharge of Milwaukee River near Milwaukee, Wis., for the year ending September 30, 1924*

[Drainage area, 661 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,100	71	201	0.304	0.35
November.....	221	105	156	.236	.26
December.....	490	80	200	.303	.35
January.....	190	65	92.7	.140	.16
February.....	520	100	208	.315	.34
March.....	4,600	248	1,020	1.54	1.78
April.....	2,710	552	1,280	1.94	2.16
May.....	3,850	289	873	1.32	1.52
June.....	520	212	299	.452	.50
July.....	490	73	170	.257	.30
August.....	14,700	105	2,670	4.04	4.66
September.....	364	183	272	.411	.46
The year.....	14,700	65	624	.944	12.84



## LITTLE CALUMET RIVER AT HARVEY, ILL.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 9, T. 36 N., R. 14 E., at Illinois Central Railroad bridge, 800 feet north of railroad station at One hundred and forty-seventh Street, Harvey, Cook County, 11 miles above mouth of river.

**DRAINAGE AREA.**—570 square miles (measured on map issued by United States Geological Survey; scale 1:500,000).

**RECORDS AVAILABLE.**—Daily discharge, October 1, 1916, to September 30, 1924. Daily gage heights were collected by Sanitary District of Chicago, June 10, 1907, to September 30, 1916.

**GAGE.**—Vertical staff gage attached to bridge pier; read by Mrs. H. Wurtman.

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

**CHANNEL AND CONTROL.**—Bed of river composed of clay and gravel. Low-water control, gravel and boulders, practically permanent. Banks are not overflowed.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 8.5 feet March 30 (discharge, 2,520 second-feet); minimum stage, 3.12 feet September 22 (discharge, 72 second-feet).

1907–1924: Maximum stage recorded, 13.4 feet March 6, 1908 (discharge not determined); 1917–1924 minimum discharge estimated at less than 25 second-feet in January, 1918.

**ACCURACY.**—Stage-discharge relation practically permanent; seriously affected by ice during winter. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good for open water; fair for period of ice effect.

Discharge from Little Calumet River is diverted through the Calumet-Sag Channel into the Chicago Sanitary Canal. The capacity of this channel as computed by the sanitary district is 2,000 second-feet when the slope is that prevailing with a flow of 8,000 second-feet in the main sanitary canal above the effluent of the Calumet-Sag Channel. Diversion from Little Calumet River was begun in August, 1922. The point of diversion is near center of sec. 32, T. 37 N., R. 14 E., about 3.8 miles below the gaging station at Harvey.

*Discharge measurements of Little Calumet River at Harvey, Ill., during the year ending September 30, 1924*

[Made by H. E. Grosbach]

Date	Gage height	Discharge	Date	Gage height	Discharge
	<i>Feet</i>	<i>Sec.-ft.</i>		<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 10.....	3.23	97.1	June 19.....	5.04	654
Feb. 26.....	<sup>a</sup> 4.91	434	25.....	6.84	1,460
Apr. 1.....	7.19	1,800			

<sup>a</sup> Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Little Calumet River at Harvey, Ill., for the year ending September 30, 1924

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	234	508	324	590		1, 670	1, 840	480	247	849	193	85
2.....	220	468	308			1, 420	1, 780	462	247	806	168	94
3.....	207	468	308			1, 320	1, 720	443	233	806	145	89
4.....	181	548	376			1, 370	1, 720	425	233	806	123	103
5.....	143	860	680			1, 320	1, 620	407	219	763	113	123
6.....	134	770	1, 040			1, 040	1, 520	372	247	763	123	123
7.....	123	635	770			905	1, 420	372	247	721	180	113
8.....	112	590	680			950	1, 320	372	355	721	145	99
9.....	108	508	590	660		860	1, 270	425	806	638	247	103
10.....	96	508	590			431	1, 170	425	1, 570	638	276	94
11.....	98	508	590			548	1, 130	425	892	597	219	94
12.....	100	468	590			770	1, 080	407	806	557	219	94
13.....	102	468	1, 220			1, 040	1, 040	390	721	557	206	90
14.....	104	468	1, 220			1, 040	950	390	721	557	193	85
15.....	106	431	950		640	905	950	372	721	518	180	85
16.....	110	431	860			770	905	372	721	480	168	82
17.....	169	431	860			860	860	355	721	443	168	82
18.....	590	412	860			815	770	338	679	443	156	82
19.....	1, 570	394	860			770	725	338	679	425	145	77
20.....	1, 170	376	860			770	725	338	638	390	322	89
21.....	1, 040	358	860			680	680	338	597	372	247	82
22.....	950	358	860			725	680	338	557	355	206	72
23.....	860	358	950	420		1, 130	680	322	1, 260	338	193	82
24.....	770	358	950			1, 420	635	322	849	306	168	89
25.....	725	341	950			1, 220	590	306	1, 460	291	145	93
26.....	680	341	905			1, 520	590	291	1, 210	276	141	93
27.....	590	324	905			1, 370	590	291	892	247	113	93
28.....	508	308	905			1, 220	590	291	849	233	107	93
29.....	508	308	815		1, 220	2, 140	548	276	1, 120	219	99	89
30.....	508	324	770			2, 520	508	276	936	219	94	93
31.....	508		770			1, 960		262		206	85	

NOTE.—Discharge estimated on account of ice, Jan. 2 to Feb. 28, from gage-height record, results of discharge measurement, observer's notes, and weather records. Braced figures show mean discharge for periods indicated. Discharge interpolated Oct. 11-14 because of lack of gage heights.

Monthly discharge of Little Calumet River at Harvey, Ill., for the year ending September 30, 1924

[Drainage area, 570 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1, 570	96	430	0. 754	0. 87
November.....	860	398	454	. 796	. 89
December.....	1, 220	308	781	1. 37	1. 53
January.....			534	. 937	1. 03
February.....			660	1. 16	1. 25
March.....	2, 520	431	1, 140	2. 00	2. 31
April.....	1, 840	508	1, 020	1. 79	2. 00
May.....	480	262	362	. 635	. 73
June.....	1, 570	219	714	1. 25	1. 40
July.....	849	206	501	. 879	1. 01
August.....	322	85	171	. 300	. 35
September.....	123	72	92. 2	. 162	. 18
The year.....	2, 520	72	572	1. 00	13. 65

## ST. JOSEPH RIVER AT MOTTVILLE, MICH.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 6, T. 8 S., R. 12 W., at hydroelectric plant of Michigan Gas & Electric Co. at Mottville, St. Joseph County, and 5 miles below mouth of Fawn River.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—December 13, 1923, to September 30, 1924.

**GAGE.**—Float gage in tailwater at power plant, read by plant attendants.  
Zero of gage 759.5 feet above mean sea level.

**DISCHARGE MEASUREMENTS.**—Made by wading 200 feet below gage or from highway bridges about half a mile below gage.

**CHANNEL AND CONTROL.**—Channel straight for a quarter of a mile above and below gage. Banks high. Control for low water is a riffle 300 feet below gage. At medium and high stages water flows in secondary channel around small island just below gage. Control for medium and high stages is long stretch of channel below gage. Zero flow would occur at gage height -2.5 feet.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during period, 2.8 feet 7.30 p. m. to midnight March 30, 8 to 9.30 a. m. March 31, and 8 a. m. to noon April 2 (discharge, 4,960 second-feet); minimum stage recorded, -1.9 feet at 5 and 5.30 p. m. February 17 (discharge, 96 second-feet).

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

**REGULATION.**—Flow regulated for power purposes at gage and possibly at other points above station.

**ACCURACY.**—Stage-discharge relation permanent; not seriously affected by ice.  
Rating curve well defined. Gage read every half hour day and night. Daily discharge ascertained by applying mean daily gage height to rating table.  
Records excellent.

**COOPERATION.**—Maintained in cooperation with Michigan Gas & Electric Co.

*Discharge measurements of St. Joseph River at Mottville, Mich., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Apr. 25	Lee and King	0.50	1,690	Aug. 5	W. P. Ansley	0.48	1,610
June 6	W. A. Werner	.67	1,780	Sept. 1	do	-1.18	293
12	do	.69	1,860	2	do	.44	1,730
Aug. 4	W. P. Ansley	.97	1,750				

# STREAM TRIBUTARY TO LAKE HURON

Daily discharge, in second-feet, of St. Joseph River at Mottville, Mich., for the year ending September 30, 1924

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....		1,350	1,460	960	4,020	1,570	960	1,930	1,100	342
2.....		1,350	1,300	870	4,320	1,570	1,570	1,930	960	915
3.....		1,300	1,100	1,200	4,020	1,460	1,460	1,810	870	1,000
4.....		1,200	1,460	1,350	3,870	1,150	1,250	1,350	1,460	915
5.....		1,300	1,350	1,460	3,430	2,060	1,250	1,570	1,250	960
6.....		1,250	1,460	2,590	3,150	1,460	1,100	1,300	1,050	960
7.....		1,250	1,350	2,550	3,570	1,570	915	1,690	1,000	547
8.....		1,300	1,100	2,450	3,290	1,460	960	1,570	1,350	1,050
9.....		1,350	1,050	2,450	2,870	1,650	1,570	1,570	915	1,050
10.....		1,250	742	2,870	2,730	1,810	1,570	1,200	319	915
11.....		1,300	1,350	2,590	2,730	1,690	1,690	1,350	1,300	785
12.....		1,460	1,350	2,730	2,320	2,060	1,460	1,150	1,100	960
13.....	1,350	1,200	1,250	2,190	2,060	1,690	1,570	870	960	960
14.....	1,570	1,690	1,200	2,320	2,870	1,810	1,250	1,570	742	584
15.....	1,930	1,460	1,250	2,190	2,060	1,690	870	1,300	1,000	1,000
16.....	915	1,350	1,050	2,060	2,190	1,690	1,460	1,250	960	1,050
17.....	1,460	1,350	450	2,190	1,930	1,570	1,300	1,460	700	660
18.....	1,460	1,350	1,250	2,060	2,320	1,300	1,300	828	828	828
19.....	1,350	1,350	1,300	2,190	1,570	1,930	1,250	584	960	915
20.....	1,350	870	915	2,590	1,460	1,930	1,250	584	1,050	915
21.....	1,200	2,060	828	2,190	2,320	1,810	1,200	1,200	1,000	547
22.....	1,300	2,060	960	2,060	1,930	1,810	1,300	1,050	1,100	1,200
23.....	1,100	1,200	1,150	1,460	1,810	1,460	1,930	1,050	915	1,100
24.....	1,460	1,200	228	2,320	1,570	1,570	1,810	915	620	1,200
25.....	1,690	1,300	1,000	2,190	1,570	1,250	1,930	828	1,000	1,150
26.....	1,460	1,570	1,200	2,320	1,690	1,930	2,320	620	1,100	1,200
27.....	1,570	1,570	1,000	2,590	1,810	1,690	2,190	620	1,000	1,100
28.....	1,570	1,460	960	2,870	2,060	1,350	2,190	1,000	915	584
29.....	1,570	1,460	1,000	3,430	1,810	1,350	1,930	1,250	915	1,460
30.....	1,250	365		3,430	1,690	1,150	2,190	1,250	1,150	1,100
31.....	1,570	419		4,320		1,150		960	584	

Monthly discharge of St. Joseph River at Mottville, Mich., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
December 13-31.....	1,930	915	1,430	May.....	2,060	1,150	1,600
January.....	2,060	365	1,320	June.....	2,320	870	1,500
February.....	1,460	228	1,110	July.....	1,930	584	1,210
March.....	4,320	870	2,290	August.....	1,460	319	973
April.....	4,320	1,460	2,500	September.....	1,460	342	932

# STREAM TRIBUTARY TO LAKE HURON

## TITTABAWASSEE RIVER AT FREELAND, MICH.

LOCATION.—At highway bridge at Freeland, Saginaw County.

DRAINAGE AREA.—2,530 square miles.

RECORDS AVAILABLE.—August 22, 1903, to December 31, 1909; January 1, 1912, to September 30, 1924.

COOPERATION.—Daily-discharge record furnished by G. S. Williams, consulting engineer, Ann Arbor, Mich.

*Daily discharge, in second-feet, of Tittabawassee River at Freeland, Mich., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	540	730	1,300	930	1,020	1,500	6,480	1,200	1,050	440	930	392
2	540	700	1,200	960	1,040	1,740	5,800	1,110	870	513	960	416
3	566	845	1,110	648	1,060	1,780	4,800	1,050	845	489	930	392
4	566	960	1,080	700	1,080	1,780	5,420	1,110	815	465	1,240	392
5	566	700	1,020	750	1,030	1,980	6,930	1,140	815	416	1,450	344
6	566	870	990	750	1,090	2,400	6,930	1,300	786	315	1,600	315
7	592	845	960	718	1,110	2,400	5,800	1,600	780	416	1,600	290
8	592	815	960	700	1,110	2,400	5,280	1,780	700	465	1,670	290
9	620	845	930	663	1,090	2,270	4,900	2,110	646	465	1,600	344
10	592	815	930	630	1,090	1,980	4,250	6,040	620	440	1,640	368
11	566	815	900	770	1,110	1,820	4,000	7,220	592	416	1,600	392
12	566	870	900	945	1,130	1,860	3,660	8,580	566	392	1,410	465
13	566	845	900	967	1,160	1,940	3,710	6,360	566	368	1,240	646
14	566	815	930	967	1,180	1,980	3,060	5,320	540	392	1,140	440
15	540	845	930	983	1,180	1,980	2,400	4,750	540	465	845	392
16	540	870	1,600	1,000	1,200	1,940	1,980	3,760	540	440	646	368
17	566	900	1,480	1,000	1,200	1,900	1,940	3,760	540	392	620	315
18	566	960	1,410	983	1,180	1,900	2,060	3,200	513	344	562	290
19	620	930	1,300	928	1,150	2,190	2,060	2,400	489	290	566	315
20	1,050	900	1,170	967	1,130	2,840	2,060	1,940	513	315	566	315
21	2,270	870	1,020	928	1,090	3,280	1,860	1,700	540	315	540	368
22	2,230	845	930	928	1,080	3,350	1,900	1,520	513	344	540	592
23	1,980	845	930	910	1,060	3,860	2,840	1,480	489	315	540	700
24	1,780	815	900	891	1,020	5,380	2,400	1,380	489	315	489	675
25	1,600	786	870	910	648	3,680	2,150	1,340	465	344	465	592
26	1,340	786	870	910	983	8,700	2,020	1,300	465	344	392	566
27	1,110	845	900	866	983	9,320	1,860	1,270	440	392	368	540
28	930	870	900	858	1,000	8,820	1,560	1,270	440	489	368	489
29	870	1,240	930	866	1,200	8,840	1,410	1,270	465	540	344	489
30	815	1,340	930	866	-----	7,620	1,300	1,300	465	540	315	489
31	786	-----	930	928	-----	6,480	-----	1,200	-----	646	344	-----

NOTE.—Chain of chain gage broken on Mar. 8 and Aug. 13; assumed to have been correctly repaired by gage reader.

*Monthly discharge of Tittabawassee River at Freeland, Mich., for the year ending September 30, 1924*

[Drainage area, 2,530 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,270	540	890	0.352	0.41
November	1,340	700	870	.344	.38
December	1,600	870	1,040	.411	.47
January	1,000	630	865	.342	.39
February	1,200	648	1,080	.427	.46
March	9,320	1,500	3,530	1.40	1.61
April	6,930	1,300	3,430	1.36	1.52
May	8,580	1,050	2,610	1.03	1.19
June	1,050	440	603	.238	.27
July	646	290	414	.164	.19
August	1,670	315	889	.351	.40
September	700	290	433	.171	.19
The year	9,320	290	1,390	.650	7.48

NOTE.—Monthly and yearly discharge computed by U. S. Geological Survey from daily-discharge record furnished by G. S. Williams, consulting engineer, Ann Arbor, Mich.

## STREAMS TRIBUTARY TO LAKE ERIE

## HURON RIVER AT BARTON, MICH.

LOCATION.—At dam and power plant of Eastern Michigan Edison Co. at Barton, near Ann Arbor.

DRAINAGE AREA.—723 square miles.

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1924.

DETERMINATION OF DISCHARGE.—Flow computed from records of operation of power plant, the flow through under sluice during floods, and the depth of flow over dam. Flow through power house is determined from a calibration of the turbines by means of a specially constructed weir, the crest of which was formed by a  $\frac{1}{4}$  by 5 inch milled plate, the discharge over the weir being computed by Bazin's formula for free overflow. The greater part of the flood water passes through under sluices in the power-house foundation, and this flow is determined from a weir calibration of the sluices. Water flows over crest of dam only a few days during year.

COOPERATION.—Daily-discharge record furnished by G. S. Williams, consulting engineer, Ann Arbor, Mich.

*Daily discharge, in second-feet, of Huron River at Barton, Mich., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	184	137	185	364	380	249	1,040	484	494	512	131	6
2.....	180	146	184	276	405	163	963	465	444	478	71	136
3.....	153	170	180	341	408	294	946	585	365	393	6	137
4.....	150	164	219	254	408	302	940	221	399	416	139	117
5.....	148	168	262	180	380	1,750	894	413	359	434	138	123
6.....	162	179	302	210	408	1,680	887	415	341	361	124	159
7.....	81	189	301	269	343	1,170	884	336	322	357	98	6
8.....	147	190	273	259	340	944	870	351	334	310	121	168
9.....	138	173	252	244	291	941	934	485	378	323	124	146
10.....	126	173	293	286	270	943	961	554	351	280	82	119
11.....	121	156	254	340	331	944	942	540	350	263	157	118
12.....	131	164	249	384	239	936	906	567	318	282	146	120
13.....	139	158	361	340	260	932	774	562	314	212	140	102
14.....	94	149	378	320	266	941	795	487	314	335	130	76
15.....	113	158	319	300	235	866	730	496	305	201	132	120
16.....	129	173	345	348	230	685	663	501	277	199	156	140
17.....	116	210	335	320	209	753	727	381	250	200	36	139
18.....	141	131	322	262	235	759	670	415	255	184	126	126
19.....	162	237	316	318	219	677	572	438	242	173	122	121
20.....	157	129	313	207	177	681	668	381	298	146	122	158
21.....	75	136	330	206	237	690	595	412	434	140	118	72
22.....	173	157	332	234	202	672	716	371	463	129	122	145
23.....	146	177	355	226	211	664	656	380	429	155	159	145
24.....	148	163	426	214	171	778	639	504	434	153	124	149
25.....	138	236	411	224	236	741	657	591	439	168	89	129
26.....	147	129	373	178	205	836	573	576	432	151	102	131
27.....	144	156	432	152	214	784	549	578	388	105	112	152
28.....	71	163	453	223	234	860	549	563	414	198	123	133
29.....	141	167	403	228	222	1,050	513	525	560	119	105	163
30.....	162	179	391	355	1,300	486	486	488	488	58	97	158
31.....	152	-----	417	461	-----	1,090	-----	490	-----	77	6	-----

*Monthly discharge of Huron River at Barton, Mich., for the year ending September 30, 1924*

[Drainage area, 723 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	184	71	138	0.191	0.22
November.....	237	129	167	.231	.26
December.....	453	180	321	.444	.51
January.....	461	152	276	.382	.44
February.....	408	171	275	.380	.40
March.....	1,750	163	860	1.19	1.37
April.....	1,040	486	757	1.05	1.17
May.....	591	221	469	.649	.75
June.....	560	242	374	.517	.58
July.....	512	58	242	.335	.39
August.....	159	6	112	.155	.18
September.....	168	6	124	.172	.19
The year.....	1,750	6	343	.474	6.46

NOTE.—Monthly and yearly discharge computed by U. S. Geological Survey from daily-discharge record furnished by G. S. Williams, consulting engineer, Ann Arbor, Mich

**MAUMEE RIVER AT ANTWERP, OHIO**

**LOCATION.**—At highway bridge 1 mile north of Antwerp, Paulding County, and 7 miles downstream from State boundary.

**DRAINAGE AREA.**—2,050 square miles; revised (area in Ohio measured on topographic maps, area in Michigan and Indiana measured on post-route maps).

**RECORDS AVAILABLE.**—September 1, 1921, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge; read by H. G. Carr.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel straight for 500 feet above and below gage. One channel at all stages. Left bank high; right bank fairly high. Control for low water is rock and gravel riffle about half a mile below gage; control for high water is long stretch of river below gage. Zero flow would occur at zero gage height.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 16.8 feet March 31 (discharge, 14,700 second-feet); minimum stage recorded, 1.14 feet October 13 (discharge, 155 second-feet).

1921-1924: Maximum stage recorded, 16.8 feet on April 2, 1922, and March 31, 1924 (discharge, 14,700 second-feet); minimum stage recorded, 1.08 feet at 6 p. m. September 9, 1921 (discharge, 133 second-feet).

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

**ACCURACY.**—Stage-discharge relation permanent except when affected by ice in January. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to table of daily discharge. Records good except for period of ice effect for which they are fair.

*Discharge measurements of Maumee River at Antwerp, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 8	F. R. Morgan	1.22	183	May 5	F. R. Morgan	3.49	1,060
9	do	1.19	160	July 12	W. F. Ansley	4.76	1,920
Mar. 15	do	8.28	4,820	Aug. 6	do	1.54	267
Apr. 7	do	5.88	2,550	Sept. 3	do	4.79	1,880

*Daily discharge, in second-feet, of Maumee River at Antwerp, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	248	410	565	2,280	7,600	2,370	14,600	1,620	890	5,700	278	207
2	220	392	700	1,740	6,100	3,320	13,600	1,560	840	4,700	263	308
3	207	340	610	1,500	5,500	3,150	12,400	1,380	990	4,400	263	1,680
4	207	324	745	1,320	5,106	3,590	8,700	1,280	940	4,500	263	1,740
5	194	445	5,700	1,180	5,200	6,200	5,200	1,040	1,380	3,230	263	840
6	194	940	7,600	1,040	5,100	7,380	3,590	940	1,500	2,160	263	485
7	182	840	7,050	990	4,400	6,720	2,590	840	2,670	1,560	248	375
8	182	308	4,400	1,200	3,230	5,700	2,300	1,090	3,590	1,380	248	308
9	164	565	2,910	1,200	2,750	5,300	1,950	2,160	6,500	2,590	278	308
10	162	465	2,300	1,260	2,990	4,900	1,880	2,440	10,140	2,590	324	278
11	159	410	1,810	3,860	2,440	3,590	1,950	2,830	10,700	2,300	293	278
12	159	358	1,680	6,300	2,090	2,750	1,740	4,220	9,420	1,740	293	263
13	155	340	3,950	5,800	1,380	5,300	1,500	3,590	6,830	1,380	293	248
14	164	308	8,940	4,310	940	6,100	1,380	2,440	5,100	1,090	278	234
15	164	293	9,420	3,500	940	5,100	1,140	1,880	3,410	890	263	207
16	169	324	7,820	3,590	990	3,500	1,040	1,560	2,590	745	248	194
17	169	392	5,500	4,700	940	2,910	980	1,380	2,370	610	220	194
18	194	358	4,040	4,040	1,100	2,370	940	1,260	2,230	525	220	182
19	278	340	3,150	2,910	1,260	1,950	940	1,200	1,740	465	220	182
20	1,140	308	2,750	1,950	1,200	1,740	890	1,090	1,500	428	234	194
21	1,260	308	3,950	1,680	1,200	1,680	990	940	2,590	410	234	182
22	940	293	6,100	1,750	1,140	1,500	3,230	790	2,750	392	220	220
23	700	293	6,100	1,800	940	2,160	4,220	745	2,910	375	220	278
24	525	293	7,380	1,750	745	4,700	3,150	790	4,040	340	308	410
25	445	278	6,940	1,600	700	7,930	2,300	1,440	5,500	340	392	428
26	375	278	5,720	1,400	655	8,700	1,740	2,020	7,600	324	324	358
27	340	278	4,500	1,300	610	8,480	1,380	1,810	5,100	308	293	308
28	278	278	4,900	1,250	610	7,930	1,140	1,500	3,230	293	263	278
29	278	278	4,600	1,200	1,390	10,380	1,140	1,260	4,310	308	234	278
30	278	340	3,860	3,500	-----	14,000	1,200	1,200	5,900	293	220	248
31	358	-----	2,830	7,820	-----	14,700	-----	1,040	-----	278	207	-----

NOTE.—Gage not read Dec. 26, Jan. 1, 5, and Feb. 18; discharge interpolated. Stage-discharge relation affected by ice Jan. 22-29; discharge estimated from study of weather records and comparison with record of flow of near-by streams.



*Monthly discharge of Maumee River at Antwerp, Ohio, for the year ending September 30, 1924*

[Drainage area, 2,050 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,260	155	338	0.165	0.19
November.....	940	278	379	.185	.21
December.....	9,420	565	4,440	2.17	2.50
January.....	7,820	-----	2,570	1.25	1.44
February.....	7,600	610	2,390	1.17	1.26
March.....	14,700	1,500	5,360	2.61	3.01
April.....	14,600	890	3,330	1.62	1.81
May.....	4,220	745	1,590	.776	.89
June.....	10,700	840	3,980	1.94	2.16
July.....	5,700	278	1,500	.732	.84
August.....	382	207	263	.128	.15
September.....	1,740	182	390	.190	.21
The year.....	14,700	155	2,210	1.08	14.66

**MAUMEE RIVER AT WATERVILLE, OHIO**

**LOCATION.**—At highway bridge at Waterville, Lucas County, and 3 miles below mouth of Tontogany Creek.

**DRAINAGE AREA.**—6,310 square miles below; revised (area in Ohio measured on topographic maps, area in Michigan and Indiana measured on post-route map).

**RECORDS AVAILABLE.**—November 19, 1898, to December 31, 1901, and August 26, 1921, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge; read by John Rhodes.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Stream bed is rock ledge. One channel at all stages. Channel straight for half a mile above and below gage. Control permanent. Zero flow would occur at gage height 0.9 foot.

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

**EXTREMES OF DISCHARGE.**—Maximum combined discharge of river and canal during year, 49,600 second-feet on March 31; minimum combined daily discharge during year, 386 second-feet on October 20.

1921-1924: Maximum combined discharge of river and canal on March 31, 1924; minimum combined discharge, 299 second-feet on September 8, 1921.

**REGULATION.**—Flow at extremely low water may be affected by regulation of Auglaize River at dam of Defiance Gas & Electric Co., near Defiance.

**DIVERSIONS.**—Water is diverted into Miami & Erie Canal at Grand Rapids and carried past station. See record of Miami & Erie Canal at Waterville.

**ACCURACY.**—Stage-discharge relation permanent except when affected by ice during January and February. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for periods of ice effect, for which they are fair.

*Discharge measurements of Maumee River at Waterville, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 3	F. R. Morgan	1.68	171	May 7	F. R. Morgan	3.19	3,080
Mar. 13	do	5.42	11,200	July 10	W. P. Ansley	3.64	3,970
Apr. 9	do	4.02	6,290	Aug. 2	do	1.60	110
10	do	3.77	5,140	30	do	1.50	68.6

*Daily discharge, in second-feet, of Maumee River at Waterville, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	250	106	118	6,750	20,000	3,900	45,600	3,180	2,290	16,400	98	66
2	102	98	166	4,530	21,300	7,980	34,100	3,040	2,060	15,300	86	230
3	174	106	150	3,750	15,300	10,700	25,400	3,040	1,950	11,200	58	86
4	182	90	1,540	4,210	14,200	12,700	20,000	2,780	2,290	8,420	70	78
5	82	367	8,420	2,060	13,700	21,300	15,900	2,780	2,660	6,750	94	70
6												
7	49	484	15,300	1,740	14,200	32,600	10,200	3,040	2,530	5,230	86	940
8	90	508	17,600	1,900	13,200	25,400	6,750	3,040	3,040	3,460	86	734
9	74	925	15,900	1,900	13,200	18,800	5,600	3,040	6,750	2,910	70	378
10	98	748	11,200	1,900	9,320	13,700	5,230	3,600	17,600	2,410	86	424
11	106	585	8,420	2,060	5,600	11,200	4,210	4,870	31,800	3,900	70	290
12												
13	118	367	5,980	9,780	4,870	10,200	4,060	5,980	35,600	3,600	78	312
14	64	412	4,530	22,600	3,900	8,420	3,900	7,560	35,600	3,310	70	250
15	82	389	6,750	28,200	3,900	11,200	3,460	9,780	26,800	2,780	78	190
16	98	240	21,300	25,400	3,180	15,300	2,410	8,420	15,900	1,740	70	190
17	118	389	24,700	16,400	2,780	14,800	2,410	5,980	12,200	1,950	78	62
18												
19	98	210	22,000	12,200	2,500	11,700	2,530	4,530	8,420	1,040	78	66
20	98	182	16,400	12,200	2,800	8,420	2,660	4,210	5,980	940	78	86
21	64	134	12,200	13,200	2,530	6,750	2,060	3,310	7,150	880	66	78
22	150	82	8,860	9,780	2,180	5,600	1,840	2,530	7,980	472	70	70
23	56	64	6,750	5,980	3,040	4,210	1,950	2,530	6,750	378	230	86
24												
25	82	98	8,860	3,900	1,540	4,870	1,840	2,290	5,230	334	94	94
26	82	64	11,200	3,800	1,500	4,530	9,780	1,840	5,230	290	86	94
27	82	98	18,800	3,800	1,600	8,420	15,300	1,740	5,230	290	70	520
28	664	134	26,100	3,700	1,500	13,200	15,300	2,180	4,870	546	70	250
29	484	98	25,400	3,460	1,600	20,700	9,320	2,060	6,360	312	66	142
30												
31	260	82	21,300	3,400	1,600	25,400	6,360	2,530	8,420	142	66	972
32	150	106	16,400	3,400	1,400	28,200	4,530	4,530	18,200	110	70	910
33	106	90	14,200	3,300	1,450	26,800	3,600	3,900	15,900	86	66	820
34	90	98	13,200	3,200	1,640	30,400	3,040	3,040	17,600	110	66	624
35	106	106	11,200	11,000		47,200	2,780	2,910	13,700	110	70	472
36	134		11,200	15,300		49,500		2,410		94	70	

NOTE.—Stage-discharge relation affected by ice Jan. 7-9, 22-24, 26-30, Feb. 16-17, 22-27; discharge estimated from study of observer's notes, weather records, and records of flow of near-by streams.

*Monthly discharge, in second-feet, of Maumee River and Miami & Erie Canal at Waterville, Ohio, for the year ending September 30, 1924*

Month	Maximum (combined)	Minimum (combined)	Mean		
			River	Canal	Combined
October .....	1, 110	386	142	401	543
November .....	1, 360	482	249	430	679
December .....	26, 500	491	12, 500	430	12, 900
January .....	28, 200	-----	7, 900	103	8, 000
February .....	21, 300	-----	6, 410	204	6, 610
March .....	49, 600	4, 180	16, 600	52.0	16, 700
April .....	45, 700	2, 120	9, 070	219	9, 290
May .....	10, 100	2, 070	3, 760	333	4, 100
June .....	36, 000	2, 300	11, 200	386	11, 600
July .....	16, 800	478	3, 100	433	3, 530
August .....	637	447	80.5	401	482
September .....	1, 370	418	319	385	704
The year .....	49, 600	386	5, 950	315	6, 260

#### TIFFIN RIVER NEAR STRYKER, OHIO

**LOCATION.**—In sec. 17, T. 6 N., R. 4 E., at highway bridge 2 miles southwest of Stryker, Williams County.

**DRAINAGE AREA.**—450 square miles; revised (area in Ohio measured on topographic maps, area in Michigan measured on post-route map).

**RECORDS AVAILABLE.**—September 1, 1921, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge; read by Vernetta Allison.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel straight for about 400 feet above and below gage. One channel at all stages. Banks high and bushy. Control for low water is ruins of old timber dam half a mile below gage; control for high water is long stretch of river below gage. Zero flow would occur at zero gage height.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 13.0 feet at 4 p. m. March 7 (discharge, 2,070 second-feet); minimum stage, 1.20 feet at 7.55 a. m. August 30 (discharge, 23 second-feet).

1921-1924: Maximum stage recorded, 13.0 feet at 5.30 p. m. April 1, 1922 (revised discharge) and at 4 p. m. March 7, 1924 (discharge, 2,070 second-feet, minimum stage, 1.10 feet at 8.35 a. m. August 16, 1922 (discharge, 15 second-feet).

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

**ACCURACY.**—Stage-discharge relation permanent from October to June except when affected by leaves lodged on control in October and by ice in January and February; changed during high water on July 1; and changed gradually from July 11 to September 30. Rating curves fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in the footnote to table of daily discharge. Records fair.

*Discharge measurements of Tiffin River near Stryker, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 8	F. R. Morgan .....	1.48	30.9	May 6	F. R. Morgan .....	2.10	95.5
Mar. 17	do .....	4.73	461	July 11	W. P. Ansley .....	2.73	232
Apr. 7	do .....	4.64	436	Aug. 6	do .....	1.40	41.1
8	do .....	4.46	413	Sept. 3	do .....	1.35	35.2

*Daily discharge, in second-feet, of Tiffin River near Stryker, Ohio, for the year ending September 30, 1924.*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	67	72	128	329	1,150	520	1,780	134	94	1,460	54	33
2.....	54	62	134	245	990	704	1,360	122	88	1,460	48	34
3.....	40	62	116	203	791	536	863	116	82	845	43	34
4.....	40	58	154	203	536	971	670	110	88	399	41	36
5.....	31	67	773	189	474	1,360	552	110	88	273	37	40
6.....	28	82	990	99	399	1,720	520	99	82	217	44	29
7.....	30	88	1,070	54	357	1,970	459	94	88	231	47	30
8.....	31	82	687	50	259	1,720	429	122	140	357	46	33
9.....	27	77	399	50	245	1,480	429	203	203	385	43	40
10.....	25	67	301	72	140	971	474	287	371	259	41	43
11.....	26	62	245	935	128	536	414	273	301	231	41	39
12.....	27	58	315	1,150	116	504	329	245	189	203	33	31
13.....	23	58	827	1,150	116	687	287	203	128	168	31	27
14.....	29	54	1,300	953	122	881	287	189	128	140	34	28
15.....	35	54	1,590	738	134	845	231	175	110	116	36	28
16.....	40	58	1,590	459	203	568	203	154	99	110	31	30
17.....	41	58	1,130	585	189	474	175	134	82	94	33	30
18.....	42	62	602	687	128	429	175	122	619	88	28	27
19.....	45	62	371	414	122	399	168	116	1,030	77	28	28
20.....	67	62	399	301	116	414	161	110	738	72	40	25
21.....	94	54	687	245	41	329	175	99	568	67	287	31
22.....	77	58	670	175	54	273	385	88	755	62	203	50
23.....	62	58	670	140	38	414	489	88	520	62	94	99
24.....	54	54	1,070	122	29	602	399	203	329	58	58	62
25.....	58	58	1,190	82	44	755	273	429	385	54	48	43
26.....	58	54	1,010	94	67	881	203	329	504	50	40	33
27.....	48	54	670	67	77	1,050	175	203	357	54	39	30
28.....	50	54	791	47	77	1,190	154	168	429	54	38	29
29.....	50	54	845	110	217	1,530	154	134	1,030	47	32	38
30.....	58	67	670	881	-----	1,800	147	116	1,270	47	27	34
31.....	67	-----	414	1,110	-----	1,880	-----	104	-----	50	29	-----

NOTE.—Stage-discharge relation affected by leaves lodged on control Oct. 1-20; daily discharge Oct. 1-7 ascertained by shifting-control method, Oct. 8-20 from parallel rating curve through discharge measurement made on Oct. 8. Stage-discharge relation affected by ice Jan. 5-10, 21-30, and Feb. 19-25; discharge estimated from study of observer's notes, weather records, and records of flow of near-by streams. Discharge July 2-11 ascertained from parallel rating curve through discharge measurement made on July 11. Discharge July 12 to Sept. 30 determined by shifting-control method.

*Monthly discharge of Tiffin River near Stryker, Ohio, for the year ending September 30, 1924*

[Drainage area, 450 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	94	23	45.9	0.102	0.12
November.....	88	54	62.3	.138	.15
December.....	1,590	116	702	1.56	1.80
January.....	1,150	-----	385	.856	.99
February.....	1,150	-----	254	.564	.61
March.....	1,970	273	916	2.04	2.35
April.....	1,780	147	417	.927	1.08
May.....	1,429	88	164	.364	.42
June.....	1,270	82	363	.807	.90
July.....	1,480	47	252	.560	.65
August.....	287	27	54.0	.120	.14
September.....	99	25	36.5	.081	.09
The year.....	1,970	23	305	.678	9.25

## AUGLAIZE RIVER NEAR FORT JENNINGS, OHIO

LOCATION.—In SE.  $\frac{1}{4}$  sec. 15, R. 5 E., T. 1 S., at highway bridge  $3\frac{1}{2}$  miles northeast of Fort Jennings, Putnam County, and 6 miles above mouth of Ottawa River.

DRAINAGE AREA.—333 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 31, 1921, to September 30, 1924.

GAGE.—Chain gage on highway bridge; read by G. S. Hedrick.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Channel straight for 300 feet above and 1,000 feet below gage. Right bank high; left bank fairly high, subject to overflow at extremely high water. One channel at all stages. Low-water control, quarry coffer dam 500 feet below gage. Zero flow would occur at gage height 0.3 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 14.3 feet at 12.05 p. m. March 30; minimum stage, 1.10 feet on November 26, August 9, and 11.

1921-1924: Maximum stage recorded, 15.6 feet on April 19, 1922; minimum stage, 1.94 feet on October 4, 1921.

ACCURACY.—Gage read to hundredths once daily. Records reliable. Rating curve not yet developed for high water.

*Discharge measurements of Auglaize River near Fort Jennings, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 10	F. R. Morgan	1.28	21.9	July 15	W. P. Ansley	2.30	99.7
Mar. 19	do	2.96	204	Aug. 8	do	1.24	20.4
Apr. 1	do	5.70	861	Sept. 5	do	1.20	17.4
30	do	2.67	158				

Daily gage height, in feet, of Auglaize River near Fort Jennings, Ohio, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.40	1.36	1.58	2.55	9.0	5.0	5.7	2.68	2.74	7.4	1.70	1.24
2	1.38	1.44	1.66	3.3	8.4	5.4	4.8	2.70	2.78	4.4	1.68	1.32
3	1.34	1.62	1.46	2.88	5.0	4.0	4.2	2.70	2.80	3.6	1.80	1.32
4	1.36	1.62	1.56	2.68	5.3	4.7	3.8	2.74	3.6	4.4	1.68	1.20
5	1.35	1.54	2.42	2.60	5.9	10.6	3.5	2.86	4.0	3.2	1.70	1.18
6	1.40	1.48	2.80	2.54	6.0	9.4	3.3	2.74	5.4	2.86	1.70	1.12
7	1.44	1.38	2.64	2.40	5.2	6.7	2.90	2.60	6.6	2.66	1.68	1.14
8	1.42	1.38	2.52	2.60	3.7	4.4	2.86	2.80	6.0	6.4	1.21	1.18
9	1.36	1.22	2.50	2.54	3.3	3.4	2.74	2.42	11.5	3.6	1.10	1.24
10	1.28	1.52	2.84	3.00	3.3	3.3	2.66	2.50	13.3	3.10	1.12	1.28
11	1.40	1.46	2.88	1.48	2.74	3.10	2.54	3.02	10.9	2.74	1.10	1.24
12	1.44	1.36	2.78	3.04	2.90	3.6	2.40	3.8	6.6	2.60	1.20	1.18
13	1.46	1.46	4.2	1.50	2.58	5.4	2.36	3.3	5.6	2.44	1.20	1.30
14	1.42	1.40	7.2	5.4	2.56	5.6	2.32	3.10	5.8	2.26	1.20	1.76
15	1.38	1.60	5.1	4.7	2.42	4.0	2.30	4.0	4.0	2.30	1.20	1.72
16	1.40	1.58	3.6	5.5	1.76	3.4	2.36	3.4	3.5	2.22	1.16	1.70
17	1.40	1.58	3.06	7.1	2.34	3.04	2.38	3.00	3.4	2.14	1.28	1.48
18	1.62	1.80	2.92	5.4	2.26	2.98	2.40	2.76	3.12	2.06	1.20	1.22
19	1.36	1.36	2.82	4.4	2.82	2.86	2.46	2.72	2.80	2.14	1.30	1.50
20	1.46	1.28	2.72	3.4	2.40	3.00	2.44	2.62	2.54	1.94	1.30	1.64
21	1.42	1.22	3.06	3.2	2.36	3.02	2.40	2.52	2.36	1.86	1.22	1.76
22	1.32	1.28	7.2	3.2	2.36	3.02	4.3	2.44	2.20	1.96	1.22	1.44
23	1.22	1.30	8.6	3.16	2.22	6.4	5.0	2.36	2.48	1.84	1.20	1.42
24	1.36	1.30	9.2	3.04	2.12	8.0	3.8	2.68	2.62	1.90	1.16	1.46
25	1.48	1.32	6.7	2.96	1.90	7.2	3.2	4.0	6.4	1.82	1.14	1.56
26	1.50	1.10	4.8	2.66	2.20	8.0	2.90	3.3	6.2	1.94	1.24	1.66
27	1.40	1.20	4.1	2.66	2.22	8.2	2.72	2.84	3.8	1.84	1.24	1.78
28	1.50	1.20	4.8	2.46	2.74	6.2	2.66	2.66	3.4	1.70	1.22	1.72
29	1.44	1.36	4.5	2.84	3.9	11.1	2.62	2.60	9.0	1.66	1.16	1.68
30	1.46	1.56	3.6	7.4	-----	14.3	2.66	2.54	11.4	1.74	1.18	1.68
31	1.50	-----	3.2	10.1	-----	12.2	-----	2.84	-----	1.62	1.22	-----

#### AUGLAIZE RIVER NEAR DEFIANCE, OHIO

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 9, T. 3 N., R. 4 E., at dam and power plant of Defiance Gas & Electric Co., 3 miles south of Defiance, Defiance County.

**DRAINAGE AREA.**—2,330 square miles; revised (area in Ohio measured on topographic maps, area in Indiana measured on post-route maps).

**RECORDS AVAILABLE.**—May 20 to October 24, 1903; April 13, 1915, to September 30, 1924.

**GAGE.**—Vertical staff gage on upstream side of power plant at right end of dam. Auxiliary staff gage in tailwater. Gages set to mean sea level datum. Crest of dam is 688 feet. Height of flashboards 1.75 feet prior to April 16, 1924; 2.00 feet thereafter.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge  $1\frac{1}{4}$  miles below dam or by wading near dam.

**CHANNEL AND CONTROL.**—Channel slightly curved above and below dam. Banks high. One channel at all stages. Dam and power plant form control for gage.

**EXTREMES OF DISCHARGE.**—Maximum mean daily discharge during year, 21,300 second-feet on March 31; minimum mean daily discharge, 6 second-feet on October 17.

1915-1924: Maximum mean daily discharge, 36,100 second-feet on March 18, 1919; minimum mean daily discharge, same as of October 17, 1923.

**ICE.**—Determination of discharge over dam and through plant not seriously affected by ice conditions.

**REGULATION.**—Flow regulated by Defiance Gas & Electric Co. at this point. Record of discharge not corrected for storage.

**ACCURACY.**—Discharge ascertained by power company from hourly readings on head and tail gages and ratings of crest of dam, Taintor gate, and turbines which have been checked by current-meter measurements made by engineers of the United States Geological Survey below dam at various stages and found accurate, except as noted in footnote to table of daily discharge. The leakage through dam and plant has been determined for various stages below crest level by current-meter measurements made by wading below dam when power plant was shut down. The leakage varies from 7 second-feet at headwater elevation 679 feet to 45 second-feet at headwater elevation 688 feet. All daily discharge values below 300 second-feet have been corrected for leakage. Records good.

**COOPERATION.**—Record of daily discharge, not corrected for leakage, furnished by Defiance Gas & Electric Co.

*Discharge measurements of Auglaize River near Defiance, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 6	F. R. Morgan	683.20	304	May 5	F. R. Morgan	90.20	1,570
Jan. 23	do	88.90	1,360	June 10	W. A. Werner	92.80	16,600
Mar. 18	do	88.20	1,660	July 14	W. F. Ansley	89.4	1,140
Apr. 4	do	90.05	3,400	Aug. 8	do	87.6	367
May 3	do	88.00	1,020	Sept. 4	do	87.2	44.7

*Daily discharge, in second-feet, of Auglaize River near Defiance, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	246	247	276	1,720	7,980	1,060	14,200	1,310	986	7,370	41	222
2	273	110	370	1,660	7,730	2,850	6,750	1,280	1,310	4,350	42	40
3	276	171	288	1,330	6,030	3,120	3,700	1,280	1,270	2,210	42	55
4	265	232	426	1,350	4,700	3,370	3,300	1,060	1,030	1,560	112	42
5	260	167	996	1,120	4,450	9,570	2,400	1,610	1,320	1,350	61	291
6	256	231	3,010	1,120	5,410	11,500	1,800	1,750	1,590	562	117	229
7	210	234	3,940	1,250	5,170	7,460	5,600	1,460	3,050	712	278	82
8	289	172	3,410	942	3,590	3,620	4,400	1,510	5,000	712	83	345
9	269	236	2,650	723	1,960	1,650	3,500	1,480	10,500	1,300	74	363
10	231	240	2,110	894	1,370	1,360	2,700	1,340	14,200	948	45	371
11	178	236	1,810	4,820	1,320	1,330	2,500	1,390	19,700	986	46	204
12	153	234	1,510	11,800	1,340	1,370	2,100	3,050	13,500	906	274	34
13	205	243	4,600	11,100	1,200	2,040	1,200	3,020	7,560	650	278	34
14	54	138	7,280	10,300	1,130	3,310	1,800	2,750	5,620	960	296	62
15	174	13	8,060	6,060	945	2,810	2,100	2,160	3,620	963	306	35
16	36	15	5,880	4,340	945	1,670	906	2,080	2,750	538	232	36
17	6	17	3,400	3,820	599	1,400	939	1,780	1,740	445	42	36
18	8	18	2,290	4,160	971	1,380	726	1,240	2,040	266	64	64
19	9	20	1,760	2,930	1,120	1,400	797	1,530	1,840	227	82	65
20	11	35	1,620	1,680	769	1,400	396	1,270	1,420	42	82	80
21	11	36	2,250	1,320	644	1,280	654	1,200	1,080	277	75	142
22	13	37	5,320	1,250	731	1,270	2,300	1,210	589	402	168	364
23	14	50	10,600	1,230	629	1,800	7,470	1,060	939	467	42	780
24	15	25	12,100	1,240	575	5,660	4,880	736	900	49	53	989
25	16	26	11,300	1,120	698	8,180	3,020	924	754	39	42	814
26	17	40	8,020	1,110	608	8,710	1,950	1,930	5,420	40	56	711
27	18	44	4,960	1,040	570	9,900	1,340	1,660	8,080	41	60	771
28	67	44	4,070	1,020	586	8,710	1,500	1,460	7,260	189	42	408
29	19	29	4,180	766	595	12,000	1,490	1,370	4,030	129	42	489
30	33	149	3,390	1,290	-----	18,100	1,370	1,210	6,200	41	83	457
31	193	-----	2,300	5,130	-----	21,300	-----	1,110	-----	86	176	-----

**NOTE.**—Flashboards on dam partly destroyed by high water on Mar. 31; repaired on Apr. 16. Daily discharge for this period furnished by power company has been corrected on basis of discharge measurement made on Apr. 4.

*Monthly discharge of Auglaize River near Defiance, Ohio, for the year ending September 30, 1924*

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October.....	289	6	123	May.....	3,050	736	1,560.
November.....	247	13	116	June.....	19,700	589	4,510.
December.....	12,100	276	4,010	July.....	7,370	39	930.
January.....	11,800	723	2,880	August.....	306	41	111
February.....	7,980	570	2,220	September.....	989	34	287
March.....	21,300	1,060	5,180	The year.....	21,300	6	2,090.
April.....	14,200	396	2,930				

#### OTTAWA RIVER AT ALLENTOWN, OHIO.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 29, T. 3 S., R. 6 E., at highway bridge at Allentown, Allen County.

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

**RECORDS AVAILABLE.**—November 15, 1923, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge; read by A. E. Benedum.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel curved above but straight for 500 feet below gage. Banks fairly high and brushy. Control is a flat bar of boulders and coarse gravel about 75 feet below gage. Zero flow would occur at zero-gage height.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 8.6 feet at 6.10 p. m. March 29; minimum stage, 0.86 foot at 6.15 p. m. August 21.

**ACCURACY.**—Gage read to hundredths twice daily. Records reliable. Rating-curve not yet developed for high water.

*Discharge measurements of Ottawa River at Allentown, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov 15	Morgan and Dornbach.....	0.92	10.5	Apr. 30	F. R. Morgan.....	1.50	67.9.
Jan. 24	F. R. Morgan.....	1.69	55.3	July 16	do.....	1.15	30.1
Mar. 20	do.....	1.59	77.2	Aug. 8	W. P. Ansley.....	1.58	82.4
Apr. 1	do.....	3.06	388	Sept. 5	do.....	1.00	13.7

\* Stage-discharge relation affected by ice.



*Daily gage height, in feet, of Ottawa River at Allentown, Ohio, for the year ending September 30, 1924*

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-----	1.00	2.00	3.8	2.30	2.94	1.46	1.59	2.54	0.96	1.54
2	-----	.93	1.46	3.2	1.96	2.38	1.42	1.54	2.06	.91	1.06
3	-----	.94	1.41	2.57	1.88	2.12	1.32	1.78	1.98	.92	.98
4	-----	1.22	1.19	2.88	2.62	1.90	1.92	2.57	1.64	.92	.98
5	-----	1.50	1.80	3.5	4.8	1.78	1.88	2.00	1.44	1.33	.95
6	-----	1.38	1.74	3.6	3.4	1.72	1.58	3.3	1.34	1.79	.92
7	-----	1.35	1.79	2.48	2.68	1.47	1.48	2.26	1.48	1.46	.90
8	-----	1.30	1.59	1.96	2.02	1.38	1.42	5.5	1.58	1.54	.88
9	-----	1.56	1.59	1.62	1.68	1.36	1.58	6.6	1.53	1.40	1.20
10	-----	1.80	3.1	1.71	1.64	1.54	1.48	7.5	1.52	1.15	1.22
11	-----	1.18	7.4	1.50	1.63	1.46	2.40	4.3	1.31	1.00	1.12
12	-----	1.17	4.5	1.60	1.88	1.40	2.60	3.1	1.23	1.00	1.03
13	-----	3.7	2.91	1.44	2.48	1.28	2.14	2.42	1.16	1.10	1.07
14	-----	2.30	2.12	1.42	2.61	1.32	2.08	2.08	1.12	.98	1.02
15	-----	0.93	1.60	1.54	1.41	2.27	2.18	1.83	1.10	.94	.94
16	-----	.98	1.17	2.18	1.38	1.75	1.71	1.67	1.11	.94	.94
17	-----	.97	1.14	3.0	1.38	1.64	1.38	1.50	1.06	.90	.94
18	-----	.92	1.15	2.00	1.30	1.54	1.40	1.38	1.04	.88	.94
19	-----	.93	1.17	1.76	1.31	1.52	1.24	1.44	1.28	1.00	.92
20	-----	.94	1.20	1.62	1.37	1.58	1.33	1.54	1.20	1.00	.92
21	-----	.96	1.54	1.88	1.36	1.60	1.46	1.45	1.16	1.04	.89
22	-----	.95	5.3	1.80	1.31	1.81	4.3	1.38	1.12	1.02	.90
23	-----	.96	5.1	1.78	1.28	3.6	2.98	1.32	1.40	1.00	1.03
24	-----	1.00	4.4	1.70	1.25	4.3	2.19	3.1	1.36	1.00	.98
25	-----	.96	2.58	1.68	1.20	3.8	1.78	2.65	3.3	1.02	.94
26	-----	.92	2.19	1.72	1.12	5.1	1.66	1.88	3.4	1.00	.92
27	-----	.94	1.50	1.67	1.30	4.4	1.66	1.64	2.32	.97	.94
28	-----	.93	2.64	1.58	1.74	3.2	1.53	1.58	2.00	.99	.92
29	-----	.96	2.03	3.0	2.41	8.3	1.42	1.58	6.4	.96	.89
30	-----	1.09	1.62	5.5	-----	5.5	1.50	1.78	3.8	.98	.92
31	-----	-----	2.13	4.4	-----	4.1	-----	1.62	-----	1.00	.99

#### BLANCHARD RIVER NEAR FINDLAY, OHIO

**LOCATION.**—On east line of sec. 10, T. 1 N., R. 10 E., at highway bridge 2 miles northwest of Findlay, Hancock County.

**DRAINAGE AREA.**—343 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—November 14, 1923, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge; read by R. T. Rees and Miss Gertrude Parish.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel curved above but straight for 400 feet below gage. Banks high and brushy. Control for extremely low water is concrete protection wall for pipe line beneath bridge. Control for high stages is long stretch of channel below gage. Zero flow would occur at gage height 0.4 foot.

**EXTREMES OF STAGE.**—Maximum stage recorded, 10.9 feet at 7 a. m. March 30; minimum stage, 0.72 foot on August 2, 22, and September 1 and 17.

**ACCURACY.**—Gage read to hundredths twice daily. Records reliable. Rating curve not yet developed for high water.

*Discharge measurements of Blanchard River near Findlay, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		Feet	Sec.-ft.			Feet	Sec.-ft.
Nov. 14	Morgan and Dornbach	0.94	14.4	May 8	F. R. Morgan	1.64	109
Jan. 25	F. R. Morgan	1.50	62.4	July 9	W. P. Ansley	1.72	135
Mar. 20	do	1.79	151	Aug. 7	Lasley Lee	.96	17.8
Apr. 2	do	2.64	486	Sept. 11	Lee and Markel	1.00	19.5

*Daily gage height, in feet, of Blanchard River near Findlay, Ohio, for the year ending September 30, 1924*

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		1.10	2.64	3.8	3.10	3.17	1.73	1.62	1.96	0.77	0.77
2		1.06	2.20	2.88	2.59	2.66	1.61	1.54	1.60	.73	.87
3		1.05	1.95	2.84	2.38	2.42	1.78	1.56	1.34	.81	.85
4		1.25	1.82	3.00	3.5	2.26	2.76	2.22	1.22	.88	.92
5		2.10	1.64	3.6	6.8	2.08	2.30	2.38	1.17	.83	.93
6			3.4	1.74	4.6	5.0	1.90	1.96	2.50	1.13	.94
7			3.6	1.68	2.85	3.2	1.85	1.75	2.49	1.60	.99
8			2.52	1.57	2.26	2.31	1.72	1.63	3.7	2.18	1.01
9			2.44	1.50	2.00	2.13	1.74	1.60	6.9	1.69	1.03
10			2.80	1.97	1.88	2.11	1.69	1.64	7.9	1.45	.96
11			2.49	9.3	1.88	2.01	1.61	2.10	6.1	1.32	.96
12			2.11	8.3	1.76	2.12	1.52	2.48	4.8	1.20	.95
13			4.5	5.4	1.66	2.50	1.45	2.22	3.14	1.06	.92
14	0.94	5.1	3.5	1.60	2.88	1.50	2.06	2.50	1.07	.92	.89
15	.94	3.2	3.2	1.55	2.30	1.43	2.24	2.32	1.13	.83	.86
16	.94	2.32	3.0	1.48	1.97	1.37	2.00	2.00	1.17	.88	.85
17	.97	2.11	3.4	1.58	1.89	1.43	1.78	1.72	1.13	.83	.75
18	.94	1.99	2.65	1.39	1.82	1.42	1.74	1.64	1.07	.84	.81
19	.94	1.91	2.07	1.24	1.76	1.43	1.67	1.45	1.07	1.04	.83
20	.92	1.92	1.72	1.48	1.78	1.44	1.63	1.37	.95	.95	.85
21	.91	2.25	1.78	1.38	1.84	1.73	1.47	2.30	.99	.84	.80
22	.91	6.7	1.98	1.47	1.96	5.4	1.45	1.24	1.01	.80	4.6
23	.95	7.9	1.65	1.28	3.5	3.3	1.42	1.17	1.00	.77	2.10
24	.93	6.9	1.53	1.20	5.7	2.52	1.91	1.23	.91	.77	1.66
25	.91	4.1	1.51	1.26	5.0	2.17	1.94	2.21	.86	.80	1.26
26	.92	3.02	1.75	1.26	6.0	1.80	1.85	2.35	.92	.75	1.09
27	.98	2.65	1.52	1.41	6.1	1.66	1.62	2.10	.85	.79	1.03
28	.92	3.8	1.41	1.87	4.3	1.91	1.52	1.70	.90	.77	1.01
29	.95	2.96	1.98	2.53	8.7	1.58	1.58	2.28	.84	.77	1.20
30	1.02	2.34	5.2		10.6	1.68	1.63	2.31	.96	.77	1.18
31		2.24	5.5		6.0		1.59		.87	.88	

#### BLANCHARD RIVER AT GLANDORF, OHIO

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 17, T. 1 N., R. 7 E., at highway bridge three-fourths mile northeast of Glandorf, Putnam County, and  $1\frac{1}{4}$  miles above mouth of Cranberry Creek.

**DRAINAGE AREA.**—643 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—August 30, 1921, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge; read by Victor Unterbrink.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel straight for 500 feet above and below gage.

Banks fairly high and wooded. One channel at all stages. Control is stretch of channel below gage; practically permanent. Zero flow would occur at gage height 0.7 foot.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 20.8 feet at 6 a. m. March 31; minimum stage, 1.70 feet at 6 a. m. September 1.

1921-1924: Maximum stage recorded, 22.4 feet at 1 p. m. April 1, 1922; minimum stage, 1.58 feet at 11 a. m. and 3 p. m. August 30, 1921, and 6 p. m. August 31, 1921.

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

**ACCURACY.**—Gage read to hundredths once daily. Records good. Rating curve for high water not yet developed.

*Discharge measurements of Blanchard River at Glandorf, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 9	F. R. Morgan	1.95	17.9	May 1	F. R. Morgan	3.76	230
Mar. 19	do	4.64	338	July 15	W. P. Ansley	2.60	72.2
Apr. 1	do	17.71	3,080	Aug. 7	do	2.52	70.2
2	do	13.74	1,800	Sept. 4	do	2.11	36.0

*Daily gage height, in feet, of Blanchard River at Glandorf, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3.22	2.12	2.22	6.5	17.0	9.4	18.2	3.8	2.7	6.7	1.86	1.70
2	2.86	1.98	2.24	6.4	17.0	9.7	14.1	3.8	3.6	6.0	1.86	2.36
3	2.44	2.18	2.38	4.1	12.2	9.7	9.8	3.7	3.8	5.0	1.86	2.18
4	2.32	2.22	3.8	3.28	11.1	10.3	7.0	7.0	4.6	4.4	1.86	2.10
5	2.18	2.30	4.3	3.00	9.1	11.6	6.1	6.7	5.0	3.04	1.94	2.04
6	2.10	2.34	6.8	4.0	10.0	12.8	5.5	5.6	5.2	2.90	3.42	1.08
7	2.04	2.40	9.5	4.2	11.5	14.9	5.1	5.4	5.4	2.76	2.60	1.90
8	1.98	2.42	10.1	4.2	9.2	13.6	4.8	5.0	8.8	2.70	2.48	1.88
9	1.94	2.46	8.8	4.2	8.5	8.7	4.2	5.0	16.2	5.0	2.66	1.88
10	1.92	2.38	8.4	4.2	6.6	7.3	4.0	4.6	18.7	4.2	2.64	1.88
11	1.90	2.30	7.9	13.6	4.7	5.4	4.0	5.1	18.0	3.6	2.62	1.88
12	1.90	2.22	7.0	20.3	4.5	4.9	3.9	7.8	16.8	3.28	2.54	1.88
13	1.88	2.16	6.7	19.1	4.1	6.6	5.6	7.9	15.0	3.04	2.48	1.88
14	2.02	2.14	14.4	18.5	4.0	7.3	5.0	7.4	10.6	2.76	2.34	1.96
15	2.00	2.12	15.2	14.4	3.9	8.6	4.9	6.7	8.4	2.57	2.08	1.94
16	1.98	2.12	11.8	8.6	3.5	8.0	4.4	6.1	7.5	2.42	2.04	1.90
17	1.96	2.12	7.2	11.9	3.5	5.7	4.0	6.0	6.8	2.36	2.00	1.88
18	1.96	2.08	7.0	9.9	3.6	4.6	3.8	5.1	5.4	2.24	1.94	1.86
19	1.94	2.02	6.8	8.1	3.7	4.6	3.28	4.4	3.8	2.20	1.84	1.80
20	1.94	2.02	6.4	7.6	3.7	4.6	4.1	4.0	3.35	2.20	1.84	1.78
21	1.98	2.02	5.8	6.4	3.7	4.6	5.6	4.0	3.05	2.18	1.84	1.76
22	2.08	2.02	8.8	5.1	3.7	4.6	8.8	3.9	2.88	2.18	1.84	8.6
23	2.06	2.02	12.9	4.9	3.7	9.0	12.2	3.9	2.94	2.28	1.84	9.3
24	2.02	2.02	18.2	4.8	3.7	13.2	9.6	3.8	3.8	2.16	1.84	7.2
25	2.14	2.08	16.7	4.8	3.7	15.6	7.4	3.9	6.7	2.12	1.84	5.0
26	2.28	2.12	15.8	4.7	3.7	16.9	5.3	4.1	8.7	2.08	1.84	3.18
27	2.20	2.14	12.2	4.4	3.7	17.2	4.1	4.0	6.6	2.04	1.80	2.88
28	2.20	2.36	9.0	3.9	3.7	16.6	4.1	4.0	5.5	2.00	1.76	2.80
29	2.18	2.38	6.3	5.4	4.4	17.5	3.9	4.0	5.8	1.98	1.76	2.76
30	2.18	2.28	7.1	11.3	-----	20.0	3.8	3.8	6.2	1.96	1.74	2.75
31	2.16	-----	6.9	17.0	-----	20.8	-----	3.8	-----	1.90	1.72	-----

#### MIAMI & ERIE CANAL AT WATERVILLE, OHIO

**LOCATION.**—At highway bridge at Waterville, Lucas County, opposite gaging station on Maumee River at Waterville.

**RECORDS AVAILABLE.**—August 27, 1921, to September 30, 1924.

**GAGE.**—Prior to September 13, 1922, chain gage on downstream side of highway bridge; beginning that date, vertical staff gage at same datum on downstream wingwall of left abutment; read by John Rhodes.

**DISCHARGE MEASUREMENTS.**—Made from footbridge 500 feet below gage.

**CHANNEL AND CONTROL.**—Channel straight for a quarter of a mile above and below gage. One channel at all stages. Control is long stretch of channel below gage, shifting. Zero flow occurs at gage height 0.86 foot.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.85 feet on January 5 (discharge, 546 second-feet). No flow in canal January 8–10, 12–16, and March 6–21, when there was a break in bank above gage.

1921–1923: Maximum stage recorded, 7.07 feet March 2, 1922 (discharge, 610 second-feet). No flow in canal March 15, 1923, January 8–10, 12–16, and March 6–21, 1924.

**ICE.**—Stage-discharge relation may be slightly affected by ice during severe winters.

**REGULATION.**—Flow in canal is regulated at head gate at Grand Rapids 10 miles upstream, the point of diversion from Maumee River. Water is used for power at Maumee and Toledo.

**ACCURACY.**—Stage-discharge relation not permanent; not seriously affected by ice. Gage read to half-tenths once daily. Daily discharge ascertained by shifting-control method. Records fair.

*Discharge measurements of Miami & Erie Canal at Waterville, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 3	F. R. Morgan	6.00	422	July 9	W. P. Ansley	5.74	444
Apr. 9	do	4.00	204	Aug. 2	do	5.60	389
May 6	do	5.12	327	Aug. 30	do	5.60	406

*Daily discharge, in second-feet, of Miami & Erie Canal at Waterville, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	435	410	373	432	36	276	74	307	352	450	394	402
2	426	410	392	426	36	276	69	325	352	447	389	413
3	423	423	433	432	32	286	102	325	350	437	389	404
4	422	433	461	413	42	289	134	314	353	430	390	402
5	415	440	444	546	87	18	159	298	356	423	390	406
6	409	446	385	83	101	0	177	327	342	439	394	430
7	415	447	398	11	132	0	164	342	349	451	402	440
8	409	433	435	0	162	0	200	326	379	437	393	424
9	402	430	451	0	198	0	204	326	366	444	393	400
10	406	427	439	0	252	0	195	325	366	458	394	407
11	402	430	422	2	242	0	232	327	323	454	388	402
12	396	456	439	0	242	0	239	330	352	454	383	402
13	383	424	453	0	242	0	239	347	383	446	385	401
14	389	424	406	0	240	0	235	338	365	437	384	392
15	377	444	432	0	263	0	237	332	394	432	394	383
16	347	447	439	0	263	0	240	325	397	437	407	380
17	356	465	439	8	255	0	289	320	424	426	405	366
18	354	500	419	22	255	0	286	321	411	414	400	359
19	342	479	422	18	255	0	283	315	409	366	393	348
20	330	431	432	42	252	0	279	333	397	432	407	342
21	323	444	439	57	252	0	279	344	401	454	394	334
22	360	424	436	68	258	13	170	334	401	444	413	343
23	423	418	423	69	258	28	216	334	402	443	411	340
24	450	411	432	63	258	32	257	347	428	442	416	352
25	443	424	419	107	258	30	251	344	432	436	420	373
26	430	420	432	107	258	38	269	348	404	432	418	389
27	436	398	426	63	258	48	269	348	454	454	418	380
28	446	392	431	61	258	39	269	355	392	428	419	392
29	436	398	453	51	274	91	258	355	368	423	419	383
30	423	405	460	60	60	81	266	359	439	368	413	374
31	423	450	48	48	68	68	356	394	415	415	415	415

*Monthly discharge of Miami & Erie Canal at Waterville, Ohio, for the year ending September 30, 1924*

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October.....	450	323	401	May.....	359	298	333
November.....	500	392	430	June.....	454	323	386
December.....	461	373	430	July.....	458	366	433
January.....	546	0	103	August.....	420	383	401
February.....	274	32	204	September.....	440	334	385
March.....	289	0	52.0	The year.....	546	0	315
April.....	296	69	219				

**NORTH BRANCH OF PORTAGE RIVER NEAR BOWLING GREEN, OHIO**

**LOCATION.**—In SE.  $\frac{1}{4}$  sec. 14, T. 5 N., R. 11 E., at highway bridge half a mile below mouth of Poe ditch and 5 miles northeast of Bowling Green, Wood County.

**DRAINAGE AREA.**—54.0 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—November 10, 1923, to September 30, 1924.

**GAGE.**—Chain gage on bridge; read by C. N. Swindler.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel curved above gage, straight for 150 feet below gage. Banks fairly high and clean. One channel at all stages. Control is rock ledge about 100 feet below gage. Zero flow would occur at gage height 0.3 foot.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during period, 5.8 feet June 29 (discharge, 598 second-feet); minimum stage, 0.60 foot at 8 a. m. November 29 (discharge, 0.5 second-foot).

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

**ACCURACY.**—Stage-discharge relation permanent; not affected by ice during year. Rating curve fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Discharge measurements of North Branch of Portage River near Bowling Green, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 10	Morgan and Dornbach.	0.97	11.6	May 7	F. R. Morgan.....	1.07	14.5
Jan. 18	F. R. Morgan.....	1.90	87.6	Aug. 2	W. P. Ansley.....	.78	3.52
Mar. 13	-----do-----	2.07	125	29	-----do-----	.70	1.48
Apr. 9	-----do-----	1.38	54.5				

*Daily discharge, in second-feet, of North Branch of Portage River near Bowling Green, Ohio, for the year ending September 30, 1924*

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		18	45	314	119	167	25	44	444	6	2
2		18	46	114	131	125	15	43	301	4	7
3		17	31	86	92	97	17	47	227	4	5
4		70	24	92	263	75	17	63	179	5	4
5		327	32	102	405	62	19	62	149	6	3
6		353	14	155	314	50	15	64	114	3	2
7		275	14	92	191	41	16	50	114	5	2
8		179	14	57	102	36	26	114	119	5	3
9		125	29	34	75	40	70	288	108	6	3
10	12	97	70	53	58	36	48	340	131	4	4
11	8	75	418	36	61	23	53	263	114	4	4
12	5	60	379	28	92	23	70	191	97	3	3
13	5	227	191	32	114	22	49	155	75	4	3
14	5	301	97	22	119	18	37	143	50	4	2
15	6	179	75	203	80	17	30	125	35	5	2
16	6	97	97	41	49	14	25	114	27	4	2
17	7	75	155	22	43	17	21	102	20	4	2
18	5	64	97	25	36	15	27	179	17	3	3
19	4	57	64	37	38	14	22	203	14	3	3
20	2	64	75	36	37	14	20	179	12	10	3
21	2	97	52	18	50	38	18	179	9	12	2
22	2	125	38	17	49	379	16	155	14	10	4
23	2	191	34	14	149	288	15	137	11	6	4
24	4	215	34	12	137	155	38	114	9	4	4
25	4	137	34	11	119	92	43	275	14	3	3
26	5	114	30	12	179	57	42	379	9	3	2
27	4	97	26	20	191	42	39	314	7	4	2
28	1	155	35	19	125	34	38	366	6	3	4
29	1	108	114	64	379	29	45	598	5	3	3
30	12	191	327		458	28	47	556	6	3	2
31		62	353		314		40		6	2	

*Monthly discharge of North Branch of Portage River near Bowling Green, Ohio, for the year ending September 30, 1924*

[Drainage area, 54.0 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
November 10-30	12	1	4.86	0.090	0.07
December	353	17	135	2.50	2.88
January	418	14	98.2	1.82	2.10
February	314	11	61.0	1.13	1.22
March	458	36	147	2.72	3.14
April	379	14	68.3	1.26	1.41
May	70	15	32.4	.600	.69
June	598	43	195	3.61	4.03
July	444	5	78.8	1.46	1.68
August	12	2	4.68	.087	.10
September	7	2	3.07	.057	.06

## SANDUSKY RIVER NEAR UPPER SANDUSKY, OHIO

**LOCATION.**—In sec. 21, T. 2 S., R. 14 E., at highway bridge 2 miles northeast of Upper Sandusky, Wyandot County.

**DRAINAGE AREA.**—299 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—October 20, 1921, to September 30, 1924.

**GAGE.**—Chain gage on downstream side of highway bridge.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel is straight for 400 feet above gage but is divided by island; straight for 1,000 feet below gage. One channel at all stages. Banks are low and wooded. All water flows under bridge up to gage height 11.3 feet when road leading to bridge on right bank is overflowed. Control for low water is riffle 200 feet below gage, composed of rock ledge and gravel. At high stages control is long stretch of channel below gage. Zero flow would occur at gage height 0.1 foot, as determined August 14, 1923.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year and for period of record; 8.15 feet at 1.30 p. m. March 30 (discharge, 4,240 second-feet); minimum stage, 1.06 feet at 4 p. m. August 31 (discharge, 5.0 second-feet).

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

**ACCURACY.**—Stage-discharge relation changed gradually from July 31 to August 27; seriously affected by ice in January. Rating curves used before and after change well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for periods of shifting control and ice effect, for which they are fair.

*Discharge measurements of Sandusky River near Upper Sandusky, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 2	F. R. Morgan.....	1.28	23.8	July 8	W. P. Ansley.....	2.86	485
Mar. 11	-----do-----	2.34	280	July 30	-----do-----	1.14	13.6
Apr. 11	-----do-----	1.96	176	Aug. 27	-----do-----	1.14	7.53
23	-----do-----	2.70	437	Sept. 24	E. E. R. Dornbach----	1.19	8.82

*Daily discharge, in second-feet, of Sandusky River near Upper Sandusky, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	27	42	72	312	1,480	415	599	172	112	157	15	6
2.....	22	56	127	332	528	599	459	213	98	117	15	7
3.....	18	42	98	293	373	528	332	146	127	98	14	9
4.....	18	44	84	280	505	599	312	332	138	80	13	16
5.....	16	76	437	260	842	1,950	275	240	191	68	14	13
6.....	16	74	1,180	250	1,180	950	240	157	373	50	13	10
7.....	18	91	1,620	240	373	599	194	117	505	950	13	9
8.....	16	82	646	230	1,180	332	185	107	1,810	459	9	8
9.....	14	59	792	400	1,060	240	172	146	2,310	197	13	13
10.....	14	46	1,000	950	1,180	240	166	201	1,810	185	13	10
11.....	14	40	792	3,100	694	257	154	149	2,380	149	13	17
12.....	13	35	792	4,060	646	332	127	149	3,350	76	12	15
13.....	15	31	1,240	842	482	332	107	191	842	57	12	17
14.....	14	29	2,380	437	352	352	98	275	742	64	13	21
15.....	16	28	2,240	599	143	352	96	106	312	49	12	25
16.....	18	28	505	792	135	332	78	201	223	56	11	20
17.....	18	29	373	950	217	140	84	240	160	37	11	15
18.....	17	28	312	394	188	132	78	257	138	34	9	13
19.....	22	28	257	275	182	122	84	646	117	24	9	11
20.....	21	26	257	260	742	117	84	312	98	22	9	9
21.....	21	29	437	250	895	143	86	217	98	21	8	9
22.....	28	27	1,810	240	552	152	84	132	93	20	8	9
23.....	24	28	2,770	230	599	842	275	127	100	19	8	9
24.....	29	30	2,060	220	240	1,300	223	138	332	19	8	9
25.....	30	29	950	210	160	842	172	332	293	18	8	9
26.....	42	29	599	190	132	1,480	143	191	275	16	7	9
27.....	37	27	437	180	160	1,420	98	127	176	16	7	9
28.....	27	26	895	179	204	1,550	93	120	240	15	6	13
29.....	22	32	895	191	163	3,440	96	117	394	15	6	17
30.....	25	35	352	2,240	-----	4,240	105	122	552	14	6	23
31.....	35	-----	646	2,380	-----	1,000	-----	107	-----	15	5	-----

NOTE.—Stage-discharge relation seriously affected by ice Jan. 4-9 and 20-27; discharge estimated from study of observer's notes, weather records, and records of flow of near-by streams. Discharge July 31 to Aug. 27 ascertained by shifting-control method.

*Monthly discharge of Sandusky River near Upper Sandusky, Ohio, for the year ending September 30, 1924*

[Drainage area, 299 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	42	13	21.5	0.072	0.08
November.....	91	26	40.2	.134	.15
December.....	2,770	72	874	2.92	3.37
January.....	4,060	702	702	2.35	2.71
February.....	1,480	132	537	1.80	1.94
March.....	4,240	117	817	2.73	3.15
April.....	599	78	177	.592	.66
May.....	646	107	198	.662	.76
June.....	3,350	93	613	2.05	2.29
July.....	950	14	101	.338	.39
August.....	15	5	10.3	.034	.04
September.....	25	6	12.7	.042	.05
The year.....	4,240	5	342	1.14	15.69



## SANDUSKY RIVER NEAR MEXICO, OHIO

LOCATION.—In sec. 13, T. 1 N., R. 14 E., at highway bridge  $4\frac{1}{4}$  miles north of Mexico, 5 miles south Tiffin, Seneca County, and 3 miles above mouth of Honey Creek. From November 17, 1898, to November 17, 1900, in NW.  $\frac{1}{4}$  sec. 1, T. 1 S., R. 14 E., at highway bridge half a mile west of Mexico and 9 miles by river above present site.

DRAINAGE AREA.—776 square miles, at present site (measured on topographic maps).

RECORDS AVAILABLE.—November 17, 1898, to November 17, 1900; March 1, 1923, to September 30, 1924.

GAGE.—Chain gage on bridge; read by L. E. Keller.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Channel straight for 800 feet above and below gage. Right bank high and wooded; left bank fairly high, wooded, subject to overflow at extremely high water. One channel at all stages. Control for low water is riffle of boulders on rock ledge 100 feet below gage; fairly permanent. Control at high stages is long stretch of channel below gage. Zero flow would occur at gage height 0.7 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period of record, 15.0 feet at 5.45 p. m. March 31, 1924 (discharge, 8,200 second-feet); minimum stage, 1.60 feet at 6.30 p. m. August 11 and 13, 1924 (discharge, 10 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation changed during high water on March 31; slightly affected by ice in January. Rating curves well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good, except for periods of ice effect, for which they are fair.

*Discharge measurements of Sandusky River near Mexico, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 2	F. R. Morgan	2.30	93.2	Aug. 24	F. R. Morgan	5.14	986
Jan. 16	do	4.98	828	July 31	W. P. Ansley	1.99	37.9
Mar. 11	do	4.05	549	Aug. 28	do	1.72	15.4
Apr. 11	do	3.60	425				

*Daily discharge, in second-feet, of Sandusky River near Mexico, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	123	96	123	1,880	3,160	1,180	3,440	326	252	1,730	39	25
2.....	88	101	239	1,100	2,820	1,330	1,430	376	239	410	39	57
3.....	72	99	480	980	2,340	1,530	1,060	410	266	252	50	52
4.....	60	107	725	940	1,880	2,160	900	830	342	180	71	44
5.....	58	180	900	900	2,040	3,880	690	760	359	158	57	42
6.....	60	180	2,950	830	2,520	3,580	620	445	428	280	47	37
7.....	49	160	3,160	830	1,430	2,100	550	326	480	620	39	32
8.....	43	150	3,300	760	760	1,060	480	310	980	900	25	57
9.....	58	141	1,630	690	550	760	445	480	4,760	585	20	310
10.....	60	115	2,520	760	515	620	410	428	5,000	359	13	202
11.....	56	101	2,280	5,950	445	585	410	310	4,520	280	10	57
12.....	58	93	1,430	5,410	393	655	359	252	6,500	226	11	50
13.....	49	86	2,580	6,220	326	760	280	295	5,320	180	10	47
14.....	51	79	3,720	3,440	280	760	239	620	2,160	158	12	44
15.....	55	83	3,960	1,180	239	620	214	1,060	1,330	119	12	42
16.....	56	115	3,020	980	252	480	226	1,060	795	119	13	57
17.....	53	160	1,680	1,380	252	376	202	690	585	89	14	64
18.....	49	132	760	1,580	252	342	191	690	480	80	15	60
19.....	51	99	655	1,330	295	310	191	655	428	74	18	54
20.....	56	79	585	1,500	342	295	202	550	359	64	21	49
21.....	60	72	900	1,100	655	342	214	480	376	71	23	52
22.....	64	70	4,440	900	550	760	1,330	342	295	65	20	49
23.....	66	74	5,080	830	445	1,730	1,230	252	252	63	18	47
24.....	70	79	5,320	690	359	3,230	1,020	342	725	63	15	47
25.....	77	70	4,040	620	280	3,020	900	480	1,680	57	14	42
26.....	81	66	2,880	580	252	3,880	690	550	1,630	54	17	44
27.....	86	64	1,330	550	214	3,800	410	342	2,100	52	20	39
28.....	81	58	2,040	550	359	3,580	252	266	1,930	49	18	44
29.....	77	62	2,040	585	550	6,220	226	226	2,160	44	20	63
30.....	83	86	1,450	2,040	-----	7,000	214	214	2,640	44	20	71
31.....	93	-----	1,140	2,900	-----	8,200	-----	266	-----	42	23	-----

NOTE.—Stage-discharge relation affected by ice Jan. 6-8, 20-23, 26, 27, and 31; discharge estimated from study of observer's notes, weather records, and records of flow of near-by streams.

*Monthly discharge of Sandusky River near Mexico, Ohio, for the year ending September 30, 1924*

(Drainage area, 776 square miles)

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	123	43	65.9	0.085	0.10
November.....	180	58	102	.131	.15
December.....	5,320	123	2,170	2.80	3.23
January.....	6,220	550	1,610	2.07	2.39
February.....	3,160	214	854	1.10	1.19
March.....	8,200	295	2,100	2.71	3.12
April.....	3,440	191	634	.817	.91
May.....	1,060	214	472	.608	.70
June.....	6,500	239	1,650	2.13	2.38
July.....	1,730	42	241	.311	.36
August.....	71	10	24.0	.031	.04
September.....	310	25	62.7	.081	.09
The year.....	8,200	10	835	1.08	14.66

#### SANDUSKY RIVER NEAR FREMONT, OHIO

LOCATION.—In sec. 17, T. 4 N., R. 15 E., at highway bridge  $3\frac{1}{2}$  miles southwest of Fremont, Sandusky County, and  $2\frac{1}{2}$  miles below mouth of Wolf Creek. From November 18, 1898, to March 9, 1901, in NE.  $\frac{1}{4}$  sec. 3, T. 4 N., R. 15 E., at Lake Shore & Michigan Southern Railroad bridge, 4 miles below present gage.

**DRAINAGE AREA.**—1,250 square miles at present location, 1,260 square miles at original location (measured on topographic maps).

**RECORDS AVAILABLE.**—November 18, 1898, to March 9, 1901, and November 8, 1923, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge; read by G. E. Smith.

**DISCHARGE MEASUREMENTS.**—Made from gage at bridge or by wading.

**CHANNEL AND CONTROL.**—Channel curved above but straight for 1,500 feet below gage. Banks high and wooded. Control for low water is rock ledge just below gage. Control for high stages is long stretch of channel below gage. Zero flow would occur at gage height 0.5 foot.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 8 feet at 8 a. m. January 31; minimum stage, 0.96 foot at 6 p. m. August 20 and 7 a. m. and 6 p. m. August 21.

**ACCURACY.**—Gage read to hundredths twice daily. Records reliable. Rating curve not yet developed.

*Discharge measurements of Sandusky River near Fremont, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 8	Morgan and Dornbach	1.51	243	Apr. 24	F. R. Morgan	2.84	1,720
Jan. 17	F. R. Morgan	3.64	2,970	25	do	2.44	1,100
Mar. 12	do	2.69	1,430	Aug. 1	W. P. Ansley	1.17	99.3
Apr. 10	do	2.13	755	29	do	1.02	37.1

*Daily gage height, in feet, of Sandusky River near Fremont, Ohio, for the year ending September 30, 1924*

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		1.39	3.01	6.6	3.04	5.6	1.83	1.89	3.06	1.18	1.12
2		1.48	3.00	5.4	3.25	3.50	1.95	1.85	2.46	1.17	1.50
3		1.56	2.49	3.62	3.08	2.96	2.06	1.83	2.03	1.14	1.45
4		1.66	2.31	3.09	4.1	2.71	2.73	1.85	1.83	1.17	1.32
5		2.56	3.34	3.16	5.7	2.54	2.92	1.98	1.68	1.21	1.23
6		3.89	4.9	4.1	5.0	2.39	2.29	2.04	1.59	1.20	1.18
7		4.8	5.0	3.67	4.1	2.24	2.15	2.07	1.68	1.22	1.15
8	1.52	4.1	4.7	2.90	3.08	2.17	2.03	2.64	2.57	1.28	1.14
9	1.50	3.42	4.5	2.26	2.62	2.16	2.48	5.2	2.61	1.23	1.29
10	1.42	3.84	4.2	2.10	2.42	2.10	2.46	5.8	2.15	1.17	1.75
11	1.38	3.90	6.6	2.12	2.38	2.03	2.39	6.0	1.87	1.12	1.54
12	1.33	3.34	6.0	2.08	2.68	1.96	2.13	5.8	1.70	1.08	1.33
13	1.26	3.72	5.5	1.98	2.69	1.87	2.15	5.3	1.61	1.13	1.25
14	1.25	5.4	4.9	1.92	2.73	1.79	2.16	4.4	1.57	1.15	1.22
15	1.23	4.6	3.36	1.84	2.55	1.71	2.46	3.07	1.54	1.05	1.23
16	1.22	4.1	2.80	1.82	2.27	1.67	2.89	2.70	1.47	1.02	1.33
17	1.22	2.92	3.68	1.75	2.09	1.67	2.66	2.31	1.41	1.05	1.29
18	1.25	2.61	3.54	1.79	1.99	1.68	2.27	2.31	1.36	1.02	1.21
19	1.22	2.43	4.4	1.85	1.92	1.68	2.16	2.12	1.26	1.00	1.17
20	1.23	2.34	6.8	4.1	1.89	1.67	2.45	1.89	1.30	.97	1.16
21	1.20	2.46	7.0	4.9	1.95	1.72	2.32	1.77	1.40	.96	1.35
22	1.20	4.5	5.9	4.9	1.98	3.45	2.03	1.65	1.52	1.10	1.48
23	1.22	5.7	2.0	3.61	3.28	3.26	1.86	1.66	1.44	1.13	1.48
24	1.21	5.7	5.8	3.01	4.2	2.88	1.86	1.65	1.39	1.13	1.35
25	1.20	5.1	5.6	2.43	4.4	2.44	2.40	2.37	1.30	1.10	1.24
26	1.20	4.2	4.6	2.68	4.7	2.15	2.33	2.58	1.26	1.10	1.20
27	1.20	3.29	4.6	1.86	4.8	1.96	2.12	2.64	1.22	1.12	1.15
28	1.20	3.46	4.6	1.93	4.5	1.87	1.93	2.59	1.22	1.09	1.16
29	1.21	3.58	4.9	2.29	6.0	1.82	1.85	4.4	1.23	1.04	1.21
30	1.23	3.13	6.2		7.2	1.80	1.90	3.27	1.22	1.03	1.24
31		2.67	7.7		6.3		1.97		1.18	1.04	

## EAST BRANCH OF HURON RIVER NEAR NORWALK, OHIO

LOCATION.—At highway bridge  $1\frac{3}{4}$  miles northwest of Norwalk, Huron County, and  $1\frac{1}{2}$  miles below mouth of Cole Creek.

DRAINAGE AREA.—84.9 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 7, 1923, to September 30, 1924.

GAGE.—Chain gage on highway bridge; read by C. L. Hartwig.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Channel curved above but straight for 500 feet below gage. Banks fairly high and brushy. Control is rock ledge about 75 feet below gage. Zero flow would occur at gage height 0.3 foot.

EXTREMES OF STAGE.—Maximum stage recorded during year, 5.9 feet at 4 p. m. March 29; minimum stage, 0.84 foot at 7 a. m. and 6 p. m. August 31.

ACCURACY.—Gage read to hundredths twice daily. Records reliable. Rating curve not yet developed.

*Discharge measurements of East Branch of Huron River near Norwalk, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
Jan. 17	F. R. Morgan	<i>Feet</i> 1.90	<i>Sec.-ft.</i> 181	July 31	W. P. Ansley	<i>Feet</i> 0.99	<i>Sec.-ft.</i> 8.4
Mar. 12	do	1.93	187	Aug. 28	do	.88	4.4
Apr. 25	do	1.26	42.4				

*Daily gage height, in feet, of East Branch of Huron River near Norwalk, Ohio, for the year ending September 30, 1924*

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		1.25	1.48	1.93	2.00	1.68	1.27	1.33	1.78	0.96	1.66
2		1.20	2.26	1.79	1.99	1.64	1.21	1.27	1.61	.96	1.23
3		1.11	1.47	1.67	1.81	1.52	1.45	1.38	1.35	.94	1.11
4		1.38	1.56	1.98	3.05	1.44	1.94	1.45	1.24	.94	1.04
5		2.58	1.40	2.15	3.24	1.36	1.51	1.42	1.22	.94	1.02
6		3.77	1.70	2.02	2.19	1.32	1.31	1.38	1.22	.95	.96
7	0.99	2.31	1.72	1.48	1.97	1.30	1.24	1.35	1.26	1.00	.96
8	1.02	1.77	1.48	1.52	1.50	1.38	1.20	3.28	1.22	.94	.90
9	.93	2.11	1.44	1.52	1.37	1.41	1.21	3.00	1.14	.92	1.02
10	.98	2.29	1.48	1.40	1.44	1.42	1.18	2.35	1.26	.92	1.11
11	.92	1.69	5.20	1.52	1.58	1.30	1.17	3.44	1.21	.90	1.04
12	.88	1.46	2.20	1.42	1.86	1.23	1.15	3.19	1.14	.91	1.04
13	.86	3.48	1.75	1.33	1.58	1.18	1.18	2.00	1.12	.90	1.00
14	.87	2.98	1.53	1.28	1.44	1.16	1.28	1.61	1.06	.90	1.04
15	.90	1.70	1.50	1.53	1.25	1.14	2.45	1.39	.98	.90	1.00
16	.91	1.43	1.46	1.47	1.17	1.12	1.86	1.32	.98	.90	1.00
17	1.17	1.32	1.84	1.50	1.21	1.16	1.71	1.30	1.14	.90	1.00
18	1.11	1.37	1.53	1.54	1.20	1.16	1.63	1.82	1.12	.90	1.00
19	1.06	1.34	1.55	1.44	1.17	1.12	2.19	1.59	1.08	.90	.96
20	.98	1.36	1.51	1.55	1.15	1.10	1.56	1.33	1.04	.96	.97
21	.95	2.34	1.66	1.74	1.24	1.27	1.38	1.19	1.07	.96	1.12
22	.93	4.17	1.66	1.68	1.61	2.34	1.26	1.14	1.20	.94	1.21
23	.96	3.06	1.44	1.50	2.06	1.65	1.23	1.12	1.22	.94	1.17
24	.98	2.88	1.46	1.57	1.89	1.39	1.39	1.12	1.17	.92	1.08
25	.99	1.97	1.42	1.36	1.78	1.27	1.65	1.96	1.08	.90	1.08
26	1.00	1.85	1.45	1.62	2.59	1.20	1.38	2.00	1.00	.90	1.02
27	.99	1.69	1.58	1.47	2.16	1.14	1.29	1.48	.96	.89	.98
28	.96	2.40	1.58	1.37	2.28	1.13	1.26	1.33	.95	.86	1.11
29	.96	1.67	1.87	1.49	5.50	1.18	1.34	4.20	.94	.86	1.72
30	1.12	1.49	3.39		2.67	1.19	1.75	2.27	.94	.86	1.46
31		1.55	2.30		1.91		1.48		.97	.84	

## EAST BRANCH OF BLACK RIVER AT ELYRIA, OHIO

**LOCATION.**—At Fuller Street Bridge,  $1\frac{1}{4}$  miles southeast of center of Elyria, Lorain County, and 3 miles above junction with West Branch.

**DRAINAGE AREA.**—211 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 8, 1922, to September 30, 1924.

**GAGE.**—Chain gage on bridge; read by Mrs. Joe Wojcik.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel straight for 1,000 feet above and 700 feet below gage. Banks high and clean, not subject to overflow. One channel at all stages. Bed of stream, solid rock. Control for low water is rock ledge extending diagonally across channel 25 feet below gage. Control for high stages is long stretch of channel below gage. Zero flow would occur at gage height, 0.52 foot.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 9.9 feet at 5.30, a. m. June 29; minimum stage, 0.68 foot at 8.30 a. m. and 5.30 p. m. October 18 and 10 a. m. October 21.

1922-1924: Maximum stage recorded, that of June 29, 1924; minimum stage recorded, 0.57 foot at 7.30 a. m. and 5.30 p. m. October 5 and 9.30 a. m. October 6, 1922.

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

**ACCURACY.**—Gage read to hundredths twice daily. Record reliable. Rating curve not yet developed.

*Discharge measurements of East Branch of Black River at Elyria, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 19	W. W. Perrin-----	0.70	0.67	Apr. 14	W. A. Werner-----	1.15	50.7
Jan. 22	-----do-----	<sup>a</sup> 2.28	74.9	July 16	E. E. R. Dornbach----	.99	22.8
Mar. 25	-----do-----	2.38	615	Aug. 11	-----do-----	.75	3.04

<sup>a</sup>Affected by ice.

*Daily gage height, in feet, of East Branch of Black River at Elyria, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.96	0.90	1.68	2.49	2.14	1.49	1.92	1.14	1.75	2.42	0.82	0.71
2	.90	1.00	1.63	1.83	1.85	1.56	1.54	1.41	1.64	1.76	.85	.76
3	.81	.94	1.57	1.57	1.74	1.71	1.61	1.37	1.38	1.49	.86	.78
4	.94	.96	1.55	1.92	1.73	1.82	1.48	2.22	1.50	1.25	.85	.77
5	.83	.98	3.01	1.64	1.97	3.05	1.43	2.36	1.30	1.21	.83	.76
6	.79	1.26	4.27	3.23	2.42	2.50	1.38	1.58	1.06	2.00	.80	.74
7	.74	1.38	4.02	2.88	2.04	2.13	1.30	1.37	1.14	2.68	.81	.76
8	.76	1.20	2.39	2.28	1.50	1.38	1.52	1.24	1.81	2.27	.82	.76
9	.74	1.19	2.12	1.62	1.37	1.32	1.62	1.19	3.18	1.72	.84	.91
10	.76	1.16	2.74	1.54	1.28	1.39	1.62	1.80	3.07	1.82	.83	2.14
11	.72	1.05	2.29	4.70	1.30	1.49	1.44	1.51	3.35	1.52	.80	1.63
12	.76	.98	1.79	4.62	1.22	1.80	1.32	1.36	3.00	1.22	.73	1.29
13	.77	1.02	2.75	2.36	1.16	1.65	1.24	1.35	2.71	1.13	.74	1.11
14	.76	.98	4.50	1.78	1.14	1.56	1.16	1.43	1.88	1.05	.74	1.06
15	.74	.97	3.40	1.49	1.18	1.29	1.10	2.30	1.43	1.01	.74	1.04
16	.72	.95	1.85	1.75	1.18	1.26	1.06	2.66	1.26	1.00	.74	.94
17	.74	1.48	1.54	2.49	1.21	1.24	1.15	2.13	1.20	.98	.75	.93
18	.68	1.93	1.47	1.98	1.13	1.18	1.10	1.78	2.50	.96	.73	.90
19	.70	1.45	1.45	1.69	1.28	1.14	2.30	2.98	2.14	.93	.70	.90
20	.72	1.29	1.47	1.60	1.28	1.12	1.70	1.96	1.73	.92	.74	.94
21	.69	1.12	1.76	2.34	1.62	1.16	1.50	1.68	1.33	.91	.76	1.85
22	.72	1.05	3.60	2.33	1.76	2.02	2.62	1.44	1.13	.94	.84	2.04
23	.78	1.05	4.45	2.02	1.70	2.64	2.50	1.32	1.11	1.32	.82	1.54
24	.82	1.08	3.21	1.55	1.51	2.55	1.81	1.32	2.48	1.25	.77	1.29
25	.91	1.10	2.28	1.45	1.33	2.32	1.42	1.48	2.71	1.09	.75	1.04
26	1.06	1.19	2.05	1.34	1.20	2.77	1.41	1.62	1.98	.99	.73	.88
27	1.11	1.50	2.20	1.34	1.14	3.28	1.20	1.40	1.57	.97	.72	.85
28	.95	1.62	2.49	1.32	1.14	2.70	1.10	1.30	2.80	.96	.77	.87
29	.89	1.62	2.32	1.66	1.22	4.10	1.12	1.28	9.15	.89	.79	2.06
30	.89	1.74	1.71	3.26	-----	4.68	1.12	1.46	5.82	.81	.76	2.96
31	.88	-----	1.93	2.47	-----	2.98	-----	1.67	-----	.82	.73	-----

#### ROCKY RIVER NEAR BERE, OHIO

**LOCATION.**—At highway bridge just below junction of East and West branches and 3 miles northwest of Berea, Cuyahoga County.

**DRAINAGE AREA.**—269 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—November 2, 1923, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge; read by Ralph Campbell and O. R. Ruple.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel straight for 1,000 feet below gage. Branches join just above gage. Banks fairly high, clean. Control is rock ledge and large flat stones about 150 feet below gage. Zero flow would occur at gage height 0.2 foot.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 18.6 feet at 6 a. m. June 29; minimum stage, 0.88 foot at 4.15 p. m. August 27.

The flood of March, 1913, reached a stage corresponding to gage height 20.9 feet.

**ACCURACY.**—Gage read to hundredths twice daily. Records reliable. Rating curve not developed.

*Discharge measurements of Rocky River near Berea, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 2	Morgan and Dornbach	1.05	30.5	Apr. 14	W. A. Werner	1.40	90.1
Jan. 22	W. W. Perrin	2.25	80.2	July 17	E. E. R. Dornbach	1.60	48.8
Mar. 24	do	2.44	682	Aug. 12	do	1.16	14.2

*Daily gage height, in feet, of Rocky River near Berea, Ohio for the year ending September 30, 1924*

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		1.29	2.13	2.24	2.00	1.87	1.61	1.48	3.45	1.24	1.43
2	1.05	1.33	1.69	2.07	2.15	1.91	1.52	1.40	2.60	1.20	1.53
3	.99	1.50	1.93	2.04	2.41	1.95	1.42	1.52	2.26	1.16	1.60
4	1.06	1.90	2.18	2.29	3.30	1.78	2.33	1.45	1.80	1.13	1.72
5	1.21	4.9	1.80	3.02	5.1	1.48	2.60	1.34	1.75	1.15	1.84
6	1.55	6.4	2.41	3.41	2.81	1.42	1.65	1.25	3.31	1.25	1.92
7	1.41	4.1	2.71	1.81	2.50	1.74	1.41	1.25	3.32	1.22	2.48
8	1.55	2.10	2.43	1.57	1.78	2.02	1.44	2.16	3.14	1.21	2.51
9	1.58	2.68	2.08	1.49	1.61	2.14	1.41	2.75	2.68	1.36	2.56
10	1.39	2.50	2.07	1.50	1.57	2.00	1.44	1.92	2.92	1.39	5.7
11	1.25	2.28	7.4	1.48	1.68	1.70	1.38	2.00	2.41	1.34	4.9
12	1.23	1.78	3.30	1.41	1.90	1.54	1.40	4.9	2.07	1.21	4.6
13	1.14	3.89	2.33	1.44	1.76	1.53	1.72	3.40	2.86	1.18	3.52
14	1.05	2.75	1.88	1.41	1.64	1.41	1.92	2.34	2.30	1.12	2.80
15	1.03	2.32	1.80	1.34	1.58	1.38	3.34	1.71	1.74	1.06	2.25
16	1.02	1.72	1.94	1.33	1.34	1.28	2.60	1.48	1.62	1.09	1.62
17	1.71	1.95	3.30	1.43	1.30	1.26	1.86	1.52	1.61	1.27	2.85
18	2.15	1.86	1.57	1.36	1.24	1.50	2.25	2.25	1.56	1.22	2.74
19	1.66	1.74	1.96	1.44	1.22	2.54	2.01	2.46	1.49	1.16	2.68
20	1.36	1.78	1.73	1.74	1.19	1.79	1.70	1.74	1.42	1.16	2.38
21	1.23	2.34	2.05	1.94	1.28	1.68	1.56	1.50	1.35	1.15	2.05
22	1.16	4.8	2.22	2.00	1.88	4.20	1.51	1.40	2.35	1.12	1.76
23	1.24	4.1	2.18	1.86	3.34	2.34	1.38	2.15	2.02	1.14	1.62
24	1.43	3.09	2.04	1.67	2.63	1.84	1.44	1.98	1.76	1.03	1.52
25	1.56	2.25	1.95	1.59	2.24	1.57	2.04	2.89	1.41	.97	1.34
26	2.02	2.14	1.83	1.56	3.08	1.50	1.64	2.79	1.46	.95	1.37
27	2.21	2.09	1.78	1.51	2.79	1.32	1.50	2.22	1.43	.89	1.61
28	3.05	3.75	1.74	1.58	2.53	1.29	1.38	1.54	1.36	.89	3.94
29	4.3	2.62	1.91	1.74	5.0	1.32	1.34	15.4	1.24	.94	5.2
30	2.50	1.81	4.0		4.8	1.32	2.15	4.1	1.27	1.00	4.2
31		2.40	3.22		2.26		1.72		1.26	1.06	

#### CUYAHOGA RIVER AT OLD PORTAGE, OHIO

**LOCATION.**—At highway bridge at Old Portage, also known as Cranmer, Summit County, 4 miles northwest of Akron. Little Cuyahoga River enters on left  $1\frac{1}{4}$  miles above station.

**DRAINAGE AREA.**—405 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—September 27, 1921, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge used to December 21, 1923, when Au recorder was installed. Observer, N. A. Bucklin.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel straight for 300 feet above and below gage. Banks fairly high, wooded. At extremely high stages water flows through second channel on right bank. Bed of stream composed of sand and gravel. Control for low water is riffle about 50 feet below gage; control for high water is long stretch of channel below gage. Zero flow would occur at zero gage height.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 10.8 feet at 9 p. m. June 28 (discharge, 3,540 second-feet); minimum stage from recorder, 1.04 feet at 9.30 p. m. August 10 (discharge, 83 second-feet).

1921-1924: Maximum stage recorded that of June 28, 1924; minimum stage, 0.98 foot at 7.30 a. m. September 1, 1923 (discharge, 51 second-feet).

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

**DIVERSIONS.**—Municipal water supply for Akron is diverted from headwaters of this stream. Return water from Akron enters above this station. A small amount of water is diverted into this stream from Tuscararus River by the Ohio Canal.

**REGULATION.**—Flow regulated at reservoir above Akron.

**ACCURACY.**—Stage-discharge relation permanent. Rating curves for the chain gage and the recorder well defined up to 2,500 second-feet. Chain gage read to hundredths twice daily. Operation of water-stage recorder satisfactory. Daily discharge prior to December 21 ascertained by applying mean daily gage height to rating table, after that date by means of discharge integrator. Records good.

*Discharge measurements of Cuyahoga River at Old Portage, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 19	W. W. Perrin.....	1.84	221	Mar. 27	W. W. Perrin.....	4.93	1,200
Jan. 18	.....do.....	5.63	1,430	Apr. 12	W. A. Werner.....	3.15	555
Feb. 19	.....do.....	2.32	378	May 13	.....do.....	3.46	635
Mar. 20	.....do.....	2.60	430	July 17	E. E. R. Dornbach.....	2.83	435
21	.....do.....	2.84	490	Aug. 12	.....do.....	1.98	299
22	.....do.....	2.78	519	Sept. 12	.....do.....	3.10	586

*Daily discharge, in second-feet, of Cuyahoga River at Old Portage, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	287	166	572	1,030	700	375	1,430	510	385	1,720	255	238
2	261	121	540	890	730	280	1,320	465	455	1,650	232	322
3	261	110	572	1,030	755	362	1,160	460	435	1,320	145	312
4	166	136	604	975	815	560	965	640	440	1,080	198	285
5	146	156	1,010	820	920	1,070	820	650	400	950	308	415
6	110	188	1,180	575	1,050	1,200	725	565	390	810	222	420
7	82	177	1,140	560	855	1,180	700	500	295	850	222	370
8	89	188	1,080	565	775	1,210	640	470	335	950	182	415
9	90	328	1,280	555	715	1,160	680	465	560	850	152	625
10	130	300	1,500	610	650	1,050	650	425	665	760	125	750
11	128	287	1,280	2,040	580	860	605	420	1,250	690	198	655
12	104	300	1,110	1,970	510	730	585	600	750	620	215	585
13	106	287	1,140	1,630	440	675	570	685	605	715	225	810
14	82	287	1,320	1,780	395	625	540	880	505	710	192	790
15	96	261	972	1,690	368	575	485	1,350	440	600	155	710
16	125	177	904	1,690	305	510	440	1,300	435	562	140	610
17	166	199	870	1,800	260	495	405	1,140	375	525	170	54
18	104	90	836	1,390	285	462	690	1,100	460	470	175	470
19	134	103	708	1,280	320	425	870	1,120	330	460	232	400
20	96	223	637	1,210	395	420	800	950	370	325	200	420
21	85	199	604	895	340	475	860	830	305	340	195	435
22	94	97	940	690	346	490	1,070	730	295	415	138	460
23	84	115	1,170	715	325	610	1,020	650	340	330	145	405
24	132	223	1,060	585	274	820	935	615	300	265	150	370
25	188	287	970	520	302	845	910	540	335	262	195	325
26	136	414	1,000	390	308	985	815	535	300	270	210	320
27	130	414	990	320	330	1,170	665	490	310	228	200	292
28	73	384	1,080	262	342	1,180	610	460	1,040	248	162	375
29	156	314	1,000	412	338	1,570	495	460	2,040	232	161	745
30	223	736	885	620	-----	1,740	460	455	2,180	192	171	1,070
31	146	-----	1,040	740	-----	1,500	-----	455	-----	200	117	-----

NOTE.—Recorder not operating July 16; discharge interpolated.



*Monthly discharge of Cuyahoga River at Old Portage, Ohio, for the year ending September 30, 1924*

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October.....	287	73	136	May.....	1,350	420	675
November.....	736	90	242	June.....	2,940	295	609
December.....	1,500	540	967	July.....	1,720	192	632
January.....	2,040	262	975	August.....	308	117	187
February.....	1,050	260	508	September.....	1,070	238	498
March.....	1,740	280	826	The year.....	2,940	73	586
April.....	1,430	405	764				

**CUYAHOGA RIVER AT BRECKSVILLE, OHIO**

**LOCATION.**—At highway bridge at Brecksville railroad station, 2 miles east of Brecksville, Cuyahoga County. Chippewa Creek enters on right 800 feet above gage.

**DRAINAGE AREA.**—584 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—March 1, 1923, to June 12, 1924, when station was discontinued.

**GAGE.**—Foxboro pressure gage and auxiliary enamel vertical staff gage on highway bridge; read by Leonard Brown.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel slightly curved above and below gage. Left bank high; right bank fairly high; subject to overflow at extremely high stages. Control is timber dam with steel crest, 300 feet below gage. Leakage negligible.

**EXTREMES OF DISCHARGE.**—Maximum combined discharge of river and canal feeder during period of record, 7,000 second-feet on January 11, 1924; minimum combined discharge, 88 second-feet on October 21, 1923.

**ICE.**—Stage-discharge relation not affected by ice during period of record.

**DIVERSIONS.**—Water is diverted into Ohio Canal feeder at the dam 300 feet below gage. (See record of flow of Ohio Canal feeder at Brecksville.) A small amount of water is diverted into this stream from Tuscarawas River by Ohio Canal.

**REGULATION.**—Flow is regulated at reservoir above Akron.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

**COOPERATION.**—Gage installed and gage-height record furnished by American Steel & Wire Co.

*Discharge measurements of Cuyahoga River at Brecksville, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 22	W. W. Perrin.....	0.10	130	Apr. 12	W. A. Werner.....	0.84	596
Jan. 29	do.....	.52	391	May 13	do.....	.88	630
Mar. 24	do.....	1.22	1,050	July 17	E. E. R. Dornbach.....	.68	516
27	do.....	1.70	1,710	Aug. 12	do.....	.14	134
30	do.....	2.19	2,750				

*Combined daily discharge, in second-feet, of Cuyahoga River and Ohio Canal feeder at Brecksville, Ohio, for the period October 1, 1923, to June 12, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	255	213	808	1,150	908	453	1,580	625	349
2	236	166	649	910	897	339	1,510	635	408
3	235	144	620	1,550	899	688	1,310	734	356
4	142	216	1,040	1,540	1,010	1,540	1,080	947	378
5	140	232	1,850	1,000	1,400	2,080	881	786	385
6	139	261	2,960	596	1,410	1,760	778	644	367
7	130	261	1,730	682	1,020	1,960	636	552	275
8	108	324	1,320	596	892	1,550	816	553	596
9	122	359	1,670	753	798	1,400	892	535	697
10	108	331	1,790	1,300	767	1,270	743	480	782
11	120	293	1,510	7,000	610	1,080	712	435	1,750
12	144	297	1,230	2,830	625	963	682	553	1,320
13	138	299	2,510	1,900	591	901	640	633	-----
14	312	280	1,880	2,020	512	844	659	1,220	-----
15	165	280	1,280	1,920	469	767	534	2,070	-----
16	142	214	1,050	2,450	396	659	521	1,340	-----
17	173	339	975	2,720	352	640	417	1,080	-----
18	134	224	890	1,770	345	582	1,430	1,340	-----
19	123	186	777	1,490	372	534	1,070	1,160	-----
20	102	215	765	1,390	477	446	824	1,020	-----
21	88	215	833	1,030	430	552	1,030	702	-----
22	92	186	2,070	804	408	768	1,590	624	-----
23	98	231	2,020	902	372	951	1,130	561	-----
24	186	263	1,560	633	320	1,040	1,110	587	-----
25	256	303	1,300	589	339	890	1,120	462	-----
26	174	553	1,240	446	333	1,380	983	417	-----
27	162	579	1,410	429	372	1,640	789	361	-----
28	123	479	1,830	357	394	1,610	744	345	-----
29	157	475	1,330	487	408	3,580	664	447	-----
30	214	1,460	1,060	1,340	-----	2,360	654	509	-----
31	190	-----	1,410	1,030	-----	1,750	-----	438	-----

*Combined monthly discharge of Cuyahoga River and Ohio Canal feeder at Brecksville, Ohio, for the period October 1, 1923, to June 12, 1924*

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	312	88	158	March	3,580	339	1,190
November	1,460	144	329	April	1,590	417	918
December	2,960	620	1,400	May	2,070	345	735
January	7,000	357	1,410	June 1-12	1,750	275	639
February	1,410	320	625				

#### OHIO CANAL FEEDER AT BRECKSVILLE, OHIO

**LOCATION.**—300 feet below head gate at dam on Cuyahoga River at Brecksville railroad station, 2 miles east of Brecksville, Cuyahoga County.

**RECORDS AVAILABLE.**—March 1, 1923, to June 12, 1924, when station was discontinued.

**GAGE.**—Enameled vertical staff on right bank about 300 feet below head gate; read by Leonard Brown.

**DISCHARGE MEASUREMENTS.**—Made from footbridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel straight for 200 feet above and below gage.

Control is stretch of channel below gage; shifting.

**EXTREMES OF DISCHARGE.**—Maximum mean daily discharge during period of record, 160 second-feet on May 14, 1924; minimum mean daily discharge, 44 second-feet on March 14 and 15, 1923.

ACCURACY.—Stage-discharge relation not permanent; affected by ice during January. Gage read to hundredths twice daily. Daily discharge ascertained by shifting-control method. Records fair.

COOPERATION.—Gage-height record furnished by American Steel & Wire Co.

The feeder diverts water from Cuyahoga River at the dam at Brecksville. The water is used for industrial purposes at Cleveland by the American Steel & Wire Co.

*Discharge measurements of Ohio Canal feeder at Brecksville, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 22	W. W. Perrin	1.39	95.7	Apr. 12	W. A. Werner	1.26	88.2
Jan. 29	do	1.63	132	May 13	do	1.73	144
Mar. 24	do	1.36	110	July 17	E. E. R. Dornbach		48.2
27	do	1.12	95.6	Aug. 13	do		79.9
30	do	1.40	113				

*Daily discharge, in second-feet, of Ohio Canal feeder at Brecksville, Ohio, for the period October 1, 1923, to June 12, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1	122	100	100	113	131	113	108	113	104
2	113	96	88	122	131	113	108	113	113
3	122	96	88	122	122	108	108	122	104
4	122	88	100	113	122	113	104	122	104
5	113	88	96	113	113	92	104	122	104
6	122	84	100	131	113	108	104	122	100
7	113	84	84	131	104	104	104	131	104
8	108	92	104	131	104	104	108	140	131
9	122	92	104	131	113	100	104	140	96
10	108	92	92	140	113	113	100	140	108
11	113	92	96	140	108	96	100	140	104
12	113	96	96	122	113	113	92	140	122
13	100	92	88	150	108	113	108	150	
14	92	92	113	150	108	113	108	160	
15	113	92	104	150	113	113	104	131	
16	104	96	113	150	108	108	100	113	
17	84	100	113	140	113	108	100	140	
18	96	96	113	150	113	108	122	131	
19	96	92	113	150	113	104	122	122	
20	92	92	122	150	113	113	104	122	
21	88	92	113	145	113	122	104	122	
22	92	92	131	140	113	104	104	122	
23	88	92	113	136	113	113	113	122	
24	92	92	104	131	113	113	104	122	
25	96	96	113	150	113	113	104	122	
26	100	96	113	113	113	108	108	122	
27	96	96	113	119	113	104	104	122	
28	96	100	113	125	113	108	122	113	
29	96	88	113	131	113	100	113	122	
30	96	100	113	122		96	122	122	
31	96		113	122		113		113	

NOTE.—Stage-discharge relation affected by ice Jan. 8, 21-23, and 27-28; discharge interpolated.

*Monthly discharge of Ohio Canal feeder at Brecksville, Ohio, for the period October 1, 1923, to June 12, 1924*

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October.....	122	84	103	March.....	122	92	108
November.....	100	84	93.2	April.....	122	92	107
December.....	131	84	106	May.....	160	113	127
January.....	150	113	133	June 1-12.....	131	96	108
February.....	131	104	114				

#### GRAND RIVER NEAR MADISON, OHIO

**LOCATION.**—At highway bridge 2 miles south of Madison, Lake County. Griswold Creek enters from left half a mile below station.

**DRAINAGE AREA.**—587 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 7, 1922, to September 30, 1924.

**GAGE.**—Chain gage on highway bridge, read by E. H. Horton.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel straight for 500 feet above and below gage.

Left bank high and clean; right bank fairly high and brushy. One channel at all stages. Control for low water is riffle 150 feet below gage. Control at high stages is long stretch of channel below gage; shifts during high water. Zero flow would occur at gage height 0.7 foot.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 9.7 feet at 3.30 p. m. January 11 (discharge, 10,500 second-feet); minimum stage, 1.40 feet on October 13, 14, 16-18, 20-23 (discharge, 7 second-feet).

1922-1924: Maximum stage recorded that of January 11, 1924; minimum stage, 1.10 feet at 5.30 p. m. August 27, 1923 (discharge, 1.5 second-feet).

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

**ACCURACY.**—Stage-discharge relation changed during high water on January 11; affected by ice during January and February. Rating curves fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for periods of ice effect, for which they are fair.

*Discharge measurements of Grand River near Madison, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 18	W. W. Perrin.....	1.38	7.49	Apr. 15	W. A. Werner.....	2.62	228
Jan. 24	do.....	3.16	252	July 18	E. E. R. Dornbach.....	2.48	189
Mar. 25	do.....	4.74	1,360	Aug. 13	do.....	1.60	25.0

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Grand River near Madison, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	27	27	1,090	2,620	2,000	109	2,120	238	168	1,420	28	81
2-----	33	20	820	1,420	1,900	132	1,600	272	160	1,170	23	238
3-----	29	26	645	1,170	1,600	185	950	308	140	1,090	22	820
4-----	26	27	595	1,700	1,510	272	645	378	132	730	23	1,420
5-----	20	26	1,700	1,170	1,600	2,480	470	470	120	412	53	1,900
6-----	16	50	4,780	412	3,360	3,860	395	595	113	620	26	1,700
7-----	13	58	8,080	620	2,480	3,680	378	510	107	700	45	1,090
8-----	16	85	3,680	672	1,420	2,900	490	342	113	760	24	645
9-----	14	103	2,760	490	1,250	2,000	572	2,240	88	2,000	23	510
10-----	13	128	2,760	360	1,020	1,510	730	2,120	100	1,420	19	1,330
11-----	13	136	2,120	8,320	760	1,170	700	1,020	211	1,090	22	1,800
12-----	11	128	1,250	6,900	450	1,170	510	880	272	760	24	1,250
13-----	8	112	1,420	3,680	395	1,250	378	2,240	220	6,900	24	1,420
14-----	10	74	2,760	3,040	395	1,250	325	1,800	208	2,000	21	1,700
15-----	12	50	1,600	2,480	325	1,090	220	3,040	132	950	22	1,250
16-----	8	48	1,020	2,480	272	1,020	193	2,000	92	530	23	950
17-----	8	59	880	5,580	255	572	185	1,330	63	308	22	760
18-----	7	72	645	2,900	217	470	378	1,510	63	174	22	510
19-----	9	72	450	2,000	79	430	2,000	1,600	44	123	19	412
20-----	8	60	510	1,600	96	412	1,600	1,020	31	79	19	238
21-----	8	58	700	950	79	450	1,330	820	52	68	17	290
22-----	8	36	1,600	550	700	572	4,580	595	38	74	18	820
23-----	7	27	3,040	510	530	1,420	2,900	342	23	49	18	880
24-----	12	27	3,360	290	342	1,600	1,600	272	42	78	378	595
25-----	18	64	2,480	220	290	1,420	1,090	220	130	79	342	378
26-----	13	94	1,800	290	208	1,420	645	238	176	58	166	238
27-----	40	220	1,420	214	168	1,600	430	220	530	68	83	145
28-----	17	325	2,240	385	163	1,800	308	196	620	46	58	163
29-----	21	290	2,360	360	158	2,360	238	168	1,090	44	36	3,360
30-----	28	595	1,420	950	-----	4,040	214	140	1,600	28	18	6,900
31-----	36	-----	1,420	2,000	-----	2,900	-----	135	-----	30	22	-----

NOTE.—Stage-discharge relation affected by ice Jan. 5-10, 21-29, Feb. 17, 18, 20, 24-28; discharge estimated from study of results of discharge measurements, observer's notes, weather records, and records of flow of near-by streams.

*Monthly discharge of Grand River near Madison, Ohio, for the year ending September 30, 1924*

[Drainage area, 587 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October-----	40	7	16.4	0.028	0.03
November-----	595	20	103	.175	.20
December-----	8,080	450	1,980	3.37	3.88
January-----	8,320	-----	1,820	3.10	3.57
February-----	3,360	79	828	1.41	1.52
March-----	4,040	109	1,470	2.50	2.88
April-----	4,580	185	939	1.60	1.78
May-----	3,040	135	879	1.50	1.73
June-----	1,600	23	229	.390	.44
July-----	6,900	28	770	1.31	1.51
August-----	378	17	53.5	.091	.10
September-----	6,900	81	1,130	1.93	2.15
The year-----	8,320	7	854	1.45	19.79

## CONNEAUT CREEK AT AMBOY, OHIO

**LOCATION.**—At highway bridge half a mile east of Amboy, 3 miles southwest of Conneaut, Ashtabula County, and 6 miles above mouth.

**DRAINAGE AREA.**—178 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 1, 1922, to September 30, 1924.

**GAGE.**—Au water-stage recorder in concrete shelter on right bank at bridge; prior to August 17, 1924, chain gage on bridge; read by J. L. Evans.

**DISCHARGE MEASUREMENTS.**—Made from bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Channel straight for 300 feet above and 1,000 feet below gage. One channel at all stages. Left bank high and clean; right bank fairly high and brushy. Flood of March, 1913, flowed over right bank and across road leading to bridge at a point some distance from bridge. Control for low water is rock ledge 75 feet below gage. Control for high water is long stretch of channel below gage. Zero flow would occur at gage height 0.6 foot.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 8.0 feet at 6 p. m. May 9 (discharge 5,900 second-feet); minimum stage, 1.22 feet at 6 p. m. October 23 (discharge, 2.9 second-feet).

1922-1924: Maximum stage recorded, that of May 9, 1924; minimum stage, 1.06 feet at 6 p. m. October 20, 1923 (discharge, 1.6 second-feet).

**ACCURACY.**—Stage-discharge relation permanent; affected by ice in January, February, and March. Rating curve well defined up to 2,000 second-feet. Gage read to hundredths twice a day prior to August 17. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table. Records subsequent to installation of water-stage recorder excellent; for remainder of year good except for periods of ice effect and extremely high water for which they are fair.

*Discharge measurements of Conneaut Creek at Amboy, Ohio, during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 18	W. W. Perrin .....	1.24	3.4	Apr. 15	W. A. Werner .....	1.87	92.8
Dec. 21	L. L. Dickson .....	2.26	199	July 18	E. E. R. Dornbach .....	1.62	42.4
22	do .....	2.80	424	Aug. 14	do .....	1.43	12.6
24	do .....	3.72	1,050	Sept. 11	do .....	2.04	120
Mar. 26	W. W. Perrin .....	2.67	435				

*Daily discharge, in second-feet, of Conneaut Creek at Amboy, Ohio, for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	6.8	8.9	138	1,310	915	60	475	120	58	265	11	16
2-----	3.9	6.8	330	560	560	65	238	108	56	174	15	34
3-----	3.2	6.8	228	330	502	80	228	130	48	125	4.5	55
4-----	3.5	15	180	725	375	100	234	120	56	88	5.2	63
5-----	3.9	11	265	590	425	622	210	153	58	64	15	67
6-----	3.9	33	1,500	800	2,310	1,500	177	132	73	100	15	37
7-----	3.7	40	2,530	1,100	838	875	228	135	54	120	11	24
8-----	3.2	47	1,400	1,300	352	530	177	108	66	1,080	40	50
9-----	3.9	14	475	1,000	214	308	177	3,410	62	400	16	69
10-----	4.5	43	560	960	186	352	168	3,300	52	308	18	103
11-----	3.5	35	425	2,640	177	308	171	725	60	165	9.7	190
12-----	3.7	32	228	3,880	159	277	186	762	40	177	16	96
13-----	3.2	43	204	622	153	253	150	1,080	41	180	19	76
14-----	3.9	43	1,310	400	153	308	112	838	47	242	9.7	122
15-----	6.2	35	560	228	132	273	84	762	35	159	8.2	142
16-----	3.9	36	228	308	110	195	70	655	30	98	14	82
17-----	5.7	47	192	2,640	80	148	93	285	27	77	13	57
18-----	3.5	36	135	875	60	135	220	308	24	45	8.4	35
19-----	3.2	20	112	400	65	165	1,040	450	20	38	13	32
20-----	3.0	15	150	350	60	186	450	330	27	24	18	32
21-----	3.7	8.2	177	240	55	171	375	195	43	30	13	25
22-----	3.0	27	475	200	60	204	1,700	138	35	27	16	21
23-----	2.9	36	955	160	45	375	1,310	138	25	22	15	28
24-----	3.9	32	998	120	40	530	352	195	27	6.8	14	42
25-----	5.2	27	622	100	40	425	228	138	47	25	17	65
26-----	4.2	43	330	85	45	375	189	183	27	16	39	50
27-----	7.4	60	308	85	45	530	159	159	88	18	21	35
28-----	8.2	130	560	65	50	450	125	125	77	14	18	23
29-----	5.7	98	1,400	65	55	530	118	88	352	14	14	590
30-----	18	138	400	655	-----	1,310	112	84	875	11	12	2,200
31-----	11	-----	308	1,130	-----	762	-----	79	-----	20	11	-----

NOTE.—Stage-discharge relation seriously affected by ice Jan. 6-10, 20-29, and Feb. 17 to Mar. 4; discharge estimated from study of observer's notes, weather records, and records of flow of near-by streams.

*Monthly discharge of Conneaut Creek at Amboy, Ohio, for the year ending September 30, 1924*

[Drainage area, 178 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October-----	18	2.9	4.95	0.028	0.03
November-----	138	6.8	38.9	.219	.24
December-----	2,530	112	570	3.20	3.69
January-----	3,880	-----	772	4.34	5.00
February-----	2,310	-----	286	1.61	1.74
March-----	1,500	-----	400	2.25	2.59
April-----	1,700	70	319	1.79	2.00
May-----	3,410	79	498	2.80	3.23
June-----	875	20	84.3	.474	.53
July-----	1,080	6.8	133	.747	.86
August-----	40	4.5	15.2	.085	.10
September-----	2,200	16	149	.837	.93
The year-----	3,880	2.9	274	1.54	20.94

## STREAMS TRIBUTARY TO LAKE ONTARIO

## LITTLE TONAWANDA CREEK AT LINDEN, N. Y.

**LOCATION.**—At stone-arch highway bridge in Linden, Genesee County, 3 miles above junction with Tonawanda Creek.

**DRAINAGE AREA.**—22.0 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 8, 1912, to September 30, 1924.

**GAGE.**—Vertical staff on upstream side of right abutment; read by C. L. Schenck.

**DISCHARGE MEASUREMENTS.**—Made by wading near gage.

**CHANNEL AND CONTROL.**—A standard Francis weir, 2.01 feet long and 8 inches high was reconstructed September 18, 1920, under the upstream side of the bridge. When the water overtops this weir it flows over a 2-inch plank 13 feet long, including the 2 feet of weir.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 5.31 feet at 5.30 p. m. May 12 (discharge, 502 second-feet); minimum stage, 0.24 foot from 6 p. m. October 20 to 8 p. m. October 21 (discharge, 0.59 second-foot).

1912-1924: Maximum stage 14.6 feet during flood of April 22, 1916, determined by leveling from floodmarks (discharge, 2,400 second-feet); minimum discharge, 0.4 second-foot several times in September and October, 1921.

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

**ACCURACY.**—Stage-discharge relation permanent except as affected by ice from January to March. Rating curve well defined below 800 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for days of great range in stage, when discharge is averaged for intervals of day. Records good.

*Discharge measurements of Little Tonawanda Creek at Linden, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 11	Harrington and Lamson	0.27	0.75	Apr. 12	A. E. Johnson.....	1.31	29.7
Feb. 7	A. E. Johnson.....	a 1.02	10.9	Sept. 11	A. W. Harrington.....	1.26	25.2
	do.....	a 1.07	13.4				

a Stage-discharge relation affected by ice.



*Daily discharge, in second-feet, of Little Tonawanda Creek at Linden, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	0.9	1.1	21	120	15	6	42	42	11	3.6	7.8	2.0
2.....	.8	1.0	12	57	12	6	41	31	10	3.2	5.2	18
3.....	.9	1.0	8.4	49	12	7	57	27	8.8	2.9	4.0	16
4.....	.8	1.0	6.2	35	9	14	155	69	23	2.7	3.4	7.5
5.....	.8	1.4	81	26	3	188	120	37	19	2.9	6.8	7.8
6.....	.8	1.3	73	21	20	81	223	28	13	2.9	27	8.0
7.....	.8	1.8	61	18	11	53	102	24	12	3.4	29	5.8
8.....	.8	3.0	33	18	10	36	57	65	10	4.3	15	5.0
9.....	.8	2.9	42	19	9	31	46	135	12	4.0	8.0	41
10.....	.8	2.6	28	23	8	28	41	89	9.2	3.6	6.8	41
11.....	.8	4.3	22	310	8	27	32	46	8.0	3.0	6.0	29
12.....	.8	3.6	16	73	8	23	28	247	8.8	2.4	5.0	16
13.....	.7	2.9	27	38	8	26	25	211	8.0	2.9	6.2	24
14.....	.7	2.7	32	28	7	20	49	81	7.2	4.3	8.4	22
15.....	.9	2.4	17	21	7	17	29	120	6.8	2.9	5.5	14
16.....	.8	2.3	15	23	7	9.2	23	57	6.8	2.3	5.0	9.2
17.....	.7	2.2	15	40	6	18	23	42	6.0	31	4.8	7.8
18.....	.6	2.2	10	27	6	17	211	120	5.3	8.0	5.0	7.0
19.....	.6	2.9	10	17	6	24	98	77	5.0	5.3	4.3	6.0
20.....	.6	2.7	12	14	5	23	57	46	4.7	4.2	4.0	5.3
21.....	.6	2.3	18	11	5	34	49	35	21	3.4	4.7	7.0
22.....	.6	2.3	17	8	5	38	288	28	8.4	2.8	4.0	6.2
23.....	.6	2.9	16	8	5	98	89	24	6.2	2.4	16	5.8
24.....	2.1	6.2	17	7	5	94	49	26	5.5	2.2	7.2	5.2
25.....	1.5	5.0	18	8	5	94	36	27	5.8	5.5	5.5	5.0
26.....	1.1	4.7	17	8	5	73	28	22	5.3	4.0	4.3	4.7
27.....	1.0	9.2	16	7	6	65	24	19	4.7	3.0	3.5	4.0
28.....	1.0	6.2	81	7	6	107	23	18	4.3	2.4	3.0	3.8
29.....	1.0	5.0	46	10	6	98	21	16	4.5	2.2	2.7	69
30.....	1.3	21	32	30	-----	231	21	13	4.0	2.4	2.4	274
31.....	1.3	-----	35	22	-----	81	-----	12	-----	17	2.2	-----

NOTE.—Discharge, Jan. 20 to Mar. 4, determined from gage heights corrected for ice effect by means of two discharge measurements and study of gage-height graph and weather records.

*Monthly discharge of Little Tonawanda Creek at Linden, N. Y., for the year ending September 30, 1924*

[Drainage area, 22.0 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square miles	
October.....	2.1	0.6	0.887	0.040	0.05
November.....	2.1	1.0	3.67	.167	.19
December.....	81	6.2	27.6	1.25	1.44
January.....	310	7	35.6	1.62	1.87
February.....	20	5	7.97	.362	.39
March.....	231	6	53.8	2.45	2.82
April.....	288	21	60.7	3.17	3.54
May.....	247	12	59.2	2.69	3.10
June.....	23	4.0	8.81	.400	.45
July.....	81	2.2	4.75	.216	.25
August.....	29	2.2	7.18	.326	.38
September.....	274	2.0	22.6	1.03	1.15
The year.....	310	.6	25.2	1.15	15.63

## GENESEE RIVER AT SCIO, N. Y.

**LOCATION.**—At steel highway bridge a quarter of a mile above Vandermark Creek, half a mile above Scio, Allegany County, and 1 mile above Knight Creek.

**DRAINAGE AREA.**—288 square miles (measured on map issued by United States Geological Survey; scale 1:500,000).

**RECORDS AVAILABLE.**—June 12, 1916, to September 30, 1924.

**GAGE.**—Vertical staff attached to downstream face of left bridge abutment; read by Mrs. Margaret Potter.

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

**CHANNEL AND CONTROL.**—Coarse gravel; shifting occasionally.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.90 feet at 8.30 a. m. September 30 (discharge, 8,320 second-feet); minimum stage, 0.15 foot several times October 10–21 (discharge, 20 second-feet).

1916–1924: Maximum stage recorded, 9.1 feet at noon May 22, 1919 (discharge, 10,600 second-feet); minimum stage, 0.10 foot several times during August and September, 1923 (discharge, 16 second feet).

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

**ACCURACY.**—Stage-discharge relation changed presumably at time of break-up March 6; affected by ice, January to March. Rating curve used before change fairly well defined between 20 and 2,000 second-feet; that used after change well defined between same limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during periods of ice effect and estimate, for which they are fair.

*Discharge measurements of Genesee River at Scio, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 15	Johnson and Harrington	0.15	19.3	Mar. 5	A. E. Johnson	<sup>a</sup> 3.48	668
Feb. 5	A. E. Johnson	<sup>a</sup> 1.60	351	Apr. 13	do	2.03	701
				Sept. 10	A. W. Harrington	1.17	250

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Genesee River at Scio, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	28	51	296	2,350	240	85	705	588	260	236	43	35
2-----	26	43	200	930	240	95	588	532	269	170	43	200
3-----	23	42	161	1,420	160	110	588	400	248	150	40	130
4-----	22	39	125	790	160	240	860	400	450	150	37	86
5-----	22	46	161	592	280	1,200	1,060	425	318	300	223	68
6-----	22	34	362	460	480	850	4,090	400	292	213	176	50
7-----	22	38	435	420	240	425	3,270	370	264	232	141	40
8-----	22	44	340	400	220	278	1,760	346	240	287	120	75
9-----	22	46	317	380	190	240	1,380	828	202	296	95	400
10-----	22	42	362	400	180	216	1,060	1,300	176	248	70	252
11-----	20	42	410	3,800	160	202	892	166	224	49	166	
12-----	21	46	275	1,610	140	180	735	160	202	46	116	
13-----	22	42	256	930	130	190	675	202	240	50	256	
14-----	22	39	362	735	120	173	860	236	176	48	180	
15-----	21	36	236	592	120	153	675	166	141	48	127	
16-----	22	33	236	860	120	144	588	124	121	37	111	
17-----	23	39	218	2,940	110	144	588	108	138	50	93	
18-----	20	43	187	1,080	95	170	2,520	560	88	118	48	77
19-----	21	39	164	750	100	300	1,560	645	74	88	37	64
20-----	20	36	164	550	100	213	1,800	828	153	86	35	50
21-----	20	32	174	400	100	323	1,140	735	170	81	37	36
22-----	22	34	174	300	95	296	995	645	140	74	35	68
23-----	22	33	565	420	90	588	795	532	108	62	60	79
24-----	32	44	565	460	80	860	735	560	84	56	60	60
25-----	60	54	460	420	75	765	615	560	425	54	50	50
26-----	51	49	362	380	80	705	532	478	260	52	44	40
27-----	47	61	317	340	90	560	478	395	166	52	40	40
28-----	41	68	386	300	95	645	450	425	147	52	37	37
29-----	37	59	296	260	90	1,760	532	360	370	52	1,660	
30-----	42	362	296	300	-----	1,300	588	328	287	49	7,430	
31-----	58	-----	340	340	-----	828	-----	292	-----	46	-----	-----

NOTE.—Discharge estimated for the following periods of no gage-height record by means of comparison with records of near-by stations: Oct. 7, 14, 25, Dec. 25, Jan. 11, 21, 25-28, Mar. 3-4, Apr. 20, May 11-17, June 22, July 27, Aug. 8-10, 24-31, Sept. 1-2, and 7-8; gage not read. Discharge Jan. 6-10 and Jan. 19 to Mar. 6 determined from gage heights corrected for ice effect by means of two discharge measurements; study of observer's notes, gage-height graph, and weather records; and comparison with record of Allegheny River at Red House. Braced figures indicate mean discharge for the period.

*Monthly discharge of Genesee River at Scio, N. Y., for the year ending September 30, 1924*

[Drainage area, 288 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October-----	60	20	28.2	0.098	0.11
November-----	362	32	53.9	.187	.21
December-----	565	125	297	1.03	1.19
January-----	3,800	260	836	2.90	3.34
February-----	480	75	151	.524	.57
March-----	1,760	85	459	1.59	1.83
April-----	4,090	450	1,100	3.82	4.26
May-----	-----	292	688	2.39	2.76
June-----	450	74	212	.736	.82
July-----	300	46	144	.500	.58
August-----	228	35	61.1	.212	.24
September-----	7,430	35	403	1.40	1.56
The year-----	7,430	20	370	1.28	17.47

## GENESEE RIVER AT ST. HELENA, N. Y.

**LOCATION.**—At steel highway bridge in St. Helena, Wyoming County,  $5\frac{1}{2}$  miles below Portageville and site of proposed storage dam of New York State Conservation Commission and  $9\frac{1}{2}$  miles above mouth of Canaseraga Creek.

**DRAINAGE AREA.**—992 square miles.

**RECORDS AVAILABLE.**—August 14, 1908, to September 30, 1924.

**GAGE.**—Stevens continuous water-stage recorder on left bank just below bridge, and a chain gage on upstream side of bridge. Water-stage recorder inspected and chain gage read by Glenn Streeter.

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

**CHANNEL AND CONTROL.**—Gravel and rocks; shifting occasionally.

**EXTREMES OF DISCHARGE.**—Maximum stage during year, from water-stage recorder, 9.35 feet at 8.30 p.m. September 30 (discharge, 17,600 second-feet); minimum stage, 2.02 feet from 9 a.m. October 22 to 2 a.m. October 23 (discharge, 65 second-feet).

1908–1924: Maximum stage, from water-stage recorder, 12.81 feet at 8 a.m. May 17, 1916 (discharge, 44,400 second-feet); minimum stage, 1.70 feet at 5 p.m. October 5 and 8 a.m. October 17, 1913 (discharge, about 18 second-feet).

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

**ACCURACY.**—Stage-discharge relation practically permanent except as affected by ice from January to March. Rating curve fairly well defined between 30 and 30,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table; chain gage readings used during periods when recorder did not function properly due to plugging of intake pipe. Daily discharge ascertained by applying to rating table mean daily gage height, determined by averaging the two daily chain gage readings or by inspection of recorder graph, except for days of considerable fluctuation, when the discharge is averaged for intervals of days. Records fair.

*Discharge measurements of Genesee River at St. Helena, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 12	Johnson and Harrington.	2.15	102	Mar. 6	A. E. Johnson	<sup>a</sup> 5.48	3,700
Feb. 8	A. E. Johnson	<sup>a</sup> 4.09	730	Apr. 12	do	4.36	1,980
				Sept. 12	A. W. Harrington	3.03	539

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Genesee River at St. Helena, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	140	170	2,010	8,720	950	300	2,600	1,630	725	830	379	134
2	127	181	1,070	3,900	700	280	1,880	1,680	680	725	291	174
3	114	174	790	3,140	500	260	1,630	1,290	595	580	256	783
4	105	158	646	3,750	440	320	3,150	2,600	763	533	287	561
5	105	158	695	1,950	460	1,500	4,330	1,880	1,570	564	296	368
6	102	166	1,490	940	1,100	4,000	7,190	1,400	1,080	707	620	275
7	102	242	2,920	750	1,800	2,200	10,000	1,240	890	595	587	280
8	80	285	1,570	750	900	1,400	5,130	1,880	770	840	511	233
9	94	306	1,500	750	650	1,000	3,490	2,600	725	680	429	500
10	97	261	1,820	800	550	950	2,840	5,740	638	595	416	1,550
11	94	228	1,310	8,000	500	900	2,360	3,470	595	556	368	780
12	94	219	1,080	7,500	460	850	1,940	6,770	1,180	549	306	549
13	88	206	840	3,000	440	800	1,750	7,200	920	533	247	592
14	82	198	1,060	2,000	420	716	1,940	4,900	1,070	638	237	1,310
15	75	185	920	1,300	400	663	1,940	4,520	770	410	202	743
16	91	177	761	1,200	360	595	1,510	3,110	638	385	177	541
17	85	206	725	7,000	340	629	1,220	2,440	490	469	140	435
18	80	233	654	3,600	340	743	5,840	3,320	469	620	124	368
19	82	224	549	1,900	320	920	8,380	3,990	373	462	177	322
20	91	215	511	1,200	300	990	4,220	2,520	724	317	177	291
21	78	185	526	750	300	1,120	4,000	2,080	2,160	275	155	285
22	65	177	572	440	280	1,210	5,130	1,750	920	296	140	266
23	80	177	665	420	300	1,940	5,010	1,500	638	266	189	252
24	146	162	1,300	750	280	4,330	3,200	1,320	518	237	247	242
25	252	155	1,170	800	260	3,690	2,360	1,760	1,490	237	233	228
26	266	170	970	750	300	3,110	1,880	1,500	1,570	270	211	206
27	228	189	860	750	320	2,520	1,570	1,180	900	242	202	185
28	198	252	1,190	700	320	2,930	1,290	970	815	237	177	174
29	162	306	1,750	650	320	5,250	1,290	920	1,850	233	170	2,090
30	162	688	1,250	600	-----	9,400	1,120	820	1,080	224	158	15,500
31	174	-----	2,050	750	-----	4,110	-----	725	-----	312	155	-----

NOTE.—Discharge estimated Dec. 31, Jan. 6-7, Feb. 6, Apr. 22, 23, 27, June 11, and 30; water-stage recorder not operating satisfactorily. Chain gage readings used Nov. 24-29, Mar. 29-30, Apr. 28 to May 10, May 27 to June 4, June 8-19, 22-24, July 7, 9-11, 15-17, 19-25, and Aug. 11-22; intake pipe partly obstructed. Discharge Jan. 7 to Mar. 13 determined from gage heights corrected for ice effect by means of two discharge measurements, study of observer's notes, gage-height graph, and weather records; and comparison with records for near-by stations.

*Monthly discharge of Genesee River at St. Helena, N. Y., for the year ending September 30, 1924*

[ Drainage area, 992 square miles ]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	266	65	121	0.122	0.14
November	688	155	222	.224	.25
December	2,920	511	1,146	1.15	1.33
January	8,720	420	2,240	2.26	2.61
February	1,300	260	487	.491	.53
March	9,400	260	1,920	1.94	2.24
April	10,000	1,120	3,340	3.37	3.76
May	7,200	725	2,520	2.54	2.93
June	2,160	373	919	.926	1.03
July	840	224	465	.469	.54
August	620	124	265	.267	.31
September	15,500	134	1,010	1.02	1.14
The year	15,500	65	1,220	1.23	16.81

## GENESEE RIVER AT JONES BRIDGE, NEAR MOUNT MORRIS, N. Y.

**LOCATION.**—At steel highway bridge known as Jones Bridge, 5 miles below Mount Morris, Livingston County,  $1\frac{1}{2}$  miles below mouth of Canaseraga Creek,  $1\frac{3}{4}$  miles above mouth of Beards Creek, and 6 miles above Geneseo.

**DRAINAGE AREA.**—1,400 square miles.

**RECORDS AVAILABLE.**—May 22, 1903, to April 30, 1906; August 12, 1908, to December 31, 1913; July 12, 1915, to September 30, 1924.

**GAGE.**—Gurley seven-day water-stage recorder on right bank 60 feet downstream from bridge. Recorder inspected by Theron S. Trever and Arthur E. McNair.

**DISCHARGE MEASUREMENTS.**—Made from footbridge erected on lower chord of upstream truss of highway bridge or by wading.

**CHANNEL AND CONTROL.**—Sandy clay; fairly permanent in recent years.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, about 22.6 feet at midnight September 30 (discharge, about 20,100 second-feet); minimum stage, 0.14 foot at 6 p. m. October 17 (discharge, 40 second-feet).

1903–1906, 1908–1913, and 1915–1924: Maximum stage recorded, 25.44 at noon May 17, 1916 (discharge, 55,100 second-feet); minimum discharge, about 18 second-feet at 6 p. m. August 29, 1909.

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

**REGULATION.**—During low-water period there is considerable diurnal fluctuation due to operation of mills at Mount Morris.

**ACCURACY.**—Stage-discharge relation practically permanent except as affected by ice from January to March. Rating curve well defined between 50 and 4,000 second-feet and fairly well defined between 4,000 and 20,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph or for days of considerable fluctuation, by averaging discharge for intervals of day. Records fair.

*Discharge measurements of Genesee River at Jones Bridge, near Mount Morris, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 12	Lamson and Harrington	0.27	52.8	Feb. 11	A. E. Johnson	*3.29	605
13	do	.40	66.4	Mar. 8	do	*8.10	2,240
Nov. 7	J. L. Lamson	1.07	228	Apr. 11	do	5.84	2,870
13	do	1.28	289	15	do	5.20	2,500
26	A. W. Harrington	1.37	321	June 16	A. W. Harrington	2.63	938
				Sept. 12	do	2.16	654

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Genesee River at Jones Bridge, near Mount Morris, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	229	233	2,320	9,490	1,300	320	3,290	1,880	955	1,010	480	180
2	199	187	1,420	6,500	900	320	2,320	2,000	872	790	402	150
3	204	230	928	3,310	750	340	1,940	1,640	845	655	296	636
4	140	207	762	4,790	550	500	3,630	2,260	1,190	580	280	685
5	102	221	735	3,000	700	2,200	5,360	2,520	2,060	630	328	440
6	104	224	1,760	1,500	1,200	4,800	7,360	1,820	1,460	735	684	347
7	137	251	3,220	1,000	1,800	3,400	12,500	1,520	1,310	762	680	310
8	175	324	2,200	950	1,200	1,900	7,700	2,610	1,120	872	555	307
9	152	394	1,700	950	850	1,500	4,670	4,560	1,150	872	467	318
10	130	366	2,200	1,000	700	1,200	3,570	7,280	1,040	790	398	1,460
11	141	307	1,640	7,000	650	1,100	2,870	5,250	872	630	440	982
12	78	283	1,310	11,000	600	1,000	2,320	6,030	1,200	580	411	680
13	116	286	1,040	5,000	500	950	2,130	11,000	1,230	555	354	605
14	111	254	1,150	2,600	480	850	2,200	7,620	1,310	630	318	1,550
15	152	230	1,150	1,700	440	800	2,390	6,620	1,180	550	273	928
16	121	248	845	1,500	440	750	1,880	5,430	900	472	260	680
17	81	248	762	7,500	420	750	1,580	3,990	790	494	226	560
18	83	286	735	4,600	380	762	6,800	3,080	655	630	240	494
19	153	321	630	2,400	360	928	11,100	4,500	565	540	221	432
20	114	300	580	1,600	340	1,200	6,530	3,290	601	436	222	347
21	105	293	575	1,000	320	1,260	5,420	2,460	2,010	374	210	347
22	109	260	630	550	320	1,400	6,750	2,200	1,680	343	206	328
23	104	267	655	550	320	1,910	7,040	1,880	928	336	207	321
24	174	276	1,210	800	320	4,590	4,270	1,640	708	328	216	336
25	325	248	1,340	900	320	4,480	3,010	1,880	850	321	286	310
26	343	276	1,090	850	340	3,710	2,460	1,880	2,320	310	251	273
27	328	347	982	850	360	3,080	2,060	1,580	1,260	283		260
28	254	432	1,460	800	340	3,080	1,760	1,370	900	286		245
29	248	449	2,200	750	360	5,610	1,520	1,280	1,170	273		578
30	248	680	1,580	800	-----	10,300	1,460	1,180	1,730	283		15,300
31	251	-----	1,440	1,000	-----	6,130	-----	1,060	-----	345	184	-----

NOTE.—Discharge for the following periods estimated by comparison with records for other stations in the same drainage basin: Oct. 6-8, Nov. 16, 30, Dec. 6-8, 26-29, Jan. 2-9, 21-24, Feb. 14-16, 29, Mar. 1, Apr. 2-3, 13-14, May 1, 31, July 24-26, Aug. 27-30, and Sept. 17-30; water-stage recorder not operating satisfactorily. Discharge, Jan. 5 to Mar. 17, determined from gage heights corrected for ice effect by means of two discharge measurements, study of gage-height graph and weather records, and comparison with record of Genesee River at St. Helena.

*Monthly discharge of Genesee River at Jones Bridge, near Mount Morris, N. Y., for the year ending September 30, 1924*

[Drainage area, 1,400 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	343	78	168	0.120	0.14
November	680	187	298	.213	.24
December	3,220	575	1,300	.929	1.07
January	11,000	550	2,780	1.99	2.29
February	1,800	320	606	.433	.47
March	10,300	320	2,290	1.64	1.89
April	12,500	1,460	4,260	3.04	3.39
May	11,000	1,060	3,330	2.38	2.74
June	2,320	565	1,160	.829	.92
July	1,010	273	539	.385	.44
August	684	184	322	.230	.27
September	15,300	150	1,010	.721	.80
The year	15,300	78	1,510	1.08	14.66

## GENESEE RIVER AT DRIVING PARK AVENUE, ROCHESTER, N. Y.

**LOCATION.**—In station No. 5 of Rochester Gas & Electric Corporation, 400 feet above Driving Park Avenue Bridge,  $1\frac{1}{2}$  miles northwest of center of city of Rochester, Monroe County, and 5 miles above mouth of river.

**DRAINAGE AREA.**—2,460 square miles.

**RECORDS AVAILABLE.**—December 17, 1919, to September 30, 1924.

**GAGE.**—Gurley seven-day graph water-stage recorder in northwest corner of old power house; inspected by employee of Rochester Gas & Electric Corporation.

**DISCHARGE MEASUREMENTS.**—Made from cable about 2,000 feet below gage.

**CHANNEL AND CONTROL.**—Coarse gravel and large broken rock; practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 10.97 feet at 8 a. m. April 20 (discharge, 21,600 second-feet); minimum stage is reached nearly every day during low-water period when power plant shuts down.

1919–1924: Maximum discharge recorded, about 26,000 second-feet at 2.30 p. m. March 17, 1920 (observed at Court Street dam).

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

**REGULATION.**—Daily discharge affected by storage for power purposes at Rochester and points upstream.

**DIVERSIONS.**—Barge Canal crosses river near southern line of city of Rochester.

It discharges water into Genesee River from Lake Erie and diverts water to the east for canal use.

**ACCURACY.**—Stage-discharge relation practically permanent until March 6, when it became very unstable, shifting frequently. Rating curve used before change fairly well defined between 20 and 20,000 second-feet; indirect method used subsequent to March 5. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by averaging discharge for bi-hourly intervals of day. Records fair.

*Discharge measurements of Genesee River at Driving Park Avenue, Rochester, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 14	Harrington and Johnson	2.76	952	Mar. 24	N. H. Davidson	5.58	5,500
14	do	2.72	884	Apr. 7	do	9.19	14,600
15	J. L. Lamson	2.97	1,100	10	A. E. Johnson	5.50	5,780
Nov. 10	Lamson and Davidson <sup>a</sup>	7.75	13,8	15	N. H. Davidson	3.78	3,380
Feb. 13	Johnson and Davidson	<sup>b</sup> 2.84	1,150	16	A. E. Johnson	3.78	3,300
14	A. E. Johnson	2.84	1,040	Sept. 13	A. W. Harrington	2.69	1,660
Mar. 11	Johnson and Davidson	3.82	2,690	13	do	2.51	1,400

<sup>a</sup> Engineer, Rochester Gas & Electric Corporation.

<sup>b</sup> Gage height doubtful; automatic gage float obstructed by ice.



*Daily discharge, in second-feet, of Genesee River at Driving Park Avenue, Rochester, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	973	912	1,560	4,870	1,210	575	5,080	3,920	2,780	2,940	1,170	1,040
2.....	929	920	3,200	10,100	1,280		4,610	4,360	2,380	1,930	1,410	1,110
3.....	926	780	2,430	7,340	1,240		3,300	4,270	2,380	1,830	1,350	1,130
4.....	918	951	1,690	5,340	924		3,850	4,490	2,270	2,020	1,290	1,290
5.....	935	883	1,820		922	1,730	6,930	5,200	2,700	1,890	1,090	1,220
6.....	879	956	2,100		791	5,190	8,840	4,640	3,560	1,750	1,240	1,310
7.....	773	985	3,200		1,740	5,610	13,500	3,660	3,230	1,810	1,700	1,140
8.....	811	1,120	4,520		1,960	5,700	15,700	3,420	3,270	1,910	1,750	1,100
9.....	750	1,060	3,270	4,300		4,840	11,200	6,330	2,350	1,900	1,530	1,080
10.....	837	1,010	3,330			3,190	7,040	11,200	2,300	1,810	1,640	1,290
11.....	840	1,120	3,200		950	2,440	5,200	11,800	2,230	1,890	1,240	2,440
12.....	878	1,100	2,500			2,360	4,770	9,380	2,230	1,730	1,260	2,050
13.....	776	902	2,540			2,310	4,480	15,600	2,290	1,770	1,230	1,650
14.....	816	1,070	2,260	4,600		2,250	3,480	17,600	2,760	1,510	1,170	1,880
15.....	809	974	2,280	2,970	646	2,180	3,950	14,700	3,010	1,400	1,090	2,340
16.....	754	992	2,360	2,250	622	1,860	3,750	12,200	2,500	1,390	1,100	1,610
17.....	738	974	2,240	3,830	594	1,690	3,210	8,840	2,230	1,430	1,130	1,480
18.....	743	1,040	1,630	8,000		1,620	4,540	7,470	2,160	1,600	1,020	1,450
19.....	755	969	1,560	5,300		1,980	16,000	7,120	2,060		1,030	1,280
20.....	762	1,020	1,440	3,360		2,150	17,300	7,940	1,880		979	1,330
21.....	763	944	1,440	1,360		2,310	11,600	5,950	2,350		992	1,230
22.....	799	1,030	1,490			2,900	10,100	4,950	4,020		973	1,170
23.....	773	969	1,580		525	3,980	13,500	4,290	3,040	1,200	1,050	1,090
24.....	790	992	1,700			5,820	11,000	3,990	2,500		1,120	1,080
25.....	838	1,150	2,250			8,280	6,690	4,110	2,310		884	1,010
26.....	999	981	2,610	900		7,290	5,070	4,020	2,450		867	1,020
27.....	1,060	1,070	2,220			6,080	4,720	3,690	3,510	1,090	851	1,130
28.....	1,060	1,030	2,200			5,150	3,000	3,280	2,740	1,100	989	1,140
29.....	930	1,160	2,630			6,270	2,090	2,890	2,520	1,070	1,010	1,160
30.....	895	1,520	3,550			11,300	2,970	3,450	2,410	1,020	1,020	5,310
31.....	983		2,880			13,700		3,280		1,020	999	

NOTE.—Discharge estimated for following periods by comparison with records for Genesee River at St. Helena and Jones Bridge and operating records for plant No. 5 of the Rochester Gas & Electric Corporation: Jan. 5-13, 14, 18, 19, 22-31, Feb. 9-14, 18-29, Mar. 1-4, July 19-26, Aug. 16 and 23; water-stage recorder not operating satisfactorily. Discharge Mar. 6 to Sept. 30 determined by method of shifting control.

*Monthly discharge of Genesee River at Driving Park Avenue, Rochester, N. Y., for the year ending September 30, 1924*

[Drainage area, 2,460 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,060	738	855	0.348	0.40
November.....	1,520	780	1,020	.415	.46
December.....	4,520	1,440	2,380	.967	1.11
January.....	10,100		3,450	1.40	1.61
February.....	1,960		825	.335	.36
March.....	13,700		3,950	1.61	1.86
April.....	17,300	2,090	7,350	2.99	3.34
May.....	17,600	2,890	6,710	2.73	3.15
June.....	3,560	1,880	2,610	1.06	1.18
July.....	2,940	1,020	1,530	.622	.72
August.....	1,750	851	1,170	.476	.55
September.....	5,310	1,010	1,490	.608	.68
The year.....	17,600		2,780	1.13	15.42

NOTE.—The figures on discharge and run-off given above do not represent the natural flow from the drainage area on account of inflow and diversion at the crossing of the Barge Canal during the navigation season.

## CANASERAGA CREEK NEAR DANSVILLE, N. Y.

**LOCATION.**—At highway bridge 1 mile west of Dansville, Livingston County, half a mile below mouth of Mill Brook and 22 miles above mouth of creek.

**DRAINAGE AREA.**—158 square miles (measured by New York State Conservation Commission).

**RECORDS AVAILABLE.**—July 21, 1910, to December 31, 1912; July 10, 1915, to June 30, 1917; March 10, 1919, to September 30, 1924.

**GAGE.**—Gurley seven-day graph water-stage recorder on downstream side of left bridge abutment. During winter a vertical staff at same location is used because of unsatisfactory operation of water-stage recorder. Recorder inspected and staff gage read by Frank S. Fox.

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

**CHANNEL AND CONTROL.**—Sand and gravel; shifting frequently.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 9.49 feet at 9 a. m. September 30 (discharge, 1,680 second-feet); minimum stage, 6.32 feet at 5 a. m. October 14 (discharge, 18 second-feet).

1910-1912; 1915-1917; and 1919-1924: Maximum stage recorded, 13.0 feet at 9.30 p. m. May 16, 1916 (discharge, determined from logarithmic extension of rating curve, roughly 6,600 second-feet); minimum discharge, 14 second-feet at 4 p. m. September 10, 1921, and from 11 p. m. September 2 to 5 a. m. September 3, 1923.

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

**ACCURACY.**—Stage-discharge relation practically permanent except as affected by ice during January and from February to March, until April 6, when it became variable for the remainder of the year. Rating curve used October 1 to April 6 fairly well defined between 10 and 1,000 second-feet; shifting-control method used April 7 to September 30. Daily discharge ascertained by applying to rating table mean daily gage height as observed or as determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. From April 7 to September 30, daily discharge ascertained by shifting-control method. Records fair.

*Discharge measurements of Canaseraga Creek near Dansville, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 9	Harrington and Johnson	6.34	20.4	Apr. 11	A. E. Johnson	7.15	200
Nov. 26	A. W. Harrington	6.51	38.7	14	do	7.24	243
Feb. 9	A. E. Johnson	* 6.84	76.3	June 15	A. W. Harrington	6.98	123
Mar. 7	do	7.06	162	Sept. 10	do	6.76	67.0

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Canaseraga Creek near Dansville, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	22	29	132	682	70	30	200	186	143	72	44	3
2.....	22	27	87	320		30	140	190	137	66	44	6
3.....	21	25	66	310		48	221	186	273	64	44	5
4.....	19	26	57	251		120	342	196	414	63	44	4
5.....	21	26	106	160		440	342	207	266	64	44	4
6.....	21	26	220	130	360	210	965	203	258	66	46	3
7.....	19	32	245	100	170	164	895	190	330	63	47	3
8.....	20	47	152	99	89	140	895	228	170	63	49	3
9.....	20	43	155	87	80	110	390	299	203	63	49	7
10.....	21	36	161	83	70	85	251	405	137	57	47	6
11.....	21	39	129	698	60	78	210	440	221	55	47	5
12.....	20	39	101	431	50	68	180	476	203	52	44	4
13.....	19	37	89	200	48	72	167	647	173	54	44	6
14.....	20	34	94	110		72	217	659	161	55	43	6
15.....	22	30	72	80		78	235	653	129	54	43	5
16.....	20	30	63	170		101	207	514	118	50	40	4
17.....	21	35	57	370	44	89	190	410	113	52	40	4
18.....	21	39	50	190	44	89	254	347	101	55	40	4
19.....	23	34	44	140	44	101	420	352	87	55	39	4
20.....	23	32	46	121	32	68	440	342	89	55	39	4
21.....	23	28	49	70	44	89	435	303	126	54	39	4
22.....	22	28	50		40	78	435	266	106	52	37	3
23.....	23	32	54		30	140	445	239	94	50	37	3
24.....	80	37	63		36	186	356	221	91	49	37	3
25.....	65	37	59		36	239	299	221	164	47	36	3
26.....	39	35	61	70	38	203	251	221	103	47	36	3
27.....	33	42	57		44	170	225	196	89	46	36	3
28.....	28	46	83		48	239	203	183	83	46	35	3
29.....	26	39	121		30	365	193	173	91	44	35	28
30.....	27	94	99		200	575	183	167	78	43	35	99
31.....	30	149	170		170	320	155	43	35	35	35	99

NOTE.—Discharge estimated for the following periods by comparison with records of Keshequa Creek at Craig Colony, Sonyea: Oct. 5-9, 19-20, Jan. 13-16, 21-31, Feb. 1-11, 13-16, Mar. 9, Apr. 13-15, May 2, 14, 24, 26, 27, 29, 30, June 3-12, 17-19, 22-26, July 1, 2, 11, 12, 15, 16, 23, Aug. 6, 19, Sept. 2, 3, 6, and 19; water stage recorder not operating satisfactorily. Discharge, Jan. 5-7 and Feb. 9 to Mar. 5, determined from gage heights corrected for ice effect by means of one discharge measurement, study of gage-height graph and weather records, and comparison with record of Keshequa Creek at Craig Colony, Sonyea.

*Monthly discharge of Canaseraga Creek near Dansville, N. Y., for the year ending September 30, 1924*

[Drainage area, 158 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	80	19	26.2	0.166	0.1
November.....	94	25	36.1	.228	.2
December.....	245	44	95.8	.606	.7
January.....	698	-----	185	1.17	1.3
February.....	360	30	66.6	.422	.4
March.....	575	30	155	.981	1.1
April.....	965	140	340	2.15	2.4
May.....	659	155	306	1.94	2.2
June.....	414	78	158	1.00	1.1
July.....	72	43	54.8	.347	.4
August.....	49	35	41.1	.260	.3
September.....	992	34	85.9	.544	.6
The year.....	992	19	129	0.816	11.1

## KESHEQUA CREEK AT CRAIG COLONY, SONYEA, N. Y.

**LOCATION.**—200 feet downstream from private highway bridge on grounds of Craig Colony at Sonyea, Livingston County, and  $2\frac{1}{2}$  miles above mouth of Creek.

**DRAINAGE AREA.**—70 square miles (measured by the New York State Conservation Commission).

**RECORDS AVAILABLE.**—October 31, 1917, to September 30, 1924, at present site; July 22, 1910, to December 31, 1912, at a site 200 feet upstream; August 29, 1915, to October 31, 1917, at a site 1 mile downstream.

**GAGE.**—Vertical staff in three sections on retaining wall on left bank just above concrete dam for pumping plant of Craig Colony; read by A. J. Porter.

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

**CONTROL.**—Double-crested concrete dam built by Craig Colony for maintaining water level for their pumping plant; permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 3.50 feet at 1 p. m. May 12 (discharge, about 2,500 second-feet); minimum discharge, 1.5 second-feet on October 1 and 23.

1917–1924: Maximum stage recorded, 5.9 feet at 10 a. m. May 22, 1919 (discharge, beyond limits of present rating curve); minimum discharge, 0.7 second-foot at 8 a. m. August 20, 1918, and 5 p. m. August 24, 1923.

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

**ACCURACY.**—Stage-discharge relation practically permanent except as affected by obstruction on dam from October to December and by ice during January and February. Rating curve fairly well defined between 1 and 1,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height, corrected for back-water effect if necessary, or for days of great range in stage, when discharge is averaged for intervals of day. Records fair.

*Discharge measurements of Keshequa Creek at Craig Colony, Sonyea, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 13	Lamson and Johnson ..	0.23	1.58	Apr. 11	A. E. Johnson .....	0.92	55.6
Feb. 10	A. E. Johnson .....	.65	22.9	15	do .....	.86	48.2
Mar. 7	do .....	1.07	79.5	Sept. 12	A. W. Harrington ....	.45	8.05

\* Stage-discharge relation affected by obstruction on control.

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*Daily discharge, in second-feet, of Keshequa Creek at Craig Colony, Sonyea, N. Y.,  
for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	1.5	5.4	34	298	23	10	51	63	22	11	15	1.9
2.....	2.5	5.7	16	90	24	10	54	44	22	9.1	9.1	18
3.....	2.3	4.9	13	90	20	13	58	43	19	7.2	7.6	15
4.....	1.7	4.6	9.1	77	18	43	123	126	95	7.2	5.2	8.1
5.....	3.0	4.1	10	41	17	590	143	58	63	10	9.6	6.2
6.....	2.1	5.9	51	17	135	129	590	48	39	11	18	5.7
7.....	2.1	8.1	70	20	43	81	249	44	28	9.6	12	5.2
8.....	1.7	15	37	24	27	56	110	129	31	12	15	4.4
9.....	2.5	9.6	39	27	22	31	83	596	39	9.0	11	24
10.....	2.8	8.6	42	27	22	30	72	273	26	5.9	6.7	18
11.....	2.5	6.2	29	548	17	31	51	123	23	6.2	5.7	12
12.....	1.7	5.7	22	108	17	26	43	1,020	44	6.7	5.7	7.2
13.....	2.3	5.4	19	56	17	23	48	452	30	5.2	5.9	17
14.....	1.7	4.9	27	38	17	29	61	223	34	5.9	5.9	17
15.....	1.7	4.6	11	18	17	22	44	283	24	5.7	5.7	11
16.....	3.2	4.9	16	41	17	9.1	39	126	18	5.4	4.9	8.6
17.....	2.8	6.2	14	115	16	16	28	92	17	4	4.6	7.2
18.....	2.3	8.1	12	50	14	26	794	156	15	10	5.4	7.2
19.....	2.1	7.2	10	37	12	37	288	129	14	8.1	5.2	6.2
20.....	3.0	5.7	11	34	12	31	240	81	13	7.2	4.4	7.2
21.....	2.8	5.2	12	28	12	41	176	65	54	5.2	4.4	6.2
22.....	2.1	7.6	12	24	11	36	635	50	25	4.9	5.7	4.4
23.....	1.5	5.7	17	17	10	48	214	44	16	5.2	4.6	7.2
24.....	14	8.1	22	16	10	92	115	46	12	5.7	3.6	5.2
25.....	15	8.1	20	15	9.6	77	79	54	27	5.2	3.4	5.2
26.....	7.2	7.2	22	9	10	86	61	46	23	6.2	8.6	4.4
27.....	5.2	8.1	19	17	9.6	72	48	38	15	5.7	5.7	3.6
28.....	5.7	8.6	77	17	10	90	46	35	12	3.9	3.2	3.6
29.....	4.4	8.1	68	22	11	176	38	30	14	3.4	3.6	222
30.....	4.6	24	36	65	-----	548	37	27	12	5.2	3.0	870
31.....	5.4	-----	112	53	-----	110	-----	23	-----	15	3.2	-----

NOTE.—Discharge for the following days estimated by comparison with record of Canaseraga Creek near Dansville: Jan. 21, Feb. 12, Mar. 18, June 1, July 9, Aug. 9, and Sept. 13; gage not read. Discharge, Oct. 1 to Dec. 5, determined from gage heights corrected for backwater effect from obstruction on dam by means of one discharge measurement. Discharge Jan. 22–29 and Feb. 14–24 determined from gage heights corrected for ice effect from a study of observer's notes, gage-height graph, and weather records and by comparison with record for Canaseraga Creek near Dansville.

*Monthly discharge of Keshequa Creek at Craig Colony, Sonyea, N. Y., for the year  
ending September 30, 1924*

[Drainage area, 70 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	15	1.5	3.66	0.052	0.06
November.....	24	4.1	7.38	.105	.12
December.....	112	9.1	29.3	.419	.48
January.....	548	9	65.8	.940	1.08
February.....	135	9.6	20.7	.296	.32
March.....	590	9.1	84.5	1.21	1.40
April.....	794	28	154	2.20	2.46
May.....	1,020	23	147	2.10	2.42
June.....	95	12	27.5	.393	.44
July.....	15	3.4	7.48	.107	.12
August.....	18	3.0	6.83	.098	.11
September.....	870	1.9	44.6	.637	.71
The year.....	1,020	1.5	50.0	.714	9.72

## CONESUS CREEK NEAR LAKEVILLE, N. Y.

**LOCATION.**—At highway bridge known locally as Millville Bridge,  $1\frac{1}{2}$  miles north of Lakeville, Livingston County, and outlet of Conesus Lake.

**DRAINAGE AREA.**—71 square miles (furnished by New York State Conservation Commission).

**RECORDS AVAILABLE.**—November 13, 1919, to September 30, 1924.

**GAGE.**—Vertical staff fastened to piling just above bridge; read by William B. Milliman.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge about a quarter of a mile downstream or by wading near gage.

**CHANNEL AND CONTROL.**—Control consists of a concrete parabolic weir 25.33 feet long at upstream edge of concrete apron under highway bridge. Elevation of center of weir is 0.37 foot gage datum; elevations of right and left ends of weir are 1.11 feet and 1.19 feet gage datum, respectively.

Construction of control was completed November 12, 1923. October 1–30 control was a 2 by 4 inch timber bolted to concrete apron under highway bridge.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 2.32 feet at 7.30 a. m. May 15 (discharge, 285 second-feet); minimum discharge, 0.45 second-foot at 5 p. m. November 22.

1919–1924: Maximum and minimum discharge that of this year.

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

**ACCURACY.**—Stage-discharge relation practically permanent, except as affected by construction during November and September. Rating curve for timber control fairly well defined between 3 and 150 second-feet. Rating curve for concrete weir fairly well defined between 1 and 100 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, except during periods of estimate, for which they are fair.

*Discharge measurements of Conesus Creek near Lakeville, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft</i>			<i>Feet</i>	<i>Sec.-ft</i>
Oct. 13	Lamson and Harrington	0.33	3.56	Mar. 11	A. E. Johnson	1.14	36.0
Nov. 13	J. L. Lamson	.57	1.15	Apr. 10	do	1.59	100
Nov. 26	A. W. Harrington	.615	2.34	June 16	A. W. Harrington	1.47	82.8
Feb. 12	A. E. Johnson	.98	20.5	Sept. 12	do	.82	69.9
							11.2

*Daily discharge, in second-feet, of Conesus Creek near Lakeville, N. Y., for the year ending September 30, 1924*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.4		1.2	14	16	20	50	141	118	68	20	10
2	8.4		2.4	13	16	18	51	132	114	65	20	12
3	8.4		1.4	14	16	20	50	132	108	67	18	12
4	7.2		1.4	18	18	36	50	130	108	65	14	12
5	7.2		8.7	14	19	44	57	128	105	54	12	12
6	5.9	2.0	12	15	20	33	81	128	101	52	44	11
7	4.0		7.7	15	23	33	86	122	101	52	21	11
8	4.0		6.5	15	22	36	88	126	105	52	21	9
9	4.0		6.1	12	22	36	91	128	99	50	20	13
10	4.0		6.1	13	22	35	91	137	92	48	20	12
11	3.7		6.1	16	21	35	91	146	88	48	20	12
12	3.4	1.9	6.1	18	20	35	88	181	84	50	20	11
13	3.4	1.4	8.2	20	22	35	89	210	84	49	20	12
14	2.8	1.9	6.1	19	22	37	88	226	84	45	19	9
15	2.2	1.9	3.4	19	21	39	84	277	81	41	22	9
16	1.9	1.6	6.1	23	20	34	81	260	68	35	21	8
17	2.2	2.4	4.9	19	21	33	84	242	65	20	20	10
18	2.2	2.4	5.3	19	21	34	176	242	67	17	20	18
19	1.9	1.0	5.7	19	20	36	141	226	67	14	19	20
20	1.6	1.4	5.3	19	22	36	160	210	67	14	20	20
21	1.5	1.0	6.1	19	22	35	168	210	67	22	20	21
22	1.2	.7	6.1	19	22	33	181	196	70	20	20	19
23	1.0	.8	6.5	19	22	33	178	181	70	20	12	24
24	7.2	1.4	7.7	18	22	35	168	178	70	20	8.7	26
25	4.6	1.0	6.9	20	22	35	163	171	67	20	7.3	22
26	4.3	1.9	6.9	20	22	35	158	153	67	20	6.1	22
27	4.0	1.4	7.3	20	22	37	139	146	70	20	12	22
28	2.2	1.4	6.1	22	20	39	141	144	70	19	12	22
29	2.0	1.4	6.1	19	21	39	137	134	68	20	12	22
30	2.0	7.3	8.7	17		51	137	128	68	20	11	60
31	2.0		15	16		50		124		20	11	

NOTE.—Stage-discharge relation affected by construction immediately above gage. Oct. 29 to Nov. 11, Sept. 2-4, and 27-30; discharge estimated.

*Monthly discharge of Conesus Creek near Lakeville, N. Y., for the year ending September 30, 1924*

[Drainage area, 71 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	8.4	1.0	3.83	0.054	0.06
November	7.3	.7	1.87	.026	.06
December	15	1.2	6.26	.088	.10
January	23	12	17.5	.246	.22
February	23	16	20.7	.292	.31
March	51	18	35.1	.494	.51
April	181	50	112	1.58	1.70
May	277	122	171	2.41	2.73
June	118	65	83.1	1.17	1.30
July	68	14	36.4	.513	.51
August	44	6.1	17.5	.246	.22
September	60	8.2	16.8	.237	.20
The year	277	.7	43.4	.611	8.31

#### CANADICE LAKE OUTLET NEAR HEMLOCK, N. Y.

LOCATION.—At foot of Canadice Lake, Livingston County. Outlet flows into Genesee River through Canadice Lake outlet and Honeoye Creek.

DRAINAGE AREA.—12.6 square miles, of which 1.0 square mile is lake surface.

RECORDS AVAILABLE.—April, 1903, to September 30, 1924.

GAGE.—Hook, in channel above weir.

**CHANNEL AND CONTROL.**—Outflow is measured over a standard thin-edged weir with a 5-foot crest and two end contractions so arranged with needle timbers at the ends that the length may be increased to 14.96 feet. No end contractions during high water. The weir crest stands 3.14 feet above stream channel, which is artificial with a plank bottom and vertical sides, and the crest is never submerged by backwater. Two additional rectangular gates, each 1 foot square with three complete contractions and a fourth incomplete contraction at the bottom.

**ICE.**—Stage-discharge relation not affected by ice as the pool above the weir is free from ice throughout winter.

**DIVERSIONS.**—No water is diverted from Canadice Lake above station.

**REGULATION.**—Outflow of lake is regulated by bulkhead and gates at dam above weir.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve used is expressed by Francis formula. Corrections are made for velocity of approach for high stages. Gage read to hundredths once daily. Records good.

**COOPERATION.**—Data collected, computed, and furnished for publication by the city engineer of Rochester, N. Y.

*Monthly discharge of Canadice Lake outlet near Hemlock, N.Y., for the year ending September 30, 1924*

Month	Mean discharge	Mean elevation of lake above low-water mark	Month	Mean discharge	Mean elevation of lake above low-water mark
	<i>Sec.-ft.</i>	<i>Feet</i>		<i>Sec.-ft.</i>	<i>Feet</i>
October .....	0.160	-1.706	May .....	37.044	+3.400
November .....	.000	-1.783	June .....	4.755	+3.160
December .....	1.965	-1.095	July .....	21.185	+2.230
January .....	3.262	-.139	August .....	11.808	+ .926
February .....	3.331	-.165	September .....	4.474	+ .318
March .....	3.763	-.088			
April .....	18.168	+2.277	The year .....	9.155	+ .611

**NOTE.**—Terminal water surface for year was 2.73 feet higher than for previous year, corresponding to a gain in storage of 77,213,977 cubic feet or a discharge of 2.443 second-feet for year. This correction applied to the above gives 11.597 second-feet, equivalent to 0.920 second-foot per square mile or a run-off of 12.588 inches from the drainage area.

#### OWASCO LAKE OUTLET NEAR AUBURN, N. Y.

**LOCATION.**—On farm of Charles H. Pearce, 2 miles below center of Auburn, Cayuga County, and  $3\frac{3}{4}$  miles below State dam at outlet of Owasco Lake.

**DRAINAGE AREA.**—206 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—November 17, 1912, to September 30, 1924.

**GAGE.**—Gurley seven-day graph water-stage recorder on left bank; inspected by Mrs. Charles H. Pearce.

**DISCHARGE MEASUREMENTS.**—Made from cable directly opposite gage or by wading.

**CHANNEL AND CONTROL.**—Control consists of low concrete dam 100 feet long about 25 feet below gage. Elevation of crest of left half of dam is 1.28 feet gage datum; right half of dam is at elevation 2.13 feet.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 3.74 feet at 1.30 p. m. January 28 (discharge, 1,390 second-feet); minimum stage from water-stage recorder, 1.47 feet at 9 p. m. November 1 (discharge, 11 second-feet).

1912-1924: Maximum stage, 6.4 feet during period March 25-30, 1913, determined by leveling from floodmarks (discharge, 2,750 second-feet); minimum discharge, 3.8 second-feet at 7 p. m. August 21, 1920.



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

REGULATION.—Large diurnal fluctuation in flow during low-water periods due to operation of mills in city of Auburn; seasonal flow regulated at State dam.

DIVERSIONS.—An average flow of about 10 second-feet is pumped from Owasco Lake for the municipal water supply of city of Auburn. Proportion returning to stream above gaging station is not known.

ACCURACY.—Stage-discharge relation permanent except for possible slight backwater effect from ice during winter and from aquatic growth during late summer. Rating curve well defined below 1,700 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by averaging discharge for bi-hourly intervals of day. Records good except for periods of estimate, for which they are fair.

*Discharge measurements of Owasco Lake outlet near Auburn, N. Y., during the year ending September 30, 1924*

[Made by A. E. Johnson]

Date	Gage height	Discharge
Feb. 16	2.39	244
Mar. 12	2.41	241
Apr. 9	3.46	1,010

*Daily discharge, in second-feet, of Owasco Lake outlet near Auburn, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	103	87	71	142	336	189	214	434	234	143	197	159
2	85	80	39	150	256	189	370	417	277	142	176	184
3	87	64	101	160	243	193	514	430	220	155	169	165
4	88	36	105	160	250	205	512	415	230	91	204	165
5	79	90	128	160	270	223	550	419	226	86	200	175
6	83	85	133	187	273	232	634	415	225	131	165	181
7	27	80	143	223	272	245	845	411	222	192	184	143
8	83	80	136	222	265	241	999	411	214	162	191	161
9	84	80	131	219	263	237	1,010	396	228	146	164	169
10	75	80	133	212	262	247	994	397	226	163	91	161
11	83	36	123	271	263	251	966	384	228	159	185	160
12	73	101	132	341	250	232	928	470	221	189	154	154
13	64	84	142	325	237	244	880	551	216	193	170	147
14	74	85	131	414	247	238	827	564	200	189	147	150
15	89	83	146	355	230	260	770	611	178	191	150	150
16	87	87	138	421	225	147	684	637	196	190	159	159
17	71	80	156	467	219	195	637	643	196	98	154	154
18	77	64	140	476	228	219	666	632	198	184	153	153
19	74	102	136	471	217	200	711	579	194	187	148	148
20	48	83	142	462	212	214	803	505	193	132	181	148
21	66	86	130	430	218	213	912	471	208	167	178	138
22	91	87	132	465	211	217	885	453	172	171	179	154
23	68	88	126	410	212	232	819	398	197	161	199	149
24	115	69	139	411	200	267	705	368	189	178	148	157
25	84	78	129	386	213	147	688	347	179	181	177	148
26	78	99	136	365	203	148	678	359	184	183	185	167
27	76	94	139	632	186	173	642	348	176	168	174	164
28	28	91	132	944	196	190	503	347	134	185	172	185
29	100	85	126	443	194	193	460	329	45	179	181	176
30	71	112	124	445	193	455	293	146	175	202	203	203
31	93	156	419	216	216	216	294	189	100	100	100	100

NOTE.—Gage-height graph faulty or missing Nov. 7-10, Jan. 3-5, and July 12-19; daily discharge estimated.

*Monthly discharge of Owasco Lake outlet near Auburn, N. Y., for the year ending September 30, 1924*

[Drainage area, 206 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	115	27	77.5	0.376	0.43
November.....	112	36	81.9	.398	.44
December.....	156	39	128	.621	.72
January.....	944	142	361	1.75	2.02
February.....	336	186	236	1.15	1.24
March.....	267	147	214	1.04	1.20
April.....	1,010	214	709	3.44	3.84
May.....	643	293	443	2.15	2.48
June.....	284	45	200	.971	1.08
July.....	189	86	158	.767	.88
August.....	204	91	175	.850	.98
September.....	203	135	160	.777	.87
The year.....	1,010	27	245	1.19	16.18

#### EAST BRANCH OF FISH CREEK AT FISH CREEK, NEAR CONSTABLEVILLE, N. Y.

**LOCATION.**—At highway bridge half a mile west of hamlet of Fish Creek, Lewis County, half a mile below mouth of Alder Creek, and 8 miles southwest of Constableville.

**DRAINAGE AREA.**—75 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—October 18, 1923, to September 30, 1924.

**GAGE.**—Chain gage bolted to downstream rail of right highway bridge near right abutment; read by Adolph F. Seelman.

**DISCHARGE MEASUREMENTS.**—Made from upstream side of the two highway bridges or by wading at same section.

**CHANNEL AND CONTROL.**—Gravel and small boulders; probably permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during period, about 5.0 feet at noon September 30, determined from graph of plotted gage readings (discharge, approximately 5,530 second-feet); minimum stage recorded, 1.22 feet at 6.40 a. m. August 4 (discharge, 22 second-feet).

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

**ACCURACY.**—Stage-discharge relation practically permanent except as affected by ice from December to April. Rating curve fairly well defined between 20 and 2,000 second-feet; extended above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table or for days of great range in stage by averaging discharge for intervals of day. Records fair.

*Discharge measurements of East Branch of Fish Creek at Fish Creek, near Constableville, N.Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 18	J. L. Lamson.....	1.28	21.3	Apr. 26	J. L. Lamson.....	3.31	1,130
Nov. 25	A. E. Johnson.....	2.10	165	June 8	do.....	1.71	79.7
Feb. 9	J. L. Lamson.....	4.50	95.9	July 26	Lamson and McConnell	1.27	25.8
Mar. 2	E. B. Shupe.....	3.46	57.2	Aug. 19	A. W. Harrington.....	1.38	35.3
Apr. 27	Lamson and Johnson..	3.28	946	Sept. 26	Johnson and Harrington	1.54	55.3

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of East Branch of Fish Creek at Fish Creek, near Constableville, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		193	2,270	180	150	55	380	2,050	111	62	39	23
2		139	760	220	130	55	340	1,240	100	46	32	40
3		122	452	200	120	55	280	656	90	39	26	80
4		107	318	200	100	55	280	1,480	100	37	24	52
5		107	302	170	100	70	700	920	92	64	125	47
6		152	692	160	130	95	1,700	620	89	92	152	66
7		144	620	140	130	110	4,200	572	89	61	134	92
8		134	388	120	110	110	2,400	452	78	48	139	66
9		111	329	100	95	100	1,700	446	70	98	73	122
10		96	249	90	95	100	1,600	638	66	61	90	204
11		104	204	1,300	90	90	1,170	452	60	53	113	228
12		104	144	2,400	90	90	810	446	66	39	70	232
13		96	318	1,100	85	85	920	588	72	64	54	163
14		83	480	600	80	85	2,760	394	83	70	46	147
15		76	300	400	80	85	1,840	865	67	48	37	107
16		76	240	440	75	80	1,040	810	61	39	32	78
17		74	170	700	75	80	980	452	51	115	44	60
18	27	83	120	650	75	75	1,100	382	46	92	42	52
19	31	89	130	600	70	80	1,940	656	56	53	32	42
20	39	89	160	360	70	75	1,170	400	39	37	37	38
21	36	76	360	260	70	80	674	267	115	32	37	34
22	31	102	280	200	70	110	1,100	193	125	31	32	44
23	30	109	170	160	65	220	1,400	166	74	46	76	152
24	692	155	140	130	65	280	810	200	73	34	58	92
25	810	166	130	110	65	320	920	400	90	49	46	66
26	388	139	100	75	60	380	760	258	113	44	37	54
27	224	394	140	100	60	240	1,100	186	73	32	32	45
28	147	262	75	120	60	260	1,240	249	56	29	33	40
29	115	186	65	140	60	260	1,100	186	60	26	28	192
30	115	920	110	170	-----	360	1,320	150	70	27	25	3,800
31	262	-----	150	160	-----	460	-----	125	-----	36	24	-----

NOTE.—Discharge Dec. 15 to Apr. 10 determined from gage heights corrected for ice effect by means of two discharge measurements, study of observer's notes, gage-height graph, and weather records; and by comparison with records for East Branch of Fish Creek at Taberg.

*Monthly discharge of East Branch of Fish Creek at Fish Creek, near Constableville, N. Y., for the year ending September 30, 1924*

[Drainage area, 75 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October 18-31	810	27	210	2.80	1.46
November	920	74	156	2.08	2.32
December	2,270	65	334	4.45	5.13
January	2,400	75	379	5.05	5.82
February	150	60	87.1	1.16	1.25
March	460	55	148	1.97	2.27
April	4,200	280	1,260	16.80	18.74
May	2,050	125	545	7.27	8.38
June	125	39	77.8	1.04	1.16
July	115	26	51.7	.689	.79
August	152	24	57.1	.761	.88
September	3,800	23	215	2.87	3.20

## EAST BRANCH OF FISH CREEK AT TABERG, N. Y.

**LOCATION.**—At steel highway bridge in Taberg, Oneida County, just below mouth of Furnace Creek and  $2\frac{3}{4}$  miles above confluence of East and West branches near Blossvale.

**DRAINAGE AREA.**—188 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—April 1, 1923, to September 30, 1924.

**GAGE.**—Gurley seven-day graph water-stage recorder installed October 6, 1923, on downstream side of left bridge abutment. Previous to this, a vertical staff attached to downstream face of left bridge abutment was used. Staff gage read and water-stage recorder inspected by Alvin Thorn.

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

**CHANNEL AND CONTROL.**—Large and small boulders; shifting occasionally.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 8.20 feet at 11 p. m. April 6 (discharge, about 16,200 second-feet); minimum stage, 0.12 foot at 10 p. m. September 26 (discharge 19.6 second-feet).

1923 and 1924; maximum and minimum stages same as of this year.

**ICE.**—Stage-discharge relation slightly affected by ice during extremely cold weather.

**REGULATION.**—During extremely low water there is some diurnal fluctuation in flow caused by operation of mills upstream.

**ACCURACY.**—Stage-discharge relation changed presumably at time of high water April 6, 1924. Rating curves fairly well defined between 20 and 2,000 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Staff gage read to tenths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph or by mean daily staff gage reading except for days of considerable fluctuation in stage, when discharge was averaged for intervals of day. Records fair.

*Discharge measurements of East Branch of Fish Creek at Taberg, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 17	Johnson and Harrington	0.88	48.5	June 6	J. L. Lamson	1.30	261
Feb. 13	J. L. Lamson	1.81	221	Aug. 8	Lamson and McConnell	1.45	347
Apr. 17	Johnson and Williams	3.18	1,660	19	A. W. Harrington	.51	66.2
27	Lamson and Johnson	3.16	1,640				

\* Engineer, Utica Gas & Electric Co.

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*Daily discharge, in second-feet, of East Branch of Fish Creek at Taberg, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	88	400	4,000	482	150		717	3,000	316	155	123	40
2-----	67	292	1,500	586			598	1,820	279	123	81	137
3-----	61	244	912	610			517	1,160	261	101	59	273
4-----	67	219	628	509			651	2,030	325	90	49	154
5-----	80	219	830	388			1,230	1,520	394	83	158	108
6-----	80	336	1,340	311	240	257	6,370	1,270	304	169	266	343
7-----	69	338	1,350	268		271	10,700	1,160	316	128	343	449
8-----	62	342	796	235		260	4,430	908	279	110	335	228
9-----	57	249	646	205		260	2,730	915	268	175	188	482
10-----	57	211	509	180		235	2,640	1,340	230	170	166	653
11-----	60	211	482	3,300	240	231	2,180	1,020	204	133	250	480
12-----	60	208	384	4,700		260	1,520	1,000	213	94	161	464
13-----	57	184	617	2,580		255	1,770	1,180	223	162	148	412
14-----	55	170	1,030	1,580		250	5,320	908	247	237	173	394
15-----	57	160	550	1,120		219	3,300	1,520	210	136	106	293
16-----	64	154	420	920	240	225	2,360	1,570	185	101	73	207
17-----	54	147	346	1,580		208	1,920	945	164	280	71	170
18-----	53	194	196	1,310		200	2,620	814	147	312	94	120
19-----	57	232	208	920		192	3,810	1,280	134	185	73	113
20-----	83	160	303	705		194	2,180	819	123	123	63	81
21-----	86	156	761	400	240	222	1,330	604	283	85	75	75
22-----	74	192	604			327	2,300	495	399	77	65	134
23-----	68	217	455			520	2,780	426	283	99	167	341
24-----	1,540	364	334			755	1,690	421	247	87	154	232
25-----	1,530	384	285			822	1,570	802	217	103	169	158
26-----	771	280	244	400	240	768	1,350	687	286	133	153	128
27-----	451	775	260			704	1,570	522	207	85	99	92
28-----	292	598	190			851	1,760	706	155	63	116	79
29-----	219	388	154			882	1,630	648	133	55	92	963
30-----	217	3,320	222			1,090	1,570	464	164	60	49	10,100
31-----	523		271			936		381		99	46	

NOTE.—Water-stage recorder not operating satisfactorily Oct. 6, Dec. 26, 27, Jan. 4-31, Feb. 1-29, Mar. 1-6, and Apr. 22; discharge estimated from fragmentary records and by comparison with record for East Branch of Fish Creek at Fish Creek, near Constableville.

*Monthly discharge of East Branch of Fish Creek at Taberg, N. Y., for the year ending September 30, 1924*

[Drainage area, 188 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October-----	1,540	53	228	1.21	1.40
November-----	3,320	147	378	2.01	2.22
December-----	4,000	154	672	3.57	4.12
January-----	4,700	180	867	4.61	5.33
February-----			240	1.28	1.34
March-----	1,090		392	2.09	2.41
April-----	10,700	517	2,520	13.40	14.95
May-----	3,000	381	1,040	5.53	6.38
June-----	399	123	240	1.28	1.43
July-----	312	55	129	.686	.79
August-----	343	46	134	.713	.82
September-----	10,100	40	597	3.18	3.55
The year-----	10,700	40	619	3.29	44.79

#### BLACK RIVER NEAR BOONVILLE, N. Y.

LOCATION.—At highway bridge 1 mile above mouth of Sugar River, 2 miles northeast of Boonville, Oneida County, and 2 miles, by river, downstream from Hawkinsville.

DRAINAGE AREA.—303 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—February 16, 1911, to September 30, 1924.

**GAGE.**—Chain near center of left span, downstream side of bridge; staff gage on right abutment used for high-water readings; read by W. D. Charbonneau.

**DISCHARGE MEASUREMENTS.**—Made from a cable about half a mile above gage or by wading near gage.

**CHANNEL AND CONTROL.**—Rough and full of boulders; permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 10.30 feet at 8 a. m. January 12 (discharge, 5,960 second-feet); minimum stage, 3.10 feet at 8 a. m. and 5 p. m. August 8 (discharge, 34 second-feet).

1911–1924: Maximum stage (determined by leveling from floodmark) about 12.5 feet during night of March 28, 1913 (discharge, about 10,000 second-feet); minimum stage, 2.40 feet at 5 p. m. August 26, 1918 (discharge, about 5 second-feet).

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

**REGULATION.**—The State dam at Forestport, about 8 miles upstream, impounds 13,068,000 cubic feet; another State dam about 1½ miles upstream from Forestport impounds about 213,440,000 cubic feet and receives storage from headwater reservoirs which have a total capacity of about 1,800,000,000 cubic feet, from which 1,397,000,000 cubic feet may be drawn each year.

**DIVERSION.**—Water is diverted at Forestport during the navigation season through the Forestport feeder, which flows west to a basin in Boonville. Black River Canal flows north from this basin and enters Black River at the foot of Lyons Falls. A spillway from the basin overflows into Mill Creek, a tributary of Black River. Water flowing through these two channels returns to the river below the gaging station. Black River Canal also flows south from Boonville, passing out of the Black River basin and entering the summit level of the Erie Canal (Barge Canal) at Rome.

A continuous record of the amount of diversion through the Forestport feeder from the Black River at Forestport during navigation season is published as a separate station, "Forestport feeder near Boonville, N. Y." A continuous record of the amount of diversion out of the Black River drainage basin is published as a separate station, "Black River Canal, flowing south, near Boonville, N. Y." The difference in discharge between these two records doubtless indicates very nearly the amount of water diverted around this station and returned to Black River.

**ACCURACY.**—Stage-discharge relation practically permanent, except as affected by ice from January to March. Rating curve well defined between 35 and 2,800 second-feet and fairly well defined between 2,800 and 4,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, except for period of ice effect, for which they are fair.

*Discharge measurements of Black River near Boonville, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Feb. 10	J. L. Lamson .....	a 5.70	525	June 6	J. L. Lamson .....	5.09	479
Mar. 3	E. B. Shupe .....	a 6 20	352	July 28	Lamson and McConnell	3.63	83.7
Apr. 25	J. L. Lamson .....	7.31	2,010				

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Black River near Boonville, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	65	227	1,840	490	650	320	680	2,860	605	164	70	84
2	66	205	2,380	580	650	340	605	3,360	470	174	72	97
3	72	184	2,160	630	550	360	630	2,380	450	184	72	250
4	71	164	1,740	680	500	380	680	2,860	410	164	66	227
5	63	154	1,370	735	550	360	795	2,740	490	145	78	205
6	59	184	990	500	600	360	1,640	2,380	470	90	56	194
7	51	205	920	480	600	340	4,140	1,740	430	90	42	184
8	49	250	855	480	550	340	3,240	1,740	410	174	34	205
9	49	238	795	500	550	340	2,500	1,640	390	262	40	275
10	46	227	735	600	550	320	1,740	1,540	370	194	46	410
11	51	205	630	2,600	500	300	1,540	1,540	352	174	53	305
12	57	194	558	5,500	500	300	1,460	1,740	352	164	97	305
13	70	184	535	4,000	460	280	1,210	2,500	335	184	90	275
14	90	174	580	3,400	440	280	1,140	1,740	320	194	127	262
15	97	174	680	1,200	420	280	2,380	1,540	262	194	119	250
16	111	164	630	900	400	280	3,360	1,370	238	216	90	227
17	119	184	512	1,400	380	260	2,160	1,290	227	227	70	205
18	111	184	352	1,400	380	260	2,160	1,210	216	290	61	184
19	104	164	305	1,200	380	260	3,490	1,140	216	250	70	184
20	104	154	390	900	360	240	3,110	1,060	205	184	72	164
21	97	164	490	700	360	240	2,160	1,060	320	164	84	145
22	97	174	450	600	360	280	2,160	855	262	145	90	164
23	111	184	490	550	340	320	2,160	680	262	136	97	164
24	335	216	450	550	320	340	2,270	680	238	145	111	184
25	680	184	410	500	320	360	2,270	855	238	136	145	164
26	430	174	390	460	300	380	1,840	795	227	119	127	145
27	290	205	370	440	300	420	1,740	735	216	119	127	127
28	227	290	352	440	300	480	1,740	920	205	90	136	119
29	205	275	335	480	300	550	1,740	920	184	72	111	238
30	216	450	320	550	-----	680	1,640	855	164	72	104	1,740
31	184	-----	305	650	-----	735	-----	795	-----	78	97	-----

NOTE.—Discharge Jan. 6 to Mar. 29 determined from gage heights corrected for ice effect by means of two discharge measurements, study of observer's notes, gage-height graph, and weather records, and comparison with records for other stations in the same drainage basin.

*Monthly discharge of Black River near Boonville, N. Y., for the year ending September 30, 1924*

[Drainage area, 303 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	680	46	141	0.465	0.54
November	450	154	204	.673	.75
December	2,380	305	752	2.48	2.86
January	5,500	440	1,100	3.63	4.18
February	650	300	444	1.47	1.58
March	755	240	354	1.17	1.35
April	4,140	605	1,950	6.44	7.18
May	3,360	680	1,530	5.05	5.82
June	605	164	318	1.05	1.17
July	290	72	161	.531	.61
August	145	34	85.6	.283	.33
September	1,740	84	256	.845	.94
The year	5,500	34	608	2.01	27.31

NOTE.—Water diverted past this station by the Forestport feeder is not included in the above table.

## BLACK RIVER AT WATERTOWN, N. Y.

**LOCATION.**—At Vanduzee Street Bridge in Watertown, Jefferson County, 8 miles above mouth of river. No important tributary enters river below this point.

**DRAINAGE AREA.**—1,890 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 18, 1920, to September 30, 1924.

**GAGE.**—Gurley seven-day graph water-stage recorder on downstream side of right bridge abutment; inspected by employees of Black River Regulating District.

**DISCHARGE MEASUREMENTS.**—Made from cable about 150 feet below gage.

**CHANNEL AND CONTROL.**—Rocky and rough; practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 9.08 feet at 5 p. m. April 8 (discharge, 24,400 second-feet); minimum stage, 0.42 foot at 1 p. m. October 15 (discharge, 216 second-feet).

1920-1924: Maximum stage recorded, 9.45 feet (staff gage reading) at 6 p. m. April 13, 1922 (discharge, 26,200 second-feet); minimum stage, 0.30 foot from 1 to 5 a. m. August 6, 1923 (discharge, 155 second-feet).

**ICE.**—Stage-discharge relation affected by ice for short periods only during extremely cold weather.

**REGULATION.**—Seasonal distribution of flow is regulated by Beaver River flow, Fulton Chain Lakes, Forestport Reservoir, and other storage reservoirs in the upper part of the drainage basin. During medium and low water periods there is considerable diurnal fluctuation in flow, caused by mills and power plants at Watertown and above.

**DIVERSIONS.**—Water is diverted from Black River into the Forestport feeder at Forestport. A part of this water returns to the river through the Black River Canal (flowing north); the rest passes out of the drainage basin through the Black River Canal (flowing south). The record at the station on Black River Canal (flowing south) near Boonville indicates the amount of this diversion. See also "Regulation" and "Diversions" in description of station on Black River near Boonville.

**ACCURACY.**—Stage-discharge relation practically permanent, except as affected by ice during February. Rating curve well defined between 200 and 25,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records excellent, except for periods of ice effect and estimate, for which they are fair.

*Discharge measurements of Black River at Watertown, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 23	A. E. Johnson.....	1.88	1,760	Apr. 28	J. L. Lamson.....	5.55	10,400
Feb. 5	J. L. Lamson.....	*3.03	3,010	July 13	A. W. Harrington.....	1.49	1,180
Mar. 1	E. B. Shupe.....	2.16	2,230	Aug. 5	Lamson and McConnell	1.45	1,150

\*Stage-discharge relation affected by ice.



*Daily discharge, in second-feet, of Black River at Watertown, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,260	2,280	7,980	2,320	3,880	2,300	7,210	10,200	2,900	1,780	1,040	834
2	1,380	2,180	8,340	3,140	3,880	2,140	6,380	10,000	3,280	1,610	945	645
3	1,210	1,940	8,940	2,650	3,400	1,800	5,250	12,000	2,860	1,160	876	1,360
4	864	1,640	8,940	2,950	3,200	2,050	5,250	13,200	2,860	1,160	846	1,680
5	731	1,550	8,050	3,350	3,000	2,300	7,210	12,600	2,650	952	936	1,840
6	824	1,580	7,490	3,000	2,800	2,660	9,880	12,000	2,480	987	1,620	1,590
7	800	1,740	7,210	2,570	2,800	2,950	17,000	12,000	2,310	1,470	1,640	1,470
8	566	1,890	6,930	2,300	3,000	2,860	23,600	11,200	1,680	1,180	2,660	1,390
9	717	2,220	6,660	2,760	2,800	2,760	22,000	10,200	2,140	1,250	2,450	1,720
10	1,000	2,190	6,000	2,660	2,400	2,660	18,000	9,560	1,830	1,280	1,770	2,130
11	787	1,900	5,010	6,520	2,400	2,630	14,800	9,250	1,000	1,280	1,660	2,660
12	911		4,430	12,200	2,400	2,760	12,000	9,560	1,770	1,170	1,700	2,950
13	883		4,100	18,400	2,400	2,760	11,200	10,500	1,940	980	1,520	2,760
14	722		5,010	20,400	2,200	2,660	11,000	9,880	1,830	1,170	1,480	2,220
15	548		4,660	15,600	2,200	2,300	12,600	10,200	1,470	1,220	1,280	2,650
16	885		3,990	11,900	2,000	2,280	14,000	10,500	1,680	1,230	1,320	2,400
17	910	1,640	3,460	11,200	2,200	2,220	14,000	10,200	1,450	1,510	1,280	1,920
18	802	1,480	2,940	10,500	2,000	2,140	13,200	9,560	1,830	988	1,360	1,740
19	817	1,300	2,790	9,880	2,200	2,220	12,000	9,250	1,620	960	968	1,720
20	683	1,750	2,760	8,940	2,000	2,050	13,200	8,640	1,500	1,320	1,070	1,440
21	516	1,620	3,510	6,930	1,000	2,050	14,400	8,340	1,690	1,280	1,180	1,220
22	665	1,290	4,100	5,250	1,900	2,300	14,000	7,450	1,140	1,140	1,380	1,320
23	691	1,520	3,660	5,010	1,800	2,800	13,600	6,360	2,000	1,300	1,430	1,270
24	1,410	1,580	3,300	4,780	1,900	3,300	13,600	5,620	1,740	1,200	1,550	1,560
25	4,090	1,840	3,050	4,430	1,800	3,900	13,600	5,250	1,880	1,340	1,630	1,480
26	4,660	1,830	3,050	3,880	1,900	4,500	12,600	5,250	1,970	986	1,770	1,500
27	4,320	1,290	2,760	3,770	1,900	5,400	11,200	5,250	1,860	943	1,710	1,460
28	3,010	3,250	2,640	3,560	2,000	6,100	10,500	4,780	1,840	1,020	1,380	1,000
29	2,140	3,150	1,730	3,350	2,200	6,930	10,200	4,660	1,560	850	1,050	1,270
30	2,340	3,540	1,970	3,660	-----	7,770	9,880	4,210	1,840	1,040	1,310	5,220
31	2,330	-----	2,080	3,660	-----	7,770	-----	3,770	-----	1,030	1,110	-----

NOTE.—Discharge estimated Nov. 10-16, Mar. 23-29, and June 22-23; automatic record imperfect or missing. Discharge Feb. 3-29 determined from gage heights corrected for ice effect by means of one discharge measurement and study of gage-height graph and weather records.

*Monthly discharge of Black River at Watertown, N. Y., for the year ending September 30, 1924*

[Drainage area, 1,890 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	4,660	516	1,400	0.741	0.85
November	3,540	1,290	1,970	1.04	1.16
December	8,940	1,730	4,760	2.52	2.90
January	20,400	2,320	6,510	3.44	3.97
February	3,880	1,800	2,430	1.29	1.39
March	7,770	1,890	3,280	1.74	2.01
April	23,600	5,250	12,600	6.67	7.44
May	13,200	3,770	8,830	4.67	5.38
June	3,280	1,350	2,010	1.06	1.18
July	1,780	850	1,190	.630	.73
August	2,660	846	1,440	.762	.88
September	5,220	645	1,810	.958	1.07
The year	23,600	516	4,020	2.13	28.96

NOTE.—See "Regulation" and "Diversions" in station description.

## FORESTPORT FEEDER NEAR BOONVILLE, N. Y.

**LOCATION.**—Slope station at lower end of feeder, above point where it enters basin at Boonville, Oneida County.

**RECORDS AVAILABLE.**—Occasional discharge measurements 1900 and 1905-1915; continuous record October 30, 1915, to September 30, 1924.

**GAGES.**—Two Gurley seven-day graph water-stage recorders, with natural scale for gage heights, 2.53 miles apart. Gage No. 1 is at downstream end of left abutment of steel highway bridge in Hawkinsville; gage No. 2 is on left bank, just below a farm bridge about a mile above basin at Boonville. These gages and the two in the Black River Canal (flowing south) near Boonville are set to the same datum. Recorders inspected by Fred Kesauer.

**DISCHARGE MEASUREMENTS.**—Made from steel highway bridge at gage No. 1 in Hawkinsville

**DETERMINATION OF DISCHARGE.**—Daily discharge determined by use of Chezy formula. The coefficient "C" is computed from each current meter measurement and is plotted on a curve showing the variation of "C" throughout the season. A smooth curve drawn through the plotted points shows the coefficients for intervening days. The other factors in the Chezy formula are obtained from gage-height records and cross section of the canal.

**REGULATION.**—Flow in the feeder is regulated at the outlet of Forestport Reservoir.

**DIVERSIONS.**—One spillway takes water from the Forestport feeder just below gage No. 2 and a second spillway takes water from the basin in Boonville. Both discharge into Mill Creek, which enters Black River below Boonville gaging station. No spillway between gage No. 1 and gage No. 2. Other spillways in the feeder above gage No. 1 discharge into Black River above gaging station. Therefore, this station indicates the total amount of water diverted past the gaging station on Black River near Boonville, and the sum of this record and the record for Black River near Boonville indicates the total run-off of the Black River basin above these gaging stations.

**ICE.**—There is usually some flow in the canal during winter seasons, and occasional current-meter measurements of the discharge have been made.

**ACCURACY.**—Operation of water-stage recorders satisfactory except as indicated in footnote to daily-discharge table. Records good except when either recorder is out of commission, when estimates for missing gage heights are made from comparison with other recorder. Records for such periods, fair.

*Discharge measurements of Forestport feeder near Boonville, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height in feet		Dis- charge in second- feet
		Gage No. 1	Gage No. 2	
Oct. 18	Lamson and Johnson	a 2.240	0.565	166
Nov. 25	A. E. Johnson	a 2.280	.600	180
Mar. 3	E. B. Shupe			50.8
June 17	A. W. Harrington	6.490	4.800	110
July 11	do	7.465	5.975	184
Aug. 28	Lamson and McConnell	7.710	6.180	200
Aug. 8	do	7.385	5.815	167
Aug. 23	do	7.575	6.115	171
Sept. 26	Harrington and Johnson	7.650	6.290	173

a Old datum; datum lowered 5.0 feet June 16, 1924.

*Daily discharge, in second-feet, of Forestport feeder near Boonville, N.Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	June	July	Aug.	Sept.
1.....	166	181	-----	118	189	169
2.....	167	170	-----	116	188	175
3.....	171	173	-----	119	186	169
4.....	173	172	-----	130	179	194
5.....	172	172	-----	167	170	161
6.....	176	173	-----	169	171	159
7.....	180	178	-----	162	171	163
8.....	180	174	-----	168	168	160
9.....	172	166	-----	180	159	160
10.....	158	181	-----	183	151	174
11.....	164	-----	-----	182	157	186
12.....	162	-----	-----	182	165	172
13.....	166	-----	-----	182	163	171
14.....	165	-----	-----	187	179	172
15.....	164	-----	-----	183	184	174
16.....	156	-----	-----	187	163	174
17.....	167	-----	120	193	158	174
18.....	167	-----	107	194	163	171
19.....	167	170	103	189	167	171
20.....	169	-----	106	175	168	172
21.....	167	-----	120	176	169	168
22.....	166	-----	119	180	168	169
23.....	165	-----	117	180	167	175
24.....	183	-----	116	180	149	170
25.....	181	-----	114	170	149	168
26.....	166	-----	114	184	155	171
27.....	166	-----	115	191	161	171
28.....	172	-----	719	192	159	165
29.....	171	-----	120	192	152	160
30.....	173	-----	119	192	154	197
31.....	177	-----	-----	193	160	-----

NOTE.—Discharge Nov. 11-23 estimated from hydrograph comparison with record for Black River canal (flowing south) near Boonville. Discharge estimated Nov. 10, June 25-27, July 8-11, 16-19, 23-25 31, Aug. 1, 5-8, and 16 from gage heights determined from comparison with other recorder; one water-stage recorder not operating.

*Monthly discharge of Forestport feeder near Boonville, N. Y., for the year ending September 30, 1924*

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maxi- mum	Mini- mum	Mean		Maxi- mum	Mini- mum	Mean
October.....	183	156	169	July.....	194	116	174
November 1-26.....	181	166	172	August.....	189	151	166
June 17-30.....	120	103	115	September.....	197	159	170

#### BLACK RIVER CANAL (FLOWING SOUTH) NEAR BOONVILLE, N. Y.

LOCATION.—Slope station at summit level of Black River Canal, near Boonville, Oneida County.

RECORDS AVAILABLE.—Occasional discharge measurements 1900 and 1905-1915; continuous record September 16, 1915, to September 30, 1924.

GAGES.—Two Gurley seven-day graph water-stage recorders with natural scale for gage heights, 1.81 miles apart. Gage No. 1 is on right bank (opposite towpath) about 50 feet downstream from collector's office in Boonville; gage No. 2 is on right bank (opposite towpath) about 300 yards above Lock 70 and 50 yards above spillway from the canal into Lansing Kill. These gages and the two gages in the Forestport feeder near Boonville are set to same datum. Recorders inspected by Fred Kesauer.

**DISCHARGE MEASUREMENTS.**—Made from steel and concrete highway bridge in Boonville, a short distance below gage No. 1.

**DETERMINATION OF DISCHARGE.**—Daily discharge determined by the use of Chezy formula. The coefficient "C" is computed from each current meter measurement and plotted on a curve showing variation of "C" throughout season. A smooth curve drawn through the plotted points shows the coefficient for intervening days. The other factors in the Chezy formula are obtained from gage-height records and cross section of canal.

**REGULATION.**—Flow in canal is regulated by operation of spillway and sluice gates at Lock 70 and also by discharge of Forestport feeder into the basin at Boonville.

**DIVERSIONS.**—No diversion between gage No. 1 and gage No. 2. Records obtained at this station indicate the quantity of water diverted from the Black River basin into the Mohawk River basin.

**ICE.**—No flow in canal during winter.

**ACCURACY.**—Operation of water-stage recorders satisfactory except as indicated in footnote to daily-discharge table. Records good, except when either recorder is out of commission, when estimates for missing gage heights are made from comparison with other recorder. Records for such periods, fair.

*Discharge measurements of Black River Canal (flowing south) near Boonville, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height in feet		Discharge in sec.-ft.
		Gage No. 1	Gage No. 2	
Oct. 18	Johnson and Lamson	40.010	—1.315	151
Nov. 25	A. E. Johnson	4.150	—355	145
July 11	A. W. Harrington	5.480	5.280	114
Aug. 28	Lamson and McConnell	5.625	5.310	127
Aug. 8	do	5.225	4.820	102
Sept. 23	do	5.585	5.155	96.8
Sept. 26	Johnson and Harrington	5.680	5.180	114

\* Old datum; datum lowered 5.0 feet June 16, 1924.

*Daily discharge, in second-feet, of Black River Canal (flowing south) near Boonville, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	July	Aug.	Sept.	Day	Oct.	Nov.	July	Aug.	Sept.
1	110	155		127	103	16	140	163	115	105	104
2	126	157		123	106	17	150	158	116	110	165
3	133	150		121	108	18	147	154	140	107	104
4	128	152	105	116	109	19	154	152	138	100	106
5	126	153	123	103	103	20	151	156	140	100	112
6	136	153	128	108	105	21	142	141	126	104	109
7	142	154	124	108	111	22	134	127	139	101	113
8	143	140	111	106	110	23	133	123	132	102	110
9	139	132	121	105	106	24	146	137	129	103	109
10	136	123	122	114	100	25	154	153	99	104	110
11	136	129	116	105	103	26	162	159	118	99	113
12	132	130	118	99	99	27	159		125	95	114
13	134	127	118	98	98	28	154		127	92	117
14	136	97	110	106	99	29	154		128	92	129
15	134	138	116	107	102	30	160		126	101	143
						31	153		124	99	

NOTE.—Canal was filled June 17 to July 3 but discharge practically zero, as determined from engineer's inspection. Discharge estimated from gage heights determined from comparison with other recorder Oct. 6-8, 11-12, 19, 25-26, 30-31, Nov. 1-2, 9, 16, 22-23, and July 18; one water-stage recorder not operating.

*Monthly discharge of Black River Canal (flowing south) near Boonville, N. Y., for the year ending September 30, 1924*

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October.....	162	110	141	July.....	140	(a)	111
November 1-26.....	163	97	143	August.....	127	92	105
June 17-30.....	(a)	(a)	(a)	September.....	143	98	109

\* Water in canal, but discharge practically zero.

#### MOOSE RIVER AT McKEEVER, N. Y.

**LOCATION.**—Half a mile below dam of Iroquois Pulp & Paper Co. at McKeever, Herkimer County, 2 miles below mouth of South Branch of Moose River, and 16 miles above junction of Black and Moose Rivers at Lyons Falls.

**DRAINAGE AREA.**—366 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—May 28, 1922, to September 30, 1924.

**GAGE.**—Gurley seven-day graph water-stage recorder on left bank; inspected by R. D. Nash.

**DISCHARGE MEASUREMENTS.**—Made from cable about 250 feet above gage or by wading.

**CHANNEL AND CONTROL.**—Primary control consists principally of coarse gravel and boulders; secondary control operative at high stages is of rock. Primary control practically permanent under normal river conditions. Section at gage and cable very smooth and uniform.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 12.0 feet at 3 a. m. January 12 (discharge, 8,900 second-feet); minimum stage, 1.56 feet at 10 a. m. June 22 (discharge, 96 second-feet).

1922-1924: Maximum stage recorded, 12.9 feet at about 10 p. m. June 22, 1922 (discharge, about 10,000 second-feet); minimum stage, 1.49 feet from 9 p. m. to midnight July 27, 1923 (discharge, 83 second-feet).

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

**REGULATION.**—Flow regulated to a considerable extent for short periods at dam of Iroquois Pulp & Paper Co., half a mile above. Seasonal distribution of flow affected by operation of State dam at Old Forge. This regulation is indicated by record from station, "Middle Branch of Moose River at Old Forge, N. Y."

**ACCURACY.**—Stage-discharge relation permanent except as affected by ice from January to April. Previous rating was revised below 800 second-feet to agree more closely with current discharge measurements, and new rating used throughout year. Rating curve well defined between 100 and 6,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height, determined by inspection of recorder graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good, except during periods of ice effect and estimate, for which they are fair.

*Discharge measurements of Moose River at McKeever, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 19	Johnson and Lamson	1.87	177	June 12	J. L. Lamson	2.65	444
Feb. 11	J. E. Lamson	3.11	430	Aug. 6	Lamson and McCon-		
Mar. 5	E. B. Shupe	2.95	353	nel		2.66	427
Apr. 25	Lamson and Harrington	5.96	2,500				

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Moose River at McKeever, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	512	755	4,330	608	400	300	600	4,650	584	313	201	206
2	185	564	2,700	701	340	300	600	4,400	741	276	194	242
3	405	538	1,760	800	320	380	600	2,920	611	199	173	539
4	235	378	1,310	800	380	320	550	4,130	498	182	194	579
5	157	507	1,240	775	300	340	800	4,850	549		224	426
6		438	1,140	701	300	380	1,510	3,100	501		439	394
7		468	1,780	925	320	360	3,500	2,650	519		478	422
8		638	1,520	750	300	380	3,100	2,450	378	250	514	442
9		753	1,120	678	340	300	2,560	3,020	518		386	422
10	280	631	960	572	320	400	2,030	3,100	482		332	782
11		469	877	3,350	440	340	1,950	2,730	418		326	775
12		581	806	6,880	340	320	1,680	2,330	393	266	305	631
13		511	771	3,170	320	260	1,530	2,230	380	266	278	576
14	285	506	919	2,310	280	280	2,820	2,030	378	302	289	568
15	279	471	942	1,830	260	280	3,700	1,870	214	298	286	550
16	271	412	668	1,790	320	200	3,100	1,910	455	258	263	480
17	265	355	725	1,680	260	340	2,550	1,990	364	266	246	422
18	256	438	560	1,750	380	240	2,870	1,700	332	355	241	378
19	161	468	473	1,470	320	170	3,940	2,190	325	374	232	344
20	343	325	489	1,300	360	300	3,600	1,870	310	298	233	317
21	220	371	571	1,000	380	280	2,830	1,480	351	248	261	298
22	252	378	779	800	400	260	2,630	1,310	216		395	280
23	264	373	622	800	420	240	3,400	1,120	305		406	287
24	578	299	723	700	360	400	2,120	1,070	342	240	459	287
25	1,780	337	410	600	420	400	2,440	949	324		522	284
26	1,260	497	665	650	360	400	2,430	1,220	309		344	266
27	821	506	469	460	280	400	2,490	883	300	234	313	244
28	555	786	497	650	280	400	2,860	950	271	221	285	230
29	578	750	386	550	280	440	3,280	850	204	194	298	230
30	440	873	516	440		480	3,680	775	270	187	269	2,160
31	436		436	440		700		685		188	248	

NOTE.—Discharge estimated from comparison with record of Black River near Boonville Oct. 6-13, Jan. 22-24, 26-28, Feb. 1, 18, 19, 24-27, 29, Mar. 15, 16, May 16, 17, June 22, July 5-12, 22-26; water-stage recorder not operating. Discharge, Jan. 20 to Apr. 5, determined from gage heights corrected for ice effect by means of two discharge measurements and study of gage-height graph and weather records.

*Monthly discharge of Moose River at McKeever, N. Y., for the year ending September 30, 1924*

[Drainage area, 366 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....	1,780	157	412	1.13	1.30
November .....	873	299	512	1.40	1.56
December .....	4,330	386	1,010	2.76	3.18
January .....	6,880	440	1,280	3.52	4.06
February .....	440	260	337	.921	.99
March .....	700	170	341	.932	1.07
April .....	3,940	550	2,420	6.61	7.38
May .....	4,850	685	2,170	5.93	6.84
June .....	741	204	395	1.08	1.20
July .....	374	182	254	.694	.80
August .....	522	173	311	.850	.98
September .....	2,160	206	469	1.28	1.43
The year .....	6,880	157	828	2.26	30.79

NOTE.—See "Regulation" in station description.

**MIDDLE BRANCH OF MOOSE RIVER AT OLD FORGE, N. Y.**

**LOCATION.**—300 feet below highway bridge and 400 feet below State dam at Old Forge, Herkimer County.

**DRAINAGE AREA.**—51.5 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—November 9, 1911, to September 30, 1924.

**GAGE.**—Vertical staff on left bank 300 feet below highway bridge; read by Joseph Otis.

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

**CHANNEL AND CONTROL.**—Bed near gage composed of stone and gravel. Control is rock ledge 200 feet below gage; practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 3.10 feet from 5 p. m. April 21 to 5 p. m. April 23 (discharge, 350 second-feet); minimum stage, 0.84 foot several times December 1–19 (discharge, 23 second-feet).

1911–1924: Maximum discharge, 862 second-feet morning and afternoon March 23, 1921; minimum discharge, 16 second-feet several times in October and November, 1919.

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

**REGULATION.**—Flow regulated by gates at dam.

**ACCURACY.**—Stage-discharge relation practically permanent except as affected by backwater from debris in channel during October and from May to September. Rating curve well defined between 20 and 400 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height, corrected for backwater effect when necessary. Records good.

*Discharge measurements of Middle Branch of Moose River at Old Forge, N.Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 19	A. E. Johnson-----	2.00	123	June 12	J. L. Lamson-----	21.67	73.4
Feb. 11	J. L. Lamson-----	1.36	56.1	Aug. 5	Lamson and McConnell	21.41	50.3
Mar. 4	E. B. Shupe-----	1.91	116	6	do-----	21.41	46.8
Apr. 25	Lamson and Harrington	3.02	330	Sept. 27	Johnson and Harrington	21.37	43.9
26	do-----	3.00	322				

<sup>a</sup> Backwater from débris in channel.

*Daily discharge, in second-feet, of Middle Branch of Moose River at Old Forge, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	80	28	24	31	56	110	117	302	70	46	44	42
2	80	32	23	31	56	117	117	279	75	46	44	44
3	80	32	23	31	56	117	117	257	75	46	44	44
4	80	32	30	31	57	117	138	257	75	46	44	44
5	80	32	28	32	57	117	170	268	75	44	44	44
6	80	62	25	33	57	117	170	302	75	44	48	44
7	100	104	25	33	57	117	179	290	75	44	50	44
8	130	104	25	33	57	117	206	268	75	44	50	44
9	130	104	24	33	57	117	216	268	75	44	50	44
10	130	104	24	32	57	117	216	268	80	44	50	44
11	130	104	24	35	57	117	206	268	75	44	50	44
12	130	92	24	56	57	117	206	257	75	44	50	44
13	130	92	24	92	57	117	206	257	70	44	50	44
14	130	92	24	197	81	117	226	257	70	44	48	44
15	120	92	23	279	104	117	246	257	70	44	48	44
16	120	86	23	236	104	117	257	257	65	44	46	44
17	120	86	23	226	104	117	257	257	65	44	48	44
18	120	86	24	216	104	117	246	246	65	44	42	44
19	120	86	23	206	104	117	257	236	65	44	42	44
20	120	86	24	197	104	117	257	236	55	44	42	44
21	120	86	25	197	104	117	314	236	50	44	42	44
22	120	81	25	146	104	117	350	236	48	44	42	44
23	120	71	25	110	104	117	350	138	48	44	42	44
24	120	71	25	110	98	117	326	75	48	44	44	44
25	65	71	25	110	98	117	326	75	48	46	44	44
26	26	71	26	110	98	117	326	75	48	46	44	44
27	26	71	26	110	98	117	326	75	48	46	42	44
28	26	71	27	104	98	117	314	75	46	46	42	44
29	26	71	28	104	98	117	302	75	48	46	44	60
30	26	68	29	81	-----	117	302	70	46	44	44	100
31	27	-----	30	57	-----	117	-----	75	-----	44	44	-----

NOTE.—Discharge estimated Sept. 8; no gage-height record. Discharge Oct. 1-25 and May 24 to Sept. 30 determined from gage heights corrected for backwater effect from débris in channel by means of five discharge measurements.



*Monthly discharge of Middle Branch of Moose River at Old Forge, N. Y., for the year ending September 30, 1924*

[Drainage area 51.5 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....	130	26	93.9	1.82	2.10
November .....	104	28	75.6	1.47	1.64
December .....	30	23	25.1	.487	.56
January .....	279	31	106	2.06	2.38
February .....	104	56	80.8	1.57	1.69
March .....	117	110	117	2.27	2.62
April .....	350	117	242	4.70	5.24
May .....	302	70	209	4.06	4.68
June .....	80	46	63.4	1.23	1.37
July .....	46	44	44.6	.866	1.00
August .....	50	42	45.4	.882	1.02
September .....	100	42	46.3	.900	1.00
The year .....	350	23	95.7	1.86	25.30

Note.—The above figures do not necessarily represent the natural flow from the basin, because of artificial storage in Fulton chain of lakes.

**OTTER CREEK NEAR GLENFIELD, N. Y.**

**LOCATION.**—A quarter of a mile above dam of Otter Creek Power Corporation,  $2\frac{1}{2}$  miles east of Glenfield, Lewis County, and  $1\frac{3}{4}$  miles above mouth of creek.

**DRAINAGE AREA.**—62 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 16 to September 30, 1924.

**GAGE.**—Gurley seven-day graph water-stage recorder installed August 22, 1924, on left bank a quarter of a mile above dam of Otter Creek Power Corporation. Previous to this, a temporary vertical staff gage, graduated to feet and inches on right bank about 25 feet upstream, was used. Temporary gage read and water-stage recorder inspected by employee of Otter Creek Power Corporation.

**DISCHARGE MEASUREMENTS.**—Made from cable about 250 feet above gage or by wading.

**CHANNEL AND CONTROL.**—The control is a timber weir with a 30-foot spillway, the crest of which is the edge of a 2-inch plank protruding about 1 inch above a 10-inch timber sill. Elevation of crest of weir, 1 foot, gage datum.

**EXTREMES OF DISCHARGE.**—Maximum stage during the period, July 16 to September 30, 1924, 4.39 feet at midnight September 30 (discharge 538 second-feet); minimum stage, 1.55 feet from 2 p. m. September 1 to 4 a. m. September 2 (discharge, 30 second-feet).

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

**ACCURACY.**—Stage-discharge relation permanent. Rating curve fairly well defined between 20 and 400 second-feet; extended above. Operation of water-stage recorder satisfactory. Temporary staff gage read to quarter-inches once daily. Daily discharge ascertained by applying to rating table mean daily gage height, determined by inspection of gage-height graph or for days of considerable fluctuation by averaging discharge for intervals of day. From July 16 to August 21 when staff gage readings were used, daily discharge was ascertained by applying gage readings to rating table. Records good, except for period when staff gage readings were used, for which they are fair.

*Discharge measurements of Otter Creek near Glenfield, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge
Aug. 16	J. W. McConnell	Feet	Sec.-ft.
16	do	1.66	42.4
22	Lamson and McConnell	1.66	40.5
		1.64	38.5

*Daily discharge, in second-feet, of Otter Creek near Glenfield, N. Y., for the year ending September 30, 1924*

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1		37	31	11		55	86	21	39	44	47
2		35	40	12		53	86	22	37	44	44
3		33	52	13		46	82	23	37	50	45
4		31	48	14		46	86	24	35	51	44
5		53	44	15		44	76	25	39	46	41
6		60	46	16	42	42	66	26	39	42	41
7		73	52	17	42	40	61	27	39	40	40
8		77	52	18	42	37	55	28	37	39	39
9		66	63	19	40	40	51	29	33	37	45
10		60	85	20	39	37	49	30	33	35	281
								31	37	36	

NOTE.—Discharge estimated Aug. 22; gage-height record incomplete.

*Monthly discharge of Otter Creek near Glenfield, N. Y., for the year ending September 30, 1924*

[Drainage area, 62 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
July 16-31	42	33	38.1	0.615	0.37
August	77	31	46.1	.744	.86
September	281	31	62.6	1.01	1.13

**BEAVER RIVER AT STATE DAM, NEAR BEAVER RIVER, N. Y.**

**LOCATION.**—At concrete storage dam at outlet of Beaver River Flow,  $7\frac{1}{2}$  miles west of Beaver River post office, Herkimer County, and 7 miles above Beaver Lake at Number Four.

**DRAINAGE AREA.**—176 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—May 11, 1908, to May 31, 1924, when station was discontinued.

**GAGES.**—Elevation of water surface in reservoir is determined by a staff gage in two sections on west corner of gate house; read by James C. Dunbar, gate tender. The mean elevation of the crest of the spillway is at gage height, 16.96 feet. Width of sluice gate openings determined by measuring on the gate stems the distance they have been raised.

**DISCHARGE MEASUREMENTS.**—Made from temporary footbridge at mouth of outlet tunnel, below gates. Discharge over the spillway has not been measured.

**DETERMINATION OF DISCHARGE.**—Records include discharge through one or more of four 4-foot circular sluice gates, when opened, the discharge over the spillway, and the discharge through the logway at the west end of the spillway. The sluice gates have been rated by current-meter measurements

made at different lake elevations, but no measurements have been made of the discharge over the spillway or through the logway. Theoretic coefficients on the Cornell experiments<sup>3</sup> have been used to compute ratings for the spillway and logway.

**REGULATION.**—At ordinary stages discharge of Beaver River is completely regulated by operation of sluice gates.

**EXTREMES OF STAGE.**—Maximum elevation of water surface in reservoir recorded during the period, October 1, 1923, to May 31, 1924, 17.95 feet January 14; minimum elevation recorded, 0.0 foot October 18.

1908–1924: Maximum elevation of water surface in reservoir, 19.85 feet at 3.15 p. m. June 23, 1922; minimum elevation, that of October 18, 1923.

**EXTREMES OF DISCHARGE.**—Maximum daily discharge during the period, October 1, 1923, to May 31, 1924, 1,680 second-feet January 14; minimum daily discharge, approximately zero, December 5 to 7.

1908–1924: Maximum discharge, 3,380 second-feet April 12, 1922; minimum discharge, zero, during periods when gates were closed and there was no discharge over spillway.

**ACCURACY.**—Stage-discharge relation permanent; probably not affected by ice. Rating curves for sluice gates fairly well defined. Lake gage read to half-tenths once daily. Accuracy of computations depends to a large extent on care with which gates were set to recorded openings. Records fair.

No discharge measurements were made at this station during the year.

*Daily discharge, in second-feet, of Beaver River at State dam, near Beaver River, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
1.....	70	150	262	244	316	370	262	1,380
2.....			262	244	316	362	272	1,380
3.....			262	245	288	354	280	1,320
4.....			88	245	266	346	290	1,280
5.....			0	245	266	338	296	1,280
6.....			0	245	265	330	324	1,270
7.....			0	245	239	322	352	1,260
8.....			286	245	216	312	376	1,250
9.....			426	245	216	304	396	1,240
10.....			426	245	216	296	416	1,240
11.....			424	529	202	284	428	1,230
12.....			424	1,360	166	272	436	1,220
13.....			449	1,520	166	258	538	1,200
14.....			460	1,680	166	246	742	1,190
15.....			460	1,130	246	232	1,110	1,200
16.....			462	1,010	554	218	1,120	1,220
17.....			462	941	591	204	1,120	1,230
18.....			458	825	583	190	1,130	1,220
19.....			312	810	575	188	1,140	1,220
20.....			240	628	570	186	1,130	1,220
21.....			240	483	562	184	1,120	840
22.....			242	488	554	184	1,200	646
23.....			243	488	468	186	1,280	638
24.....			243	504	400	190	1,260	906
25.....			243	483	394	194	1,240	1,180
26.....			244	480	390	200	1,220	1,000
27.....			244	480	384	210	1,200	860
28.....			244	427	380	222	1,230	732
29.....			244	318	376	232	1,260	640
30.....			244	318	-----	242	1,280	548
31.....			244	318	-----	252	-----	292

NOTE.—Discharge estimated Oct. 1 to Nov. 30 by comparison with record of Beaver River at Eagle Falls; gateratings not applicable because of extremely low heads.

<sup>3</sup>U. S. Geol. Survey Water-Supply Paper 200.

*Monthly discharge of Beaver River at State dam, near Beaver River, N. Y., for the year ending September 30, 1924*

[Drainage area, 176 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....			70.0	0.398	0.46
November .....			150	.852	.96
December .....	462	0	285	1.62	1.87
January .....	1,680	244	570	3.24	3.74
February .....	591	166	356	2.02	2.18
March .....	370	184	255	1.45	1.67
April .....	1,280	262	815	4.63	5.17
May .....	1,380	292	1,080	6.14	7.08

NOTE.—Discharge shown by the table does not represent the natural flow from the basin because of artificial storage in Stillwater Reservoir.

**BEAVER RIVER BELOW STILLWATER DAM, NEAR BEAVER RIVER, N. Y.**

**LOCATION.**—1,000 feet below Stillwater Dam at outlet of Beaver River Flow,  $7\frac{1}{2}$  miles west of Beaver River post office, Herkimer County, and 7 miles above Beaver Lake at Number Four.

**DRAINAGE AREA.**—176 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—June 1 to September 30, 1924. Comparable records at station at State dam half a mile above from May 11, 1908, to May 31, 1924.

**GAGE.**—Staff in two sections on left bank; the lower inclined, the upper vertical; read by employees of the Black River Regulating District.

**DISCHARGE MEASUREMENTS.**—Made from cable about 100 feet above gage.

**CHANNEL AND CONTROL.**—Gravel and large boulders about 125 feet below gage; probably permanent. During portions of the period, June 1 to September 30, logs lodged on the control causing backwater.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during period, June 1 to September 30, 3.50 feet September 30 (discharge, 410 second-feet); minimum stage recorded, 2.59 feet on June 20 (discharge, 143 second-feet).

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

**REGULATION.**—Seasonal distribution of flow is almost entirely under complete regulation by the operation of the gates at Stillwater dam.

**ACCURACY.**—Stage-discharge relation practically permanent, except as affected by logs on control during July and September. Rating curve fairly well defined between 150 and 300 second-feet. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage reading to rating table. Records fair.

*Discharge measurements of Beaver River below Stillwater Dam, near Beaver River, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
July 17	Harrington and John-son	Feet 3.15	Sec.-ft. 270	Aug. 10	Lamson and McConnell	Feet 2.99	Sec.-ft. 236
26	J. L. Lamson	2.88	205	Sept. 25	Harrington and John-son	2.90	188
27	do	2.96	229				

\* Engineer, Black River Regulating District.

† Stage-discharge relation affected by logs on control.

*Daily discharge, in second-feet, of Beaver River below Stillwater Dam, near Beaver River, N. Y., for the year ending September 30, 1924*

Day	June	July	Aug.	Sept.	Date	June	July	Aug.	Sept.
1	285	240	213	226	16	165	185	226	230
2	285	226	213	226	17	165		226	220
3	285	213	213	226	18	155		226	210
4	318	200	213	240	19	145		226	200
5	285	188	226	226	20	145		226	188
6	270	165	226	240	21	165		226	188
7	255	165	226	240	22	176		240	188
8	240	155	240	240	23	188		240	188
9	226	145	240	240	24	200		240	188
10	213	145	240	240	25	213		240	188
11	200	185	240	240	26	240	185	240	186
12	188		240	240	27	255		240	186
13	188		240	240	28	285		240	188
14	188		240	240	29	240		240	203
15	176		240	240	30	240		226	410
					31			226	

NOTE.—Discharge estimated July 11–31 and Sept. 16–29, by comparison with record of Beaver River at Eagle Falls and one discharge measurement, because of backwater from logs on control.

*Monthly discharge of Beaver River below Stillwater Dam, near Beaver River, N. Y., for the year ending September 30, 1924*

[Drainage area, 176 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
June	318	145	219	1.24	1.38
July	240	145	185	1.05	1.21
August	240	213	232	1.32	1.52
September	410	186	224	1.27	1.42
The period	410	145	215	1.22	5.53

NOTE.—Discharge shown by the table does not represent natural flow from basin because of artificial storage in Stillwater Reservoir.

#### BEAVER RIVER AT EAGLE FALLS, NEAR NUMBER FOUR, N. Y.

LOCATION.—Just below Eagle Falls power plant of Northern New York Utilities (Inc.), 4 miles north of Number Four, Lewis County,  $2\frac{1}{2}$  miles below Beaver Lake, and 9 miles below State dam at outlet of Beaver River Flow.

DRAINAGE AREA.—230 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 21, 1921, to September 30, 1924.

GAGE.—Gurley seven-day graph water-stage recorder on left bank; inspected by employees of Northern New York Utilities (Inc.).

DISCHARGE MEASUREMENTS.—Made from a cable over tailrace and river channel about 300 feet above gage or by wading.

CHANNEL AND CONTROL.—Boulders and large broken rock; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.00 feet at 8.45 a. m. April 21 (discharge, 3,500 second-feet); minimum stage, 0.33 foot at 5 a. m. September 28 (discharge, 7.6 second-feet).

1921–1924: Maximum stage, 7.30 feet at 3.30 p. m. April 13, 1922 (discharge, 4,980 second-feet); minimum stage, 0.22 foot at noon December 17, 1923 (discharge, 5.8 second-feet).

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

REGULATION.—Seasonal flow is regulated by storage in Beaver River Flow about 9 miles above. Diurnal flow regulated at dam at foot of Beaver Lake according to needs of power plant. Some regulation in other ponds and lakes in drainage area.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 100 and 1,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table, mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good.

*Discharge measurements of Beaver River at Eagle Falls, near Number Four, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec-ft.</i>			<i>Feet</i>	<i>Sec-ft.</i>
Nov. 24	A. E. Johnson	1.94	260	Aug. 10	Lamson and McCon-		
Feb. 7	J. L. Lamson	2.39	409		nell	2.08	317
July 27	Lamson and McCon-			Sept. 25	Johnson and Harring-		
	nell	1.55	164		ton	1.77	212
Aug. 9	do	2.14	383		do	1.65	193

*Daily discharge, in second-feet, of Beaver River at Eagle Falls, near Number Four, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	106	228	802	317	416	371	462	2,540	377	341	212	175
2	105	117	603	336	378	433	424	2,640	366	288	165	340
3	101	125	521	394	424	440	400	2,330	313	253	134	292
4	99	15	418	322	473	436	430	2,170	344	133	236	287
5	99	99	291	320	408	428	476	2,370	328	220	319	216
6	96	142	266	211	404	394	788	2,220	316	183	387	198
7	23	135	354	282	401	367	1,530	1,870	344	230		243
8	82	210	363	1698	399	224	1,410	1,680	235	233	850	818
9	105	279	412	306	296	338	1,180	1,590	331	210		280
10	105	312	605	323	256	423	909	1,410	287	219	306	266
11	47	296	624	1,200	437	291	849	1,330	319	150	394	309
12	41	272	589	2,370	964	351	803	1,640	221	160	826	335
13	40	260	561	2,070	348	370	710	1,460	302	182	267	362
14	29	170	647	1,920	243	351	1,330	1,410	256	267	299	319
15	45	283	628	1,520	264	292	1,820	1,500	42	230	299	402
16	42	294	565	1,310	233	182	1,680	1,640	235	263		319
17	42	232	679	1,290	410	232	1,640	1,540	243	252		279
18	42	69	561	1,260	645	271	1,720	1,410	156	202		257
19	42	287	509	1,120	665	273	2,170	1,640	162	138		274
20	43	212	386	930	655	228	2,120	1,640	149	160	300	214
21	28	223	282	782	680	221	2,170	1,410	147	277		166
22	43	221	355	680	680	211	2,170	1,290	350	323		360
23	44	228	400	670	620	180	2,480	1,170	249	242		267
24	49	210	420	625	644	220	2,370	1,030	234	220	332	275
25	320	69	366	675	602	237	2,270	1,100	321	226	410	225
26	400	308	408	664	432	268	2,120	1,100	346	229	351	197
27	306	336	389	640	448	287	1,870	1,000	286	170	286	122
28	107	342	341	818	428	279	2,220	809	280	257	273	158
29	153	122	408	588	414	291	1,910	678	254	219	232	306
30	281	411	293	529		402	2,170	615	344	236	232	708
31	222		337	448		479		507		200	109	

NOTE.—Discharge estimated by comparison with record of Beaver River below Stillwater Dam near Beaver River for Nov. 4, 24, Dec. 23-30, Jan. 11-12, Mar. 23-24, June 6-7, 27-28, July 5-6, 12-13, 19, 27, A g. 7-9, 16-23, and Sept. 20-21; water-stage recorder not operating satisfactorily.

*Monthly discharge of Beaver River at Eagle Falls, near Number Four, N. Y., for the year ending September 30, 1924.*

[Drainage area, 230 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	400	23	106	0.461	0.53
November.....	411	15	215	.935	1.04
December.....	802	266	468	2.03	2.34
January.....	2,370	211	817	3.55	4.09
February.....	680	233	452	1.97	2.12
March.....	479	180	315	1.37	1.58
April.....	2,480	400	1,490	6.48	7.23
May.....	2,640	507	1,500	6.52	7.52
June.....	377	42	271	1.18	1.32
July.....	341	133	223	.970	1.12
August.....	410	109	291	1.27	1.46
September.....	708	122	280	1.22	1.36
The year.....	2,640	15	536	2.33	31.71

NOTE.—Discharge shown by the table does not necessarily represent natural flow from basin because of artificial storage, mainly in Stillwater Reservoir and Beaver Lake.

### STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

#### EAST BRANCH OF OSWEGATCHIE RIVER AT CRANBERRY LAKE, N. Y.

**LOCATION.**—In village of Cranberry Lake, St. Lawrence County, about 500 feet below concrete dam at outlet of Cranberry Lake and 10½ miles above Newton Falls.

**DRAINAGE AREA.**—144 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—May 5, 1923, to September 30, 1924. October 6, 1912, to May 4, 1923, records obtained at station at Newton Falls, 10½ miles below.

**GAGE.**—Slope gage on left bank; read by Herbert Dean.

**DISCHARGE MEASUREMENTS.**—Made from cable about 200 feet below gage or by wading.

**CHANNEL AND CONTROL.**—Large boulders and gravel; practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.50 feet from 7 a.m. May 15 to 9 a.m. May 21 (discharge, 1,590 second-feet); minimum discharge practically zero, at numerous times when gates in dam were closed and when there was no discharge over spillway.

1923-24: Maximum stage recorded, that of May 15 to 21, 1924; minimum stage was reached many times when gates in dam were closed and when there was no discharge over spillway (discharge, nearly zero).

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

**REGULATION.**—Discharge is regulated by operation of sluice gates at Cranberry Lake Dam.

**ACCURACY.**—Stage-discharge relation practically permanent. Rating curve well defined between 40 and 1,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for days when sluice gates in dam above are operated, when the discharge is averaged for portions of the day. Records fair.

*Discharge measurements of East Branch of Oswegatchie River at Cranberry Lake, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 22	A. E. Johnson	3.99	80.4	Feb. 1	J. L. Lamson	5.80	562
22	do	4.45	142	1	do	6.20	714
22	do	4.75	233	Apr. 23	do	6.35	758
22	do	4.99	285	Aug. 2	Lamson and McConnell	5.09	300
Feb. 1	J. L. Lamson	5.26	364				

*Daily discharge, in second-feet, of East Branch of Oswegatchie River at Cranberry, Lake, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	287	190	201	161	274	315	236	940	287	248	315	315
2	287	190	177	161	274	315	236	1,060	287	248	315	315
3	287	201	144	161	274	315	236	1,500	287	248	315	315
4	274	201	144	161	274	301	236	1,500	287	248	315	315
5	274	201	144	161	274	301	236	1,500	287	248	315	315
6	274	201	144	161	274	301	236	1,500	287	248	315	315
7	274	201	144	161	274	301	236	1,320	287	248	315	315
8	274	201	144	161	276	301	236	1,010	287	257	315	301
9	274	201	152	161	287	301	236	770	248	287	315	301
10	274	201	152	179	287	301	210	770	224	287	315	301
11	274	201	152	224	287	301	190	770	224	287	315	301
12	274	201	152	224	287	301	201	770	212	287	315	301
13	274	201	152	224	274	301	201	770	212	287	315	301
14	274	201	152	196	274	301	212	770	212	287	315	301
15	274	201	152	180	274	301	224	1,350	212	287	315	301
16	274	201	152	180	295	301	236	1,590	212	287	315	301
17	261	201	152	180	315	301	236	1,590	212	287	315	301
18	261	201	152	180	315	306	248	1,590	212	287	315	301
19	261	201	180	180	315	344	248	1,590	212	295	315	301
20	261	201	201	180	315	344	248	1,590	226	315	315	301
21	261	201	201	180	315	344	248	1,340	261	315	315	301
22	261	201	201	180	315	344	248	1,190	261	315	315	301
23	261	201	201	180	315	344	248	763	261	315	315	301
24	261	201	172	180	315	344	248	550	261	315	315	301
25	261	201	161	180	315	344	248	550	261	315	315	301
26	261	201	161	186	315	320	340	438	261	315	315	301
27	261	201	161	201	315	261	405	344	261	315	315	280
28	261	201	161	201	315	261	405	344	261	315	315	236
29	261	201	161	230	315	261	405	287	261	315	315	236
30	261	201	161	274	-----	261	596	287	261	315	315	236
31	220	-----	161	274	-----	261	-----	287	-----	315	315	-----

NOTE.—Discharge estimated, Dec. 25-29, Feb. 16, June 22-26, and Sept. 27-30; gage-height record doubtful.



*Monthly discharge of East Branch of Oswegatchie River at Cranberry Lake, N. Y.,  
for the year ending September 30, 1924*

[ Drainage area, 144 square miles ]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....	287	220	268	1.86	2.14
November .....	201	190	200	1.39	1.55
December .....	201	144	163	1.13	1.30
January .....	274	161	188	1.31	1.51
February .....	315	274	295	2.05	2.21
March .....	344	261	306	2.12	2.44
April .....	596	190	266	1.85	2.06
May .....	1,590	287	988	6.86	7.91
June .....	287	212	251	1.74	1.94
July .....	315	248	288	2.00	2.31
August .....	315	315	315	2.19	2.52
September .....	315	236	297	2.06	2.30
The year .....	1,590	144	320	2.22	30.19

NOTE.—Discharge and run-off shown by table do not represent natural flow from basin because of artificial storage in Cranberry Lake.

**OSWEGATCHIE RIVER NEAR HEUVELTON, N. Y.**

**LOCATION.**—2½ miles above Heuvelton, St. Lawrence County, 3 miles below Rensselaer Falls, and 7 miles above mouth of Indian River (outlet to Black Lake).

**DRAINAGE AREA.**—967 square miles, revised (measured on topographic maps).

**RECORDS AVAILABLE.**—June 23, 1916, to September 30, 1924.

**GAGE.**—Stevens continuous water-stage recorder on right bank, installed August 4. Prior to August 4 a Gurley seven-day graph water-stage recorder was in operation. Recorders inspected by George B. Todd.

**DISCHARGE MEASUREMENTS.**—Made from cable 20 feet below gage or by wading.

**CHANNEL AND CONTROL.**—Solid rock; practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 6.33 feet from 4 a.m. to 8 p.m. April 9 (discharge, 8,600 second-feet); minimum stage, 0.90 foot at 3 a.m. October 23 (discharge, 318 second-feet).

1916-1924: Maximum stage from water-stage recorder, 7.60 feet from 9 a.m. to noon March 30, 1917 (discharge, 11,700 second-feet); minimum stage, 0.81 foot from 2 to 4 a. m. September 30, 1921 (discharge, 274 second-feet).

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

**REGULATION.**—Some diurnal fluctuation in flow due to operation of mills at Rensselaer Falls and above. Seasonal flow regulated by storage in Cranberry Lake.

**ACCURACY.**—Stage-discharge relation practically permanent. Rating curve well defined between 300 and 12,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage-height determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good, except for estimated discharges, which are fair.

*Discharge measurements of Oswegatchie River near Heuvelton, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 21	A. E. Johnson.....	1.54	763	July 14	A. W. Harrington .....	1.37	621
Feb. 4	J. L. Lamson.....	2.12	1,340	31	Lamson and McConnell	1.44	686
Apr. 24	A. W. Harrington.....	4.42	4,870				

*Daily discharge, in second-feet, of Oswegatchie River near Heuvelton, N.Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	532	1,140	4,000		1,790	892	3,960	2,570	1,210	1,170	650	676
2.....	441	1,020	4,300		1,390	816	3,300	2,640	1,080	1,220	658	570
3.....	441	1,080	4,210		1,280	825	3,080	3,000	948	1,160	676	634
4.....	405	1,080	3,960		1,330	744	3,160	3,540	920	988	610	618
5.....	411	968	3,540		1,120	735	3,460	3,780	939	676	509	658
6.....	448	844	3,300		1,140	1,410	4,210	3,780	872	602	481	771
7.....	481	642	3,230		1,100	2,290	6,450	3,700	825	547	517	753
8.....	517	735	3,000		1,200	2,360	8,100	3,460	807	594	570	709
9.....	461	958	2,780		1,220		8,540	3,080	718	676	900	762
10.....	399	1,230	2,710		1,100		8,320	2,930	555	863	1,510	789
11.....	360	1,210	2,500		1,040		7,470	2,950	650	807	1,430	854
12.....	360	1,100	2,430		948	2,100	6,450	3,000	762	735	1,210	825
13.....	376	620	2,220		920			3,050	816	692	1,240	834
14.....	370	798	2,150		939			3,100	834	586	1,100	910
15.....	370	854	2,020		1,040	1,820		3,700	718	509	910	1,080
16.....	416	798	1,810	2,400	1,060	1,650	4,600	4,400	634	448	892	1,230
17.....	435	753	1,580		1,080	1,550		5,100	540	454	882	1,250
18.....	422	735			958	1,190		5,100	481	634	718	1,060
19.....	441	753			844	1,080		4,920	555	667	658	968
20.....	448	762	1,250		700	1,190	4,740	4,740	547	517	825	901
21.....	376	726			939	1,260	4,830	4,380	570	481	930	825
22.....	370	692			977	1,700	4,830	3,870	602	435	882	718
23.....	344	718	1,430		920	2,680	4,830	3,160	667	435	1,040	642
24.....	428	844	1,520		863	3,700	4,740	2,710	1,020	481	1,210	634
25.....	658	968	1,490		762	4,120	4,740	2,290	1,120	610	1,220	650
26.....	1,030	968	1,350		700	4,210	4,380	2,080	996	650	1,320	658
27.....	1,560	988	1,230		692	4,040	3,870	1,950	968	771	1,230	658
28.....	1,590	1,080	1,150		798	4,040	3,230	1,880	1,060	863	1,120	650
29.....	1,460	1,340	1,630		910	4,120	2,780	1,640	1,120	735	1,120	626
30.....	1,170	2,110	1,020			4,210	2,640	1,440	1,120	692	996	977
31.....	968		872			4,210		1,280		684	892	

NOTE.—Water-stage recorder not operating satisfactorily Oct. 28–29, Dec. 2, 18–24, 29–31, Jan. 1–31, Mar. 9–15, Apr. 11–19, May 11–17, 31, June 5–7, 21, 27, 28, and July 5, 25, 26; discharge estimated by comparison with records in upper drainage area.

*Monthly discharge of Oswegatchie River near Heuvelton, N. Y., for the year ending September 30, 1924*

[Drainage area, 967 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....	1,590	344	597	0.617	0.71
November .....	2,110	642	960	.993	1.11
December .....	4,300	872	2,180	2.25	2.59
January .....			2,400	2.48	2.86
February .....	1,790	692	1,030	1.07	1.15
March .....	4,210	735	2,240	2.32	2.68
April .....	8,540	2,640	4,810	4.97	5.54
May .....	5,100	1,280	3,200	3.31	3.82
June .....	1,210	481	822	.850	.95
July .....	1,220	435	690	.714	.82
August .....	1,510	481	932	.964	1.11
September .....	1,250	570	797	.824	.92
The year .....	8,540	344	1,720	1.78	24.26

**WEST BRANCH OF OSWEGATCHIE RIVER NEAR HARRISVILLE, N. Y.**

**LOCATION.**—At highway bridge near Geers Corners, 4 miles downstream from Harrisville, Lewis County, and 16 miles above confluence of East and West branches near Talleville.

**DRAINAGE AREA.**—256 square miles, revised (measured on topographic maps).

**RECORDS AVAILABLE.**—July 1, 1916, to September 30, 1924.

**GAGE.**—Vertical staff in three sections on right bank; section graduated from 0.0 to 3.3 feet about 25 feet below bridge, and two sections graduated from 3.3 to 10.1 feet on downstream side of bridge abutment. Gage read by Frank Osborne.

**DISCHARGE MEASUREMENTS.**—Made from cable 200 feet above gage, from downstream side of highway bridge, or by wading.

**CHANNEL AND CONTROL.**—Rocky and rough; practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.80 feet at 5 p. m. January 12 (discharge, 3,360 second-feet); minimum stage recorded, 0.90 foot at 7 a. m. October 11 (discharge, 27 second-feet).

1916-1924: Maximum stage recorded, 8.1 feet at 6.30 a. m. and 6 p. m.

March 28, 1917 (discharge, 4,880 second-feet); minimum stage, 0.90 foot several times during August and October, 1923 (discharge, 27 second-feet).

**ICE.**—Stage-discharge relation only slightly affected by ice during extremely cold periods.

**REGULATION.**—Some diurnal fluctuation in flow caused by operation of pulp mill at Harrisville.

**ACCURACY.**—Stage-discharge relation practically permanent; not affected by ice. Rating curve fairly well defined between 50 and 4,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, except those for low stages, which are only fair owing to diurnal fluctuation.

*Discharge measurements of West Branch of Oswegatchie River near Harrisville, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 23	A. E. Johnson .....	2.48	318	Aug. 2	Lamson and McConnell	1.64	106
Feb. 6	J. L. Lamson .....	2.53	322	Sept. 24	Harrington and Johnson	1.97	163
Apr. 24	A. W. Harrington .....	5.45	2,100				

*Daily discharge, in second-feet, of West Branch of Oswegatchie River near Harrisville, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	84	486	1,250	465	425	177	1,000	1,120	387	445	155	177
2.....	80	425	1,760	465	351	177	835	1,320	387	387	135	177
3.....	76	351	1,680	507	285	177	685	1,390	351	285	126	227
4.....	71	301	1,390	507	317	201	735	1,460	317	214	101	285
5.....	67	241	1,120	486	317	255	890	1,390	317	227	109	227
6.....	67	241	1,060	465	351	255	1,320	1,390	285	201	155	227
7.....	73	285	1,060	387	351	387	2,360	1,250	270	177	317	227
8.....	51	465	1,000	387	351	387	3,140	1,060	270	177	685	255
9.....	49	465	945	369	351	369	2,740	890	255	189	735	241
10.....	55	425	890	351	351	301	2,360	835	227	189	595	255
11.....	32	387	785	1,320	351	334	2,360	835	201	177	445	334
12.....	34	369	685	3,140	301	334	2,000	990	201	135	369	351
13.....	42	351	595	3,040	285	317	1,460	1,000	189	135	317	425
14.....	38	317	640	2,540	270	285	1,530	1,000	241	117	285	595
15.....	51	285	640	1,920	255	255	2,180	1,120	214	117	255	595
16.....	55	270	595	1,250	255	241	2,180	1,760	227	117	255	465
17.....	55	241	550	1,250	201	227	1,840	1,920	177	109	227	387
18.....	55	270	550	1,250	201	214	1,600	1,530	201	117	177	334
19.....	59	317	465	1,120	214	227	1,680	1,530	201	117	166	255
20.....	73	285	387	890	214	227	2,180	1,530	201	117	177	214
21.....	55	285	465	685	201	214	2,000	1,360	241	109	369	177
22.....	71	301	550	835	177	285	1,840	1,120	685	117	595	145
23.....	59	317	595	595	189	369	2,000	890	640	117	685	227
24.....	177	351	507	550	201	507	2,000	785	425	117	735	177
25.....	785	369	465	425	177	595	1,840	785	351	227	595	166
26.....	890	351	425	486	189	640	1,530	785	387	351	507	166
27.....	835	425	387	317	201	595	1,250	685	369	285	445	135
28.....	685	595	425	301	201	685	1,060	595	425	189	351	166
29.....	507	685	317	317	189	785	1,120	550	550	166	270	117
30.....	425	835	255	406	-----	890	1,060	486	528	155	214	785
31.....	445	-----	387	445	-----	1,000	-----	465	-----	155	201	-----

NOTE.—Discharge estimated, Nov. 22; no gage-height record.

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*Monthly discharge of West Branch of Oswegatchie River near Harrisville, N. Y., for the year ending September 30, 1924*

[Drainage area, 256 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	890	32	197	0.770	0.89
November.....	835	241	376	1.47	1.64
December.....	1,760	255	736	2.88	3.32
January.....	3,140	301	886	3.46	3.99
February.....	425	177	266	1.04	1.12
March.....	1,000	177	384	1.50	1.73
April.....	3,140	685	1,090	6.60	7.36
May.....	1,920	465	1,090	4.26	4.91
June.....	685	177	324	1.27	1.42
July.....	445	109	185	.723	.83
August.....	735	101	347	1.36	1.57
September.....	785	117	284	1.11	1.24
The year.....	3,140	32	564	2.20	30.02

**RAQUETTE RIVER AT PIERCEFIELD, N. Y.**

**LOCATION.**—Half a mile below dam of International Paper Co. at Piercefield, St. Lawrence County, and three-quarters of a mile above head of Black Rapids.

**DRAINAGE AREA.**—723 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—August 20, 1908, to September 30, 1924.

**GAGE.**—Stevens continuous water-stage recorder on left bank; inspected by employee of International Paper Co.

**DISCHARGE MEASUREMENTS.**—Made from a cable three-quarters of a mile below gage.

**CHANNEL AND CONTROL.**—Channel opposite gage is a deep pond with no perceptible velocity. Control which is at head of Black Rapids is composed of rock ledge and large boulders; practically permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 10.70 feet at 10 a. m. May 5 (discharge, 5,930 second-feet); minimum stage, 1.85 feet from 3 to 7 p. m. October 14 (discharge, 60 second-feet).

1908-1924: Maximum stage from water-stage recorder, 11.82 feet from 6 to 8 p. m. April 17, 1922 (discharge, 7,580 second-feet); minimum stage, 0.85 foot at 11 a. m. September 2, 1913 (discharge, about 10 second-feet).

**ICE.**—Stage-discharge relation affected by ice for short periods only during extremely cold weather.

**REGULATION.**—Large diurnal fluctuation in flow caused by operation of paper mill during low and medium stages. Numerous lakes in upper part of drainage basin afford considerable storage, most of which is so controlled that the effect on the seasonal distribution of flow is large.

**ACCURACY.**—Stage-discharge relation practically permanent; not affected by ice. Rating curve well defined between 50 and 5,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height, determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good, except for estimated periods for which they are fair.

*Discharge measurements of Raquette River at Piercefield, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
Jan. 31	J. L. Lamson	Feet 6.55	Sec.-ft. 1,730	Aug. 1	Lamson and McConnell	Feet 3.80	Sec.-ft. 418
Apr. 23	do	8.78	3,640				

*Daily discharge, in second-feet, of Raquette River at Piercefield, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Apr.	Sept.
1	296	515	873		1,660	702	1,020	4,340	2,500	855	440	680
2	385	485	638		1,620	236	831	4,560	2,750	855	348	832
3	222	470	1,330		836	460	800	4,680	2,660	765	305	925
4	255	229	1,560		1,310	515	907	5,040	2,490	720	417	900
5	253	376	1,430		1,430	565	967	5,540	2,330	700	440	878
6	158	515	1,520	1,300	1,320	548	580	5,670	2,200	700	485	
7	101	500	1,590		1,220	860	1,290	5,800	2,090	680	530	
8	89	530	1,520		1,220	857	1,620	5,670	1,440	758	582	
9	297	548	1,310		1,460	254	1,660	5,540	1,940	765	582	
10	410	530	1,800		609	442	1,760	5,540	1,870	720	548	900
11	228	261	1,800		887	565	1,840	5,410	1,760	765	649	
12	175	415	1,700	1,400	1,130	500	1,940	5,410	1,660	596	680	
13	153	548	1,700	1,090	1,220	762	1,520	5,410	1,520	515	680	
14	95	565	1,760	1,730	1,190	500	2,160	5,280	1,400	593	680	765
15	78	548	1,730	1,840	817	626	2,410	5,410	577	600	660	832
16	77	515	1,220	1,870	998	210	2,490	5,410	844	565	640	925
17	117	530	1,670	2,010	575	498	2,660	5,410	1,040	530	565	900
18	326	276	1,730	2,090	727	644	2,660	5,280	1,080	500	515	900
19	385	398	1,730	2,090	902	500	2,930	5,280	799	381	582	1,120
20	272	530	1,700	2,010	1,050	500	3,020	5,160	652	348	680	1,030
21		530	1,560	2,060	874	760	3,500	4,920	800	444	660	565
22		530	1,460	2,090	696	869	3,700	4,680	802	470	680	600
23		587		1,940	710	270	3,800	4,560	487	455	788	1,010
24		428		1,900	218	854	3,900	4,340	582	465	680	900
25	350	207		1,940	635	1,020	4,010	3,900	680	470	900	880
26		352	1,300	1,870	754	792	4,010	3,900	765	398	975	822
27		548		1,350	746	772	3,900	3,700	855	360	1,000	932
28		530		1,780	565	777	4,230	3,500	900	457	1,000	418
29		316		1,760	565	862	4,230	3,300	855	470	1,000	789
30		455		1,650		465	4,230	3,110	878	470	878	1,190
31		485		1,730		851		2,930		455	788	

NOTE.—Discharge estimated Oct. 20-27, Dec. 23 to Jan. 11, Sept. 6-13, 24, 25; from hydrograph study and comparison with records in adjacent drainage areas; water-stage recorder not operating satisfactorily.

*Monthly discharge of Raquette River at Piercefield, N. Y., for the year ending September 30, 1924*

[Drainage area, 723 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....	485	77	265	0.367	0.42
November .....	587	207	469	.649	.72
December .....	1,800	638	1,450	2.01	2.32
January .....	2,090	1,090	1,630	2.25	2.59
February .....	1,660	218	964	1.33	1.43
March .....	1,020	210	615	.851	.98
April .....	4,230	580	2,490	3.44	3.84
May .....	5,800	2,930	4,800	6.64	7.66
June .....	2,750	302	1,360	1.88	2.10
July .....	855	348	575	.795	.92
August .....	1,000	305	657	.909	1.05
September .....	1,190	418	866	1.20	1.34
The year .....	5,800	77	1,350	1.87	25.37

**ST. REGIS RIVER AT BRASHER CENTER, N. Y.**

**LOCATION.**—600 feet above steel highway bridge in Brasher Center, St. Lawrence County,  $6\frac{1}{2}$  miles below junction of East and West branches of St. Regis River, 7 miles above mouth of Deer River, and 15 miles above mouth.

**DRAINAGE AREA.**—616 square miles, revised (measured on topographic maps).

**RECORDS AVAILABLE.**—August 22, 1910, to November 10, 1917, and January 1, 1919, to September 30, 1924.

**GAGE.**—Gurley seven-day graph water-stage recorder; inspected by Alfred Berry. Datum same as that of staff gage with inclined and vertical sections used June 24, 1916, to August 14, 1920.

**DISCHARGE MEASUREMENTS.**—Made from cable at gage or by wading.

**CHANNEL AND CONTROL.**—Rock ledge, small boulders, and coarse gravel; fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 9.37 feet at 6 a. m. April 7 (discharge, 5,670 second-feet); minimum stage, 5.86 feet at 3 a. m. October 14 and 2.30 a. m. October 23 (discharge, 188 second-feet).

1910-1924: Maximum stage recorded, 9.1 feet (old datum) at 7 a. m. March 27, 1914 (discharge, 16,200 second-feet); minimum stage, 5.25 feet at 5 p. m. August 8, 1917 (discharge, about 34 second-feet).

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

**ACCURACY.**—Stage-discharge relation changed presumably at time of high water April 7; affected by ice from December to April. Two rating curves well defined between 200 and 6,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good, except during periods of ice effect and estimate, for which they are fair.

*Discharge measurements of St. Regis River at Brasher Center, N.Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 20	A. E. Johnson	6. 22	451	July 31	Lamson and McConnell	6. 18	450
Feb. 3	J. L. Lamson	* 7. 12	687	Aug. 1	do	6. 19	456
28	E. B. Shupe	* 7. 13	456	16	A. W. Harrington	6. 37	625
Apr. 23	A. W. Harrington	8. 61	4, 100	Sept. 23	Johnson and Harrington	6. 02	287
July 15	do	5. 98	309				

\* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of St. Regis River at Brasher Center, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	234	926	2, 620	808	1, 300	420	850	2, 860	837	517	442	363
2	240	830	2, 300	900	1, 000	420	800	3, 120	782	517	433	331
3	229	668	1, 880	900	650	420	750	3, 040	718	460	355	407
4	223	535	1, 540	950	600	500	1, 100	3, 300	666	424	331	470
5	229	496	1, 360	800	500	600	2, 200	3, 570	655	371	307	527
6	234	506	1, 470	650	600	1, 000	3, 200	3, 480	615	285	291	555
7	229	622	1, 610	600	650	1, 400	5, 400	3, 040	605	339	315	595
8	234	1, 030	1, 360	550	550	1, 300	4, 040	2, 520	575	315	489	605
9	234	1, 030	1, 430	500	550	1, 200	3, 390	2, 200	555	339	837	536
10	223	854	1, 340	440	550	1, 100	3, 850	2, 440	517	315	782	555
11	223	720	1, 210	1, 800	600	950	3, 480	2, 700	508	355	635	645
12	229	699	1, 070	3, 960	500	800	2, 860	2, 520	489	355	595	605
13	229	646	986	3, 220	440	800	2, 700	2, 950	527	315	527	555
14	223	545	1, 150	2, 620	480	650	3, 390	2, 700	555	299	479	555
15	240	496	878	2, 380	500	550	3, 570	3, 660	536	272	517	555
16	252	448	900	2, 460	500	500	3, 210	3, 940	508	291	625	508
17	263	420	900	2, 540	440	480	3, 040	3, 390	470	299	565	460
18	257	439	750	2, 060	440	480	3, 300	2, 860	433	331	489	424
19	246	515	650	1, 680	440	460	4, 340	2, 950	433	363	451	371
20	217	439	750	1, 500	440	460	4, 650	2, 700	407	371	389	355
21	212	394	1, 010	1, 300	440	460	4, 140	2, 360	389	347	433	339
22	217	412	1, 100	440	750	3, 660	2, 040	407	398	460	323	323
23	217	486	1, 100	480	1, 300	3, 940	1, 760	498	442	451	315	315
24	552	565	1, 000	440	1, 800	3, 850	1, 570	470	347	424	315	315
25	1, 510	688	900	420	1, 600	3, 480	1, 500	407	595	599	323	323
26	1, 530	615	850	440	1, 300	3, 120	1, 360	460	990	1, 340	331	331
27	1, 250	1, 130	650	440	1, 200	2, 860	1, 260	555	954	687	315	315
28	986	1, 240	600	440	1, 100	2, 780	1, 170	517	771	546	291	291
29	764	1, 010	720	950	420	1, 300	2, 860	1, 080	479	595	479	315
30	626	1, 330	468	1, 000	1, 100	2, 780	978	470	479	451	2, 110	2, 110
31	720	477	1, 500	1, 500	1, 200	894	451	398	398	398	398	398

NOTE.—Discharge estimated Dec. 22-29, Jan. 25-29, and Feb. 22; water-stage recorder not operating satisfactorily. Discharge Dec. 16-20, Jan. 2-11, and Jan. 20 to Apr. 6 determined from gage heights corrected for ice effect by means of two discharge measurements, study of gage-height graph and weather records, and comparison with records for near-by stations.



*Monthly discharge of St. Regis River at Brasher Center, N. Y., for the year ending September 30, 1924*

[Drainage area, 616 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,530	212	428	0.695	0.80
November.....	1,330	394	691	1.12	1.25
December.....	2,620	468	1,130	1.83	2.11
January.....	3,960	440	1,360	2.21	2.55
February.....	1,300	420	541	.878	.95
March.....	1,800	420	894	1.45	1.67
April.....	5,400	750	3,120	5.06	5.64
May.....	3,940	894	2,450	3.98	4.59
June.....	837	389	535	.869	.97
July.....	990	272	436	.708	.82
August.....	1,340	291	520	.844	.97
September.....	2,110	291	498	.808	.90
The year.....	5,400	212	1,050	1.70	23.22

**RICHELIEU RIVER AT FORT MONTGOMERY, ROUSES POINT, N. Y.**

**LOCATION.**—At Rutland Railroad bridge in Rouses Point, Clinton County, 1 mile south of Fort Montgomery,  $1\frac{1}{2}$  miles above head of Richelieu River, outlet of Lake Champlain, and  $1\frac{1}{2}$  miles south of international boundary.

**DRAINAGE AREA.**—7,870 square miles, including 436 square miles of water surface (from annual report of New York State engineer and surveyor).

**RECORDS AVAILABLE.**—1875 to September 30, 1924.

**GAGE.**—Vertical staff gage fastened to a pile just below Rutland Railroad bridge and about 25 feet from shore. This gage was set by water level to same datum as the one previously used inside the fort. Occasional observations are made on old gage in the fort for comparison with new gage. Gages read by Thomas Burke, caretaker at the fort. Elevation of zero of gage is 92.50 feet above mean sea level.

**EXTREMES OF STAGE.**—Maximum elevation recorded during year, 99.25 feet at 10 a. m. May 18; minimum elevation, 92.75 feet at 10 a. m. October 24.

1869-1924: Maximum elevation recorded, 103.28 feet April, 1869;<sup>4</sup> minimum elevation recorded, 91.9 feet November 13, 1908.

**COOPERATION.**—Gage heights observed under direction of the Corps of Engineers of the United States Army and reported monthly to the United States Geological Survey.

<sup>4</sup>Hoyt, J. C., U. S. Geol. Survey Water Supply Paper 97, p. 340.

*Daily gage height, in feet, of Richelieu River at Fort Montgomery, Rouses Point, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.43	0.90	1.50	2.30	3.10	2.40	3.07	6.15	5.20	2.50	1.70	1.15
2	.52	1.00	2.05	2.45	3.06	2.35	3.10	6.22	5.08	2.80	1.63	1.12
3	.75	.92	2.15	2.50	3.00	2.32	3.17	6.38	4.95	2.68	1.67	1.20
4	.53	.88	2.27	2.40	2.99	2.29	3.25	6.50	4.88	2.65	1.95	1.25
5	.52	.85	2.32	2.32	2.98	2.30	3.23	6.52	4.78	2.62	1.60	1.65
6	.52	.87	2.30	2.39	2.98	2.26	3.37	6.55	4.90	2.59	1.63	1.34
7	.48	.88	2.63	2.33	2.97	2.30	3.55	6.67	4.43	2.55	1.60	1.20
8	.47	.90	2.90	2.34	2.95	2.30	3.97	6.45	4.42	2.50	1.63	1.33
9	.48	.95	2.68	2.37	2.94	2.32	4.23	6.57	4.38	2.48	1.65	1.55
10	.53	1.25	2.70	2.23	2.95	2.34	4.35	6.60	4.30	2.40	1.65	1.32
11	.45	1.05	2.72	2.46	2.82	2.36	4.60	6.65	4.30	2.35	1.60	1.45
12	.48	.95	2.80	2.63	2.80	2.36	4.75	6.49	4.20	2.38	1.60	1.53
13	.67	.98	3.30	2.62	2.78	2.45	4.78	6.53	4.00	2.40	1.57	1.55
14	.35	.95	2.63	3.05	2.76	2.46	4.77	6.55	3.93	2.25	1.53	1.52
15	.42	1.20	3.05	3.20	2.74	2.45	4.75	6.70	3.85	2.15	1.50	1.52
16	.45	1.05	3.00	3.37	2.70	2.45	5.00	6.62	3.65	2.15	1.70	1.45
17	.47	.95	2.58	3.23	2.65	2.45	5.12	6.60	3.60	2.09	1.55	1.45
18	.43	.95	2.55	3.38	2.63	2.42	5.25	6.75	3.48	1.95	1.47	1.50
19	.42	.93	2.80	3.45	2.63	2.38	5.20	6.45	3.50	1.90	1.40	1.54
20	.42	1.10	2.67	3.47	2.62	2.35	5.57	6.43	3.42	2.02	1.40	1.64
21	.33	1.35	2.55	3.48	2.62	2.37	5.56	6.32	3.47	2.00	1.37	1.80
22	.32	.84	2.58	3.56	2.60	2.40	5.75	6.20	3.40	2.18	1.38	1.50
23	.27	.85	2.50	3.40	2.57	2.48	5.88	6.18	3.40	1.90	1.40	1.32
24	.25	.83	2.50	3.36	2.55	2.57	5.90	6.35	3.20	1.60	1.40	1.37
25	.63	.80	2.60	3.38	2.52	2.68	5.97	5.93	3.20	1.60	1.42	1.32
26	.68	1.30	2.63	3.23	2.48	2.73	6.05	5.90	3.15	1.82	1.28	1.40
27	.78	1.32	2.47	3.25	2.45	2.80	6.10	5.77	3.12	1.90	1.48	1.45
28	1.30	1.23	2.75	3.27	2.46	2.85	6.05	5.65	3.07	1.95	1.25	1.60
29	.90	1.48	2.47	3.20	2.44	2.87	6.07	5.48	3.30	1.83	1.23	1.62
30	1.10	1.62	2.50	3.18	-----	3.00	6.25	5.33	2.93	1.85	1.26	1.35
31	.77	-----	2.52	3.03	-----	2.95	-----	5.20	-----	1.78	1.35	-----

#### LAKE CHAMPLAIN AT BURLINGTON, VT.

**LOCATION.**—On south side of roadway leading to dock of Champlain Transportation Co. at foot of King Street., Burlington, Chittenden County.

**RECORDS AVAILABLE.**—May 1, 1907, to September 30, 1924.

**GAGE.**—Staff. Comparisons of gage readings indicate that zero of gage at Burlington is at practically same elevation as that of gage at Fort Montgomery, 92.5 feet above mean sea level. Gage read by employee of the Champlain Transportation Co.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 7.03 feet on May 7; minimum stage, 0.58 foot October 22.

1907-1924: Maximum stage, 8.22 feet on April 19, 1922; minimum stage, -0.25 foot on December 4, 1908.

**ICE.**—Wider parts of Lake Champlain not usually frozen over until the latter part of January. Occasionally closure does not occur until February, and in some years it lasts only for a few days. The northern end of the lake above the outlet is usually covered with ice from the middle of December to the middle of April.

**ACCURACY.**—Gage read to hundredths once a day at irregular intervals. Gage readings made when the lake is rough subject to inaccuracies due to wave action.

**COOPERATION.**—Gage heights furnished by D. A. Loomis, general manager of the Champlain Transportation Co.

*Daily gage height, in feet, of Lake Champlain at Burlington, Vt., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		1.17	1.96				3.38	6.42	5.46		2.02	
2	0.86			2.74	3.33			6.54	5.40			
3	.82	1.14	2.40	2.72		2.63		6.64	5.30			1.58
4	.82		2.54	2.70	3.30		3.40		5.22			1.56
5		1.18	2.56	2.70		2.62	3.54	6.92	5.16		1.85	
6		1.18				2.52		7.00	4.95			1.48
7		1.18	2.70			2.52	3.98	7.03	4.80	2.78	1.94	
8	.74		2.80			2.60	4.25			2.76		1.47
9	.74	1.22					4.48	6.98	4.65		1.92	1.46
10			3.00	2.62		2.62	4.75		4.54	2.62		1.50
11	.72		3.04	2.66	3.12	2.68	4.86				1.88	1.62
12						2.72	4.98	6.85	4.34	2.56		1.68
13		1.30				2.72			4.25	2.52	1.82	1.80
14		1.30	3.00	3.40			5.12	6.92	4.18	2.46	1.80	
15	.66			3.44			5.28				1.80	1.82
16							5.38	6.93		2.36		1.82
17	.64	1.29		3.55			5.42	6.95				1.82
18	.64		2.94	3.66	2.94		5.45				1.68	1.82
19		1.26	2.88				5.60			2.28	1.70	1.81
20			2.84			2.66		6.78			1.66	1.78
21							6.00	6.68		2.26		
22	.58	1.24	2.86				6.05	6.54				
23		1.20					6.25	6.46		2.26	1.58	1.68
24	.72	1.18	2.86	3.64		2.87	6.35		3.48	2.26	1.56	1.67
25	.90			3.60	2.80		6.42	6.22		2.26		1.66
26	1.05	1.26	2.86			3.04	6.42	6.12	3.40			1.62
27	1.10	1.32	2.84			3.08		6.04			1.56	1.60
28		1.54			2.72		6.39	5.94	3.30			
29	1.16		2.80			3.18		5.80		2.16	1.54	1.46
30		1.64						5.75		2.10	1.52	1.63
31			2.76			3.35		5.62		2.06	1.45	

#### SARANAC RIVER NEAR PLATTSBURG, N. Y.

**LOCATION.**—At Indian Rapids power plant (formerly known as Lozier Dam) of Plattsburg Gas & Electric Co., 6 miles above mouth of river at Plattsburg, Clinton County.

**DRAINAGE AREA.**—607 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—March 27, 1903, to September 30, 1924.

**GAGES.**—Gage showing elevation of water surface above intake to power plant is a Gurley seven-day water-stage recorder on retaining wall above power house on right side of river. Tailrace gage, a vertical staff spiked to timber-work dike between tailrace and river and about 50 feet below power house. Records of kilowatt output are obtained by watt meter on switchboard at half-hour intervals. Gages and watt meters read by power-house operators.

**DISCHARGE MEASUREMENTS.**—Made from a cable at head of Indian Rapids, a quarter of a mile below dam, or by wading under cable or in tailrace.

**DETERMINATION OF DISCHARGE.**—Records include the discharge over concrete spillway which has been rated by current-meter measurements; the discharge through two power units equipped with 300-kilowatt generators which have also been rated by current-meter measurements; and the discharge through two 5-foot waste gates when open, the rating for which is theoretical.

**EXTREMES OF DISCHARGE.**—Maximum daily discharge during year, 3,450 second-feet April 19; minimum daily discharge, 144 second-feet November 19.

1903-1924: Maximum daily discharge, 6,410 second-feet April 20, 1914; minimum daily discharge, 15 second-feet August 4, 1908.

**ICE.**—The crest of spillway is usually kept free from ice, so that stage-discharge relation is not affected.

**REGULATION.**—The lakes and ponds on the main stream and tributaries above the station comprise a water-surface area of about 25.5 square miles. The actual storage afforded by these reservoirs has been largely increased by the State dam at lower Saranac Lake, the operation of which affects distribution of flow during the year.

**ACCURACY.**—Stage-discharge relation permanent; probably not affected by ice during year. Spillway rating curve fairly well defined between 100 and 5,000 second-feet; turbine ratings fairly well defined throughout. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Discharge over the spillway ascertained by averaging discharge for intervals of day. Discharge through the turbines ascertained by applying to their ratings the mean kilowatt output and head for periods of run. Records fair.

The following discharge measurement was made by Lamson and Harrington: April 22, 1924: Gage height, 2.33 feet; discharge, 2,610 second-feet.

*Daily discharge, in second-feet, of Saranac River near Plattsburg, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	260	250	1,100	410	690	580	820	2,550	950	440	390	310
2	320	250	820	415	670	560	820	2,650	950	445	335	425
3	335	246	610	590	550	540	760	2,360	930	440	370	405
4	480	184	600	580	490	580	990	3,000	950	395	315	470
5	435	176	670	600	610	600	1,660	3,150	940	365	390	380
6	370	230	740	495	610	620	1,660	2,500	900	385	380	420
7	280	228	920	460	650	630	1,700	2,180	890	380	365	395
8	194	198	760	455	590	530	1,840	2,000	830	435	460	410
9	335	224	700	600	560	530	1,700	1,620	770	420	440	475
10	350	158	680	570	510	580	1,800	1,980	790	400	238	570
11	275	190	740	570	580	580	1,980	2,200	760	345	420	440
12	325	224	730	1,240	495	590	1,580	2,200	640	375	435	395
13	395	182	730	1,140	570	570	1,480	2,700	490	244	370	380
14	208	242	820	1,080	580	520	2,440	2,800	640	345	360	440
15	200	192	680	1,060	610	580	2,650	3,050	480	330	420	375
16	335	214	750	1,040	590	480	2,220	3,050	370	420	360	450
17	440	196	650	1,080	510	560	2,040	2,650	290	355	380	390
18	340	204	560	1,040	590	510	2,200	2,260	325	480	375	470
19	320	144	580	990	620	560	3,450	2,380	335	320	355	375
20	320	196	700	980	620	510	3,350	2,200	230	250	370	365
21	160	320	780	760	670	490	2,700	1,880	315	365	415	330
22	228	325	780	710	610	780	2,500	1,800	162	350	400	355
23	200	415	660	860	560	890	2,900	1,600	290	345	480	360
24	310	335	620	710	610	850	2,600	1,660	214	465	320	495
25	620	248	490	680	530	840	2,280	1,460	345	500	330	580
26	485	410	680	590	570	910	2,120	1,440	440	560	305	640
27	345	490	680	410	610	890	2,020	1,320	500	325	415	455
28	216	405	640	560	590	940	2,240	1,260	540	275	340	425
29	190	280	435	610	560	1,040	2,240	1,180	430	325	350	460
30	232	345	420	720	-----	1,000	2,200	1,100	580	395	310	820
31	335	-----	540	710	-----	930	-----	1,080	-----	300	222	-----

NOTE.—Spillway discharge partly estimated on basis of gage readings by power-plant operators Oct. 21-27, Nov. 10-11, 24-30, Dec. 1-8, Jan. 21-23, 27, Feb. 5, 9-10, 12-13, 26, 28, Mar. 29-30, Apr. 12-13, May 4-6, June 1, 8, 22-23, 28, July 6, 15-19, 27, Aug. 3-4, 16, 24, 31, Sept. 1, 7, 14-18, and 27-30; water-stage recorder not operating satisfactorily.

*Monthly discharge of Saranac River near Plattsburg, N. Y., for the year ending September 30, 1924*

[Drainage area, 607 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....	620	160	317	0.522	0.60
November .....	490	144	257	.423	.47
December .....	1,100	420	686	1.13	1.30
January .....	1,240	410	733	1.21	1.40
February .....	690	490	587	.967	1.04
March .....	1,040	480	670	1.10	1.27
April .....	3,450	760	2,030	3.34	3.73
May .....	3,150	1,080	2,110	3.48	4.01
June .....	950	192	577	.951	1.06
July .....	560	244	380	.626	.72
August .....	480	222	368	.606	.70
September .....	820	310	442	.728	.81
The year .....	3,450	144	764	1.26	17.11

NOTE.—Discharge and run-off shown by table do not necessarily represent natural flow from basin because of artificial storage in upper part of drainage basin. The yearly mean doubtless represents very nearly the natural flow.

**WEST BRANCH OF AUSABLE RIVER NEAR NEWMAN, N. Y.**

**LOCATION.**—On farm formerly owned by James Dudley, 4 miles northeast of Newman, Essex County, and 4 miles below Lake Placid.

**DRAINAGE AREA.**—116 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—June 7, 1916, to December 31, 1917, and July 15, 1919, to September 30, 1924.

**GAGE.**—Staff in two sections on right bank; lower section, inclined, graduated from 1.4 to 8.65 feet; upper section vertical, graduated from 8.7 to 11.0 feet; read by Mrs. Ethel Fuller.

**DISCHARGE MEASUREMENTS.**—Made from cable 300 feet above gage or by wading.

**CHANNEL AND CONTROL.**—Solid rock; permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 8.40 feet at 5.30 p.m. September 30 (discharge, about 5,310 second-feet); minimum stage, 2.35 feet at 5.30 p.m. October 19 (discharge, 32 second-feet).

1916-17; 1919-1924: Maximum discharge, that of September 30, 1924; minimum stage recorded, 1.60 feet at 7.30 p.m. September 13, 1920, caused by closing gates in dam (discharge, practically zero).

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

**ACCURACY.**—Stage-discharge relation permanent except as affected by ice from January to March. Rating curve fairly well defined between 30 and 1,000 second-feet. Gage read to quarter-tenths twice daily, except from November 26 to April 23, when it was read once daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records only fair, as mean daily gage height, determined from one or two gage readings, is subject to error owing to fluctuations in stage, caused by operation of dams upstream.

*Discharge measurements of West Branch of Ausable River near Newman, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 19	A. E. Johnson.....	2.51	48.0	Apr. 22	Lamson and Harrington.....		
Jan. 30	J. L. Lamson.....	3.10	101	Aug. 22	A. W. Harrington.....	4.01	493
Feb. 27	E. B. Shupe.....	2.63	69.4			2.99	131

a Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of West Branch of Ausable River near Newman, N. Y., for the year ending September 30, 1924*

Date	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	46	153	1,020	194	85	60	113	2,740	208	142	66	51
2.....	46	120	534	166	90	55	109	1,320	179	94	61	92
3.....	44	87	313	153	85	65	100	865	179	90	44	258
4.....	51	56	258	120	75	75	142	3,630	194	94	42	153
5.....	66	90	240	109	75	80	208	1,520	179	105	105	153
6.....	56	87	275	90	75	75	240	975	179	73	80	166
7.....	41	113	439	80	75	70	153	641	208	70	73	123
8.....	45	105	294	75	75	65	208	900	153	78	109	105
9.....	61	76	275	65	75	65	275	1,100	153	80	107	120
10.....	52	94	240	100	65	60	333	1,230	153	56	101	313
11.....	46	87	194	1,100	65	60	240	1,140	153	70	111	208
12.....	67	87	179	830	65	60	179	1,420	130	52	73	208
13.....	46	83	179	641	65	60	353	1,850	179	82	64	130
14.....	44	87	395	194	65	50	1,140	1,320	153	70	70	153
15.....	46	87	240	208	65	48	560	2,740	130	73	70	100
16.....	52	87	166	258	65	50	395	1,320	130	57	58	90
17.....	41	73	142	763	65	55	374	763	126	76	70	87
18.....	44	66	100	462	60	60	417	975	105	111	56	66
19.....	34	47	76	353	65	70	1,140	1,320	126	98	53	72
20.....	64	64	113	240	65	75	641	641	94	70	60	61
21.....	38	48	153	180	60	75	395	439	166	48	105	56
22.....	52	76	153	140	60	82	462	395	179	53	98	52
23.....	48	82	179	130	60	100	560	353	153	52	142	51
24.....	258	87	153	120	60	120	485	275	153	47	130	56
25.....	485	58	153	110	60	100	395	586	586	105	105	53
26.....	224	100	130	120	65	82	353	374	333	179	107	56
27.....	179	120	113	110	65	100	294	275	179	126	105	48
28.....	94	130	90	100	65	100	534	353	179	76	153	46
29.....	56	73	76	100	65	109	975	395	194	70	98	105
30.....	76	105	73	100	-----	153	1,420	313	153	87	76	4,550
31.....	208	-----	76	110	-----	142	-----	240	-----	64	58	-----

NOTE.—Discharge estimated Dec. 7, Jan. 12, and Feb. 20-23; gage readings missing or doubtful. Discharge Jan. 6-11 and Jan. 21 to Mar. 21 determined from gage heights corrected for ice effect by means of two discharge measurements and study of observer's notes, gage-height graph, and weather records.

*Monthly discharge of West Branch of Ausable River near Newman, N. Y., for the year ending September 30, 1924*

[Drainage area, 116 square miles]

Month	Discharge in second-feet				Run off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....	485	34	87.4	0.753	0.87
November .....	153	47	87.6	.755	.84
December .....	1,020	73	226	1.95	2.25
January .....	1,100	65	243	2.09	2.41
February .....	90	60	68.3	.589	.64
March .....	153	48	78.1	.673	.78
April .....	1,420	100	440	3.79	4.23
May .....	3,630	240	1,050	9.05	10.43
June .....	586	94	180	1.55	1.73
July .....	179	47	82.1	.708	.82
August .....	153	42	85.5	.737	.85
September .....	4,550	46	260	2.24	2.50
The year .....	4,550	34	241	2.08	28.35

#### AUSABLE RIVER AT AUSABLE FORKS, N. Y.

**LOCATION.**—In village of Ausable Forks, Clinton County, immediately below junction of East and West branches and about 15 miles above mouth of river.

**DRAINAGE AREA.**—444 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—August 17, 1910, to September 30, 1924.

**GAGE.**—Chain on left bank 1,000 feet below junction of East and West branches; read by A. S. Baker.

**DISCHARGE MEASUREMENTS.**—Made from cable  $1\frac{1}{2}$  miles below gage or by wading either near cable or a short distance above gage.

**CHANNEL AND CONTROL.**—Stone and gravel; occasionally shifting. Channel divided by an island opposite gage.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, about 8.9 feet at midnight September 30, determined from graph of plotted gage readings (discharge, approximately 15,100 second-feet); minimum stage 3.33 feet at 5 p. m. October 14 (discharge, 82 second-feet).

1910-1924: Maximum stage recorded, 10.2 feet in the evening of March 27, 1913 (discharge, roughly 25,000 second-feet); minimum stage 3.0 feet at 7 a. m. July 21, 1912 (discharge practically zero.)

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

**ACCURACY.**—Stage-discharge relation practically permanent except as affected by ice from December to March. Rating curve fairly well defined between 150 and 3,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table; except for days of great range in stage when discharge is averaged for intervals of day. Records only fair as mean daily gage height, determined from two gage readings, is subject to error owing to fluctuations in stage caused by operation of power plants upstream.

*Discharge measurements of Ausable River at Ausable Forks, N. Y., during the year ending September 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>			<i>Feet</i>	<i>Sec.-ft.</i>
Nov. 19	A. E. Johnson .....	3. 60	231	Apr. 22	Lamson and Harrington	4. 76	1,790
Jan. 30	J. L. Lamson .....	4. 48	326	Sept. 21	Harrington and Johnson	3. 51	175
Feb. 26	E. B. Shupe .....	4. 63	204				

α Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Ausable River at Ausable Forks, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	170	272	3,070	550	300	140	446	7,110	634	345	177	202
2.....	234	242	1,240	550	280	150	371	3,950	714	336	164	189
3.....	214	208	864	440	240	140	354	2,490	800	287	157	455
4.....	214	183	622	400	280	160	455	8,400	702	272	142	407
5.....	170	183	465	380	240	190	864	4,210	668	257	189	336
6.....	183	170	546	320	220	260	1,070	2,490	645	242	242	287
7.....	142	189	1,130	260	200	340	2,160	1,940	656	202	354	311
8.....	132	257	1,120	240	200	280	1,350	2,490	739	208	280	294
9.....	115	257	903	220	200	260	1,010	2,720	567	242	202	264
10.....	121	242	634	320	200	260	1,200	3,690	546	196	202	1,240
11.....	121	234	567	3,800	200	260	1,070	2,600	505	177	214	903
12.....	132	250	484	3,190	190	220	825	2,720	536	189	227	465
13.....	102	234	505	1,440	200	200	864	5,000	646	242	196	371
14.....	86	221	700	1,070	190	180	2,950	3,320	588	272	214	336
15.....	106	227	546	679	190	160	2,050	5,310	465	221	177	311
16.....	115	202	515	622	180	140	1,440	3,950	407	202	170	257
17.....	121	189	480	1,530	190	130	1,350	2,840	371	221	196	250
18.....	110	142	460	1,070	180	130	1,440	2,600	426	257	202	257
19.....	110	221	440	650	160	160	3,950	3,440	407	242	189	196
20.....	132	189	460	550	160	200	2,490	2,050	426	242	148	188
21.....	121	148	480	550	160	227	1,730	1,620	622	214	214	157
22.....	121	153	600	480	160	287	1,830	1,230	446	202	242	272
23.....	110	132	500	440	160	446	2,160	1,130	371	202	272	257
24.....	1,230	170	440	420	180	371	1,440	1,040	328	177	280	242
25.....	1,530	202	420	380	180	388	1,260	2,600	611	257	287	250
26.....	668	202	380	360	200	371	1,090	1,350	903	336	250	250
27.....	484	319	320	360	170	311	1,260	1,040	622	302	227	189
28.....	336	371	260	340	170	407	2,160	1,130	526	227	221	170
29.....	272	354	260	340	160	407	2,950	1,130	446	177	214	177
30.....	189	634	260	340	-----	536	3,320	1,010	388	170	202	8,530
31.....	336	-----	280	280	-----	611	-----	776	-----	189	202	-----

NOTE.—Discharge estimated Dec. 14 and Aug. 24; gage not read. Discharge, Dec. 17 to Jan. 11 and Jan. 19 to Mar. 20 determined from gage heights corrected for ice effect by means of two discharge measurements; study of observer's notes, gage-height graph, and weather records; and comparison with records of stations in same drainage basin.



*Monthly discharge of Ausable River at Ausable Forks, N. Y., for the year ending September 30, 1924*

[Drainage area, 444 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October .....	1,530	86	265	0.597	0.69
November .....	634	132	233	.525	.59
December .....	3,070	260	644	1.45	1.67
January .....	3,800	220	728	1.64	1.89
February .....	300	160	198	.446	.48
March .....	611	130	268	.604	.70
April .....	3,950	354	1,560	3.51	3.92
May .....	8,400	776	2,840	6.40	7.38
June .....	903	328	554	1.25	1.40
July .....	345	170	236	.532	.61
August .....	354	142	215	.484	.56
September .....	8,530	170	600	1.35	1.51
The year .....	8,530	86	697	1.57	21.40

**BOUQUET RIVER AT WILLSBORO, N. Y.**

**LOCATION.**—Half a mile south of Willsboro, Essex County,  $2\frac{1}{2}$  miles below mouth of North Branch of Bouquet River, and 3 miles above mouth of river.

**DRAINAGE AREA.**—271 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 23, 1923, to September 30, 1924.

**GAGE.**—Gurley seven-day graph water-stage recorder installed August 28, 1923, on right bank. From July 23 to August 28, a vertical staff gage on left bank 600 feet below, was used. Gage read and recorder inspected by employee of New York & Pennsylvania Co.

**DISCHARGE MEASUREMENTS.**—Made from upstream side of highway bridge half a mile below gage or by wading.

**CHANNEL AND CONTROL.**—Coarse gravel and boulders; probably permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage from water-stage recorder during period, July 23, 1923, to September 30, 1924, 6.93 feet at midnight September 30, 1924 (discharge, about 4,540 second-feet); minimum stage, 2.17 feet at 9 a. m. October 23 (discharge, 30 second-feet).

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

**REGULATION.**—During low-water period there is some diurnal fluctuation in flow caused by power plants upstream.

**ACCURACY.**—Stage-discharge relation practically permanent except as affected by ice from December to March. Rating curve fairly well defined between 20 and 2,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Staff gage read to hundredths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height, determined by inspection of gage-height graph or by averaging the daily staff gage readings or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good, except during periods of ice effect and estimate, for which they are fair.

*Discharge measurements of Bouquet River at Willsboro, N. Y., during the period July 23, 1923 to Sept. 30, 1924*

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
1923		<i>Feet</i>	<i>Sec.-ft.</i>	1924		<i>Feet</i>	<i>Sec.-ft.</i>
July 23	Harrington and Gordona	2.40	73.7	Jan. 28	J. L. Lamson	b 4.46	121
Aug. 17	J. L. Lamson	2.24	37.4	Feb. 25	E. B. Shupe	b 2.75	102
23	do	2.26	43.0	Apr. 21	Lamson and Harrington	4.19	1,070
31	do	2.35	54.5	June 19	J. L. Lamson	2.63	122
Nov. 18	A. E. Johnson	2.52	90.6	30	do	2.70	147
				Aug. 22	A. W. Harrington	2.38	54.3
				Sept. 21	Johnson and Harrington	2.36	61.7

<sup>a</sup> Engineer, New York & Pennsylvania Co.<sup>b</sup> Stage-discharge relation affected by ice.*Daily discharge, in second-feet, of Bouquet River at Willsboro, N. Y., for the year ending September 30, 1923 and 1924*

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	
1923				1923				1923				
1		51	60	11		40	74	21		40	65	
2		49	56	12		40	65	22		40	119	
3		43	47	13		41	60	23	65	41	100	
4		51	41	14		41	60	24	51	43	72	
5		54	49	15		41	60	25	56	45	65	
6		44	46	16		43	60	26	63	40	61	
7		44	44	17		40	47	27	61	48	58	
8		46	49	18		40	47	28	51	54	54	
9		43	78	19		40	46	29	50	52	58	
10		43	80	20		40	52	30	48	72	61	
								31	47	61		
Date	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1923-24												
1	60	100	1,070	220	150	110	500	2,860	282	126	60	46
2	52	98	600	200	130	100		2,420	264	111	56	58
3	54	95	363	190	130	95		1,240	252	109	58	83
4	60	80	278	180	120	110		2,710	252	109	60	111
5	58	78	260	150	110	160		1,040	2,610	231	90	61
6	52	80	319	140	110	220	2,130	1,340	214	87	63	78
7	56	100	758	130	110	320	1,890	1,030	214	80	85	67
8	54	136	478	120	110	260	1,710	1,030	210	85	76	65
9	51	123	353	120	110	220	1,540	1,120	184	211	80	69
10	54	106	334	170	110	240	1,280	1,340	173	159	72	153
11	54	100	287	460	110	240	1,160	1,160	166	117	69	188
12	61	120	256	2,600	100	200	864	954	159	95	72	139
13	65	117	231	1,000	100	160	786	2,130	166	90	67	133
14	63	109	278	600	100	120	1,400	1,540	180	95	80	111
15	61	103	220	360	100	95	1,790	1,660	166	92	80	95
16	56	95	190	320	100	90	1,080	1,440	145	87	72	95
17	67	95	170	600	100	85	918	999	130	87	63	83
18	63	87	160	550	100	90	1,040	873	126	85	65	80
19	56	83	150	380	100	110	2,100	981	120	83	58	80
20	56	85	220	340	100	130	1,980	708	114	74	60	72
21	58	87	240	240	90	160	1,120	559	117	65	61	56
22	58	87	260	180	90	300	1,550	496	170	63	65	52
23	40	87	220	160	95	360	1,600	444	139	61	72	52
24	135	106	200	140	100	500	1,110	400	117	61	72	61
25	484	111	180	170	100	440	945	553	147	65	69	52
26	239	117	170	140	100	400	828	526	287	83	67	54
27	159	123	150	130	110	339	846	416	210	95	67	60
28	126	130	140	110	110	339	1,220	374	176	74	58	54
29	95	136	130	120	100	405	1,380	422	159	69	56	51
30	92	180	130	120		550	1,440	363	142	67	58	881
31	95		140	180		650		319		61	58	

NOTE.—Discharge estimated from fragmentary automatic record and by comparison with records for near-by stations July 23, 30, Aug. 12, 19, 25-28, Nov. 24-29, Dec. 20-21, 1923, Jan. 3-9, 24-28, Feb. 17-20, Mar. 17-18, 23-26, 29-31, and Apr. 1-9, 1924; water-stage recorder not operating satisfactorily. Discharge Dec. 15 to Mar. 26 determined from gage heights corrected for ice effect by means of two discharge measurements, study of gage-height graph and weather records, and comparison with record for Ausable River at Ausable Forks.

*Monthly discharge of Bouquet River at Willsboro, N. Y., for the years ending September 30, 1923 and 1924*

[Drainage area, 271 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1923					
July 23-31.....	65	47	54.7	0.202	0.07
August.....	72	40	45.5	.168	.19
September.....	119	41	61.1	.225	.25
1923-24					
October.....	484	40	88.2	.325	.37
November.....	180	78	105	.387	.43
December.....	1,070	130	288	1.06	1.22
January.....	2,600	110	339	1.25	1.44
February.....	150	90	107	.395	.43
March.....	650	85	245	.904	1.04
April.....	2,130		1,220	4.50	5.02
May.....	2,860	319	1,130	4.17	4.81
June.....	287	114	180	.664	.74
July.....	211	61	91.5	.338	.39
August.....	85	56	66.5	.245	.28
September.....	881	46	109	.402	.45
The year.....	2,860	40	332	1.23	16.62

**LAKE GEORGE AT ROGERS ROCK, N. Y.**

**LOCATION.**—At Hoopers dock on south side of Stones Bay, Rogers Rock, Essex County.

**RECORDS AVAILABLE.**—July 10, 1913, to September 30, 1924.

**GAGE.**—Vertical staff gage fastened to dock wall at Hoopers dock. This gage was set by water level to same datum as gage previously in use near steamboat landing. Datum 3.15 feet below crest of dam at outlet of lake. Gage read once daily to hundredths by an employee of the International Paper Co. A comparative study of gage heights at the Rogers Rock and Glen Island stations indicates that the datum of the Rogers Rock gage is about 4.9 feet above that of the gage at Glen Island.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 4.90 feet May 5; minimum stage 1.70 feet November 23.

1913-1924: Maximum stage, 5.07 feet April 18, 1922; minimum stage, 1.06 feet December 29, 1922.

**REGULATION.**—Elevation of lake surface is regulated by operation of gates and wheels at dam at outlet of lake at Ticonderoga.

**COOPERATION.**—Gage-height record furnished by Mr. C. S. Colson, hydraulic engineer, International Paper Co.

*Daily gage height, in feet, of Lake George at Rogers Rock, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.38	1.98	2.28	2.60	2.98	2.72	2.62	4.57	3.95	3.51	3.06	2.87
2	2.34	1.96	2.30	2.58	2.96	2.70	2.64	4.65	3.92	3.46	3.01	2.85
3	2.30	1.94	2.38	2.54	2.94	2.70	2.66	4.75	3.90	3.41	3.06	2.80
4	2.20	1.92	2.40	2.54	2.96	2.68	2.68	4.85	3.85	3.38	3.03	2.75
5	2.24	1.92	2.40	2.52	2.98	2.72	2.72	4.90	3.80	3.36	3.06	2.70
6	2.16	1.90	2.44	2.50	3.00	2.70	2.99	4.85	3.82	3.33	3.03	2.72
7	2.14	1.90	2.50	2.50	2.98	2.66	3.28	4.80	3.80	3.31	3.01	2.67
8	2.18	1.94	2.60	2.48	2.96	2.64	3.37	4.70	3.75	3.33	3.01	2.70
9	2.16	1.92	2.64	2.46	2.96	2.62	3.42	4.65	3.70	3.31	2.96	2.80
10	2.14	1.90	2.60	2.46	2.96	2.62	3.42	4.65	3.65	3.26	2.93	2.80
11	2.14	1.90	2.68	2.70	2.98	2.60	3.59	4.70	3.67	3.28	2.88	2.75
12	2.12	1.86	2.70	2.74	2.96	2.60	3.57	4.72	3.65	3.31	2.86	2.70
13	2.12	1.84	2.72	2.76	2.94	2.62	3.62	4.70	3.62	3.33	2.86	2.62
14	2.10	1.82	2.70	2.74	2.92	2.60	3.70	4.67	3.65	3.31	2.83	2.62
15	2.08	1.86	2.68	2.72	2.90	2.58	3.80	4.65	3.60	3.28	2.81	2.65
16	2.06	1.84	2.66	2.72	2.88	2.58	3.87	4.57	3.65	3.26	2.78	2.62
17	2.04	1.82	2.60	3.00	2.86	2.56	3.92	4.50	3.60	3.28	2.83	2.60
18	2.02	1.80	2.68	3.02	2.88	2.54	4.00	4.50	3.62	3.26	2.88	2.57
19	2.00	1.78	2.66	3.04	2.86	2.52	4.20	4.45	3.60	3.26	2.86	2.55
20	1.98	1.76	2.60	3.04	2.86	2.50	4.22	4.40	3.60	3.23	2.86	2.52
21	1.96	1.74	2.58	3.02	2.88	2.48	4.25	4.35	3.57	3.23	2.83	2.50
22	1.96	1.72	2.58	3.00	2.86	2.46	4.40	4.32	3.57	3.21	2.77	2.50
23	1.94	1.70	2.56	2.98	2.86	2.44	4.50	4.30	3.55	3.18	2.75	2.57
24	1.98	1.74	2.54	2.98	2.84	2.46	4.52	4.25	3.50	3.16	2.72	2.52
25	2.02	1.84	2.58	2.96	2.82	2.50	4.55	4.20	3.45	3.13	2.80	2.40
26	2.04	1.90	2.60	2.96	2.80	2.52	4.55	4.17	3.40	3.16	2.80	2.37
27	2.08	1.92	2.56	2.94	2.78	2.54	4.50	4.15	3.47	3.18	2.77	2.40
28	2.06	1.90	2.62	2.94	2.76	2.56	4.50	4.12	3.45	3.16	2.75	2.37
29	2.04	1.92	2.60	2.92	2.74	2.58	4.55	4.10	3.47	3.13	2.82	2.40
30	2.08	1.96	2.54	2.94	2.60	2.60	4.52	4.10	3.53	3.11	2.85	2.52
31	1.98	-----	2.58	2.96	-----	2.62	-----	4.00	-----	3.08	2.87	-----

#### LAKE GEORGE AT GLEN ISLAND, NEAR BOLTON LANDING, N. Y.

**LOCATION.**—100 feet east of dock on northeast side of Glen Island, 2 miles north-east of Bolton Landing, Warren County. Reached by boat from Bolton Landing.

**RECORDS AVAILABLE.**—September 4, 1919, to September 30, 1924.

**GAGE.**—Slope gage, anchored to solid rock ledge, graduated to half-tenths from 6.0 to 10.4 feet. From December 9 to April 14, a temporary vertical staff gage, attached to dock at Bolton Landing, was used. Gage read twice daily to quarter-tenths by Jay Taylor, ranger.

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 9.6 feet from 8 a. m. May 12 to 5 p. m. May 13; minimum stage, 6.65 feet from 8 a. m. November 22 to 5 p. m. November 24.

1919-1924: Maximum stage recorded, 9.88 feet, April 15-18, 1922; minimum stage, 6.02 feet from 5 p. m. December 23 to 5 p. m. December 27, 1922.

**REGULATION.**—Elevation of lake surface is regulated by operations of gates and wheels at dam at outlet of lake at Ticonderoga.

*Daily gage height, in feet, of Lake George at Glen Island, near Bolton Landing, N. Y., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept
1	7.25	6.9	-----	7.65	8.05	7.85	7.7	9.45	8.8	8.35	7.85	-----
2	7.25	6.9	-----	7.65	8.05	7.9	7.75	9.45	8.8	8.35	7.85	-----
3	7.2	6.9	7.45	7.6	8.05	7.85	7.85	9.5	8.75	8.35	7.85	-----
4	7.2	6.9	7.5	7.6	8.05	7.85	8.0	9.5	8.75	8.3	7.85	-----
5	7.2	6.9	7.5	7.6	8.05	7.8	8.1	9.5	8.7	8.3	7.85	-----
6	7.2	6.9	7.5	7.6	8.1	7.8	8.15	9.5	8.7	8.3	7.8	-----
7	7.15	-----	7.55	7.6	8.1	7.75	8.25	9.5	8.65	8.3	7.8	-----
8	7.15	-----	7.55	7.6	8.05	7.75	8.35	9.5	8.65	8.25	7.8	-----
9	7.15	6.85	7.55	7.6	8.05	7.75	8.45	9.5	8.6	8.25	7.8	-----
10	7.1	6.85	7.75	7.6	8.05	7.75	8.5	9.5	8.6	8.25	7.75	-----
11	7.1	6.85	7.75	7.6	8.05	7.7	8.55	9.55	8.55	8.25	7.75	-----
12	7.1	6.85	7.75	7.6	8.05	7.65	8.65	9.6	8.55	8.25	7.7	-----
13	7.05	6.85	7.75	7.6	8.0	7.65	8.7	9.6	8.5	8.3	7.7	-----
14	7.0	6.8	7.75	7.6	8.0	7.65	8.75	9.5	8.5	8.25	7.7	-----
15	7.0	6.8	7.75	7.6	8.0	7.65	8.75	9.5	8.5	8.25	7.65	-----
16	6.95	6.75	7.75	7.9	8.0	7.6	8.75	9.5	8.45	8.25	7.65	-----
17	6.95	6.75	7.75	7.9	8.0	7.6	8.8	9.55	8.45	8.2	7.65	-----
18	6.95	6.75	7.7	7.95	8.0	7.6	9.05	9.5	8.45	8.2	7.65	-----
19	6.9	6.7	7.7	7.95	8.0	7.55	9.05	9.5	8.45	8.2	7.6	-----
20	6.9	6.7	7.7	7.95	8.0	7.55	9.2	9.5	8.45	8.15	7.6	-----
21	6.85	6.7	7.7	8.0	8.0	7.55	9.2	9.45	8.45	8.15	7.6	-----
22	6.85	6.65	7.7	8.05	8.0	7.55	9.4	9.4	8.45	8.1	7.6	-----
23	6.85	6.65	7.65	8.1	8.0	7.6	9.45	9.35	8.4	8.1	7.6	-----
24	6.8	6.65	7.65	8.1	8.0	7.6	9.45	9.3	8.4	8.1	7.6	-----
25	6.8	-----	7.65	8.15	8.0	7.6	9.45	9.2	8.4	8.0	7.6	-----
26	7.0	-----	7.65	8.15	7.95	7.65	9.4	9.1	8.35	8.0	7.55	-----
27	7.0	-----	7.65	8.15	7.95	7.65	9.45	9.0	8.35	8.0	7.55	-----
28	7.0	-----	7.65	8.15	7.9	7.65	9.35	8.9	8.35	7.95	7.55	7.
29	7.0	-----	7.65	8.1	7.85	7.7	9.4	8.9	8.35	7.95	7.5	7.
30	6.95	-----	7.65	8.1	-----	7.7	9.4	8.8	8.35	7.9	7.5	7.
31	6.95	-----	7.65	8.05	-----	7.7	-----	8.8	-----	7.9	-----	-----

NOTE.—No gage-height record Nov. 7-8, Nov. 25 to Dec. 2, and Aug. 31 to Sept. 27. Readings from Dec. 9 to 14 made on temporary staff gage at Bolton Landing and reduced to datum of Glen Island gage.

#### GREEN RIVER AT GARFIELD, VT.

**LOCATION.**—At site of old dam above highway bridge at Garfield, town of Hyde Park, Lamoille County. Green River enters Lamoille River 4 miles east of Morrisville.

**DRAINAGE AREA.**—20 square miles (approximate).

**RECORDS AVAILABLE.**—January 23, 1915, to March 16, 1921, and December 3 1922, to September 30, 1924.

**GAGE.**—Inclined staff on left bank in pool back of weir; read by P. M. Trescott

**DISCHARGE MEASUREMENTS.**—Standard sharp-crested weir of compound section length of crest at gage height 0.00 is 9.0 feet; at gage height, 0.83 foot length of crest is increased 11.17 feet. Current-meter measurements made at footbridge about half a mile downstream from weir, and at old bridge about half a mile above weir.

**CHANNEL AND CONTROL.**—A pool of considerable size is formed in the old mill pond back of the weir; at ordinary stages velocity of approach to weir is very small. Some water leaks around weir in the old tailrace on left bank

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 3.34 feet at 5 p. m. May 1 (discharge, 397 second-feet); minimum stage, 0.23 foot at 9 a. m. and 5 p. m. October 23 (discharge, 3.7 second-feet).

1915-1921; 1922-1924: Maximum discharge (determined from high-water marks and extension of rating curve) 710 second-feet on April 12, 1919 minimum discharge, 2.2 second-feet August 11 and 12, 1923.

**ICE.**—Weir kept clear of ice during winter; stage-discharge relation not affected by ice.

**REGULATION.**—An old timber dam about 2 miles upstream affects flow to some extent. The dam leaks by an amount somewhat greater than the low-water flow. During prolonged low stages the surface of water in pond (103 acres) falls below crest of dam; subsequent increased flow into pond is retained until water again flows over crest, when the increased flow is apparent at gaging station.

**ACCURACY.**—Rating curve based on weir formula,  $Q = 3.33 LH^{3/2}$ , with correction determined from current-meter measurements, and with logarithmic extension above gage height 3.5 feet. Gage read twice daily to hundredths. Daily discharge ascertained by applying rating table to mean daily gage heights. Records are good below 130 second-feet; at the higher stages the weir is flooded and the results are somewhat uncertain.

*Discharge measurements of Green River at Garfield, Vt., during the year ending September 30, 1924*

Date	Made by—	Gage ht	Dis- charge	Date	Made by—	Gage height	Dis- charge
Oct. 9 <sup>a</sup>	H. F. Hill, jr.	Feet. 0.26	Sec.-ft. 6.0	June 27 <sup>b</sup>	C. H. Pierce	Feet. 0.36	Sec.-ft. 8.6
9 <sup>b</sup>	do	.26	6.24	27 <sup>a</sup>	do	.43	8.0

<sup>a</sup> Made at old bridge about half a mile above gage.

<sup>b</sup> Made at section about half mile below gage, just above Taylors Brook.

*Daily discharge, in second-feet, of Green River at Garfield, Vt., for the year ending September 30, 1924*

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.9	29	222	17	18	7.7	24	322	13	6.8	12	7.7
2	7.7	21	132	16	16	7.7	31	322	12	9.2	9.2	17
3	6.0	17	74	14	16	8.3	21	140	12	8.6	7.7	36
4	5.4	13	55	14	15	8.9	24	104	12	7.4	7.4	29
5	5.4	12	44	14	14	10	39	161	11	6.3	46	29
6	6.6	12	56	13	14	10	62	116	11	5.7	43	57
7	7.1	22	93	13	13	11	85	79	9.8	4.8	32	52
8	6.0	41	90	13	12	11	81	66	8.9	32	76	29
9	5.4	31	57	12	12	11	84	52	7.7	69	51	25
10	5.0	24	52	13	11	12	94	53	7.7	36	27	186
11	4.6	20	42	38	11	12	116	61	7.4	25	15	237
12	4.2	17	36	104	10	12	106	57	7.1	14	13	85
13	4.2	16	34	126	9.5	11	93	59	7.1	12	11	48
14	4.2	14	55	81	9.2	11	190	54	8.6	11	11	37
15	5.0	13	41	55	8.9	11	226	135	8.0	9.2	9.8	29
16	5.7	12	29	45	8.9	10	125	132	7.1	8.3	8.0	23
17	5.4	11	21	55	8.9	10	125	72	6.6	10	7.4	15
18	5.0	12	26	50	8.9	10	165	52	7.7	45	6.6	14
19	5.0	12	23	48	8.6	10	268	61	8.0	39	5.7	12
20	4.6	12	21	39	8.3	10	247	47	7.1	19	6.3	11
21	4.2	12	27	29	8.6	10	199	37	11	12	11	9.8
22	4.0	12	47	23	8.6	11	201	32	14	9.2	11	8.6
23	3.7	12	57	20	8.3	14	158	29	12	7.7	9.2	11
24	91	22	51	19	8.3	18	149	27	10	7.1	7.4	11
25	213	69	42	18	8.0	15	115	26	14	16	6.0	10
26	104	55	38	16	8.0	19	111	23	10	47	5.2	8.9
27	61	45	30	14	8.0	21	179	20	8.9	23	5.0	8.0
28	37	44	24	13	8.0	23	233	19	8.6	15	8.6	7.4
29	25	38	21	14	8.0	23	209	17	7.4	11	7.4	7.4
30	18	74	18	14	14	29	180	15	7.1	9.8	6.0	18
31	28	-----	16	16	-----	34	-----	14	-----	11	5.2	-----

*Monthly discharge of Green River at Garfield, Vt., for the year ending September 30, 1924*

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October.....	213	3.7	22.6	May.....	322	14	77.5
November.....	74	11	24.8	June.....	14	6.6	9.4
December.....	222	16	50.8	July.....	69	4.8	17.6
January.....	126	12	31.5	August.....	76	5.0	15.7
February.....	18	8.0	10.6	September.....	237	7.4	36.1
March.....	34	7.7	13.6	The year.....	322	3.7	36.8
April.....	268	21	131				

**CLYDE RIVER AT WEST DERBY (NEWPORT), VT.**

**LOCATION.**—Just below plant of Newport Electric Light Co. at West Derby (Newport), Orleans County, 1 mile above mouth of river.

**DRAINAGE AREA.**—150 square miles.

**RECORDS AVAILABLE.**—May 25, 1909, to September 30, 1919, and May 24, 1920, to September 30, 1924,

**GAGES.**—Water-stage recorder on right bank; referenced to gage datum by a hook gage inside well; chain gage fastened to tree is used for auxiliary readings. Recorder inspected by F. R. Sherwell.

**DISCHARGE MEASUREMENTS.**—Made by wading near gage or from highway bridge half a mile downstream.

**CHANNEL AND CONTROL.**—Stream bed rough and irregular; covered with boulders and ledge rock; fall of river rapid for some distance below gage.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 4.10 feet at 11.30 p. m. May 3 (discharge, from extension of rating curve, 1,750 second-feet); minimum discharge, 28 second-feet at 10 a. m. June 17 (water held back by dams).

1909–1924: High water of March 25–30, 1913, reached maximum stage of 5.8 feet, as determined from high-water marks (discharge, about 6,300 second-feet); minimum discharge practically zero at various times when water was held back by dams.

**ICE.**—River usually remains open at control; stage-discharge relation seldom affected.

**REGULATION.**—Flow at ordinary stages fully controlled by two dams at West Derby; distribution of flow affected also by several dams above West Derby. Seymour Lake and several small ponds in the basin afford a large amount of natural storage, but at the present time there is little if any artificial regulation at these ponds.

**ACCURACY.**—Stage-discharge relation subject to occasional changes; individual current-meter measurements occasionally plot erratically, probably because of rough measuring section. Rating curve fairly well defined. Operation of water-stage recorder satisfactory except for periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying rating table to mean daily gage heights. Records good when water-stage recorder was in operation.

## Discharge measurements of Clyde River at West Derby (Newport), Vt., during the year ending September 30, 1924

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

Date	Gage height	Discharge
Oct. 10.....	Feet 2.21	Sec.-ft. 99
July 29.....	2.38	177

## Daily discharge, in second-feet, of Clyde River at West Derby (Newport), Vt., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	125	269	460	151	222	129	286	1,100	151	109	129	169
2.....	117	264	515	160	197	117	328	1,440	340	113	109	192
3.....	109	243	498	155	192	142	328	1,710	340	121	97	212
4.....	105	173	548	155	173	117	328	1,650	334	117	105	212
5.....	113	243	515	151	173	137	316	1,490	222	105	142	207
6.....												
7.....	117	207	490	155	178	146	353	1,430	212	97	187	222
8.....	62	227	467	151	173	155	380	1,360	151	89	264	334
9.....	73	334	422	178	178	164	574	1,190	97	117	298	323
10.....	93	374	452	202	217	169	574	1,060	60	97	298	353
11.....	105	328	387	217	212	164	584	970	58	101	259	641
12.....	89	328	374	298	173	173	593	940	66	85	232	1,080
13.....	89	238	340	353	187	169	631	900	56	76	217	1,510
14.....	101	268	334	437	182	160	680	890	52	133	202	1,490
15.....	89	334	264	437	187	151	690	850	64	66	182	1,320
16.....	125	268	259	452	160	155	730	780	73	73	160	1,090
17.....	117	227	292	430	137	146	750	720	62	85	137	860
18.....	117	151	254	460	133	129	740	631	40	93	125	690
19.....	125	146	222	437	155	137	730	650	73	97	113	660
20.....	142	133	202	407	133	142	880	574	70	109	101	593
21.....	164	133	207	445	137	142	980	584	105	133	101	548
22.....	56	146	207	380	137	137	1,000	565	109	155	97	407
23.....	97	125	227	340	142	151	1,050	452	105	173	93	387
24.....	79	113	275	298	109	308	1,090	507	101	182	82	340
25.....	121	133	286	280	76	300	1,080	557	93	169	68	304
26.....	192	109	322	264	117	165	1,040	565	109	192	82	275
27.....	227	269	286	243	117	125	960	474	93	192	82	243
28.....	316	353	275	259	125	217	920	202	82	182	97	254
29.....	360	430	269	367	117	316	850	222	82	187	105	254
30.....	353	467	227	322	117	340	870	243	93	187	125	259
31.....	322	467	212	269	-----	328	940	269	97	173	142	264
	304	-----	164	222	-----	316	-----	222	-----	142	151	-----

NOTE.—Water-stage recorder not in operation Sept. 17-30; discharge for this period based on one gage reading daily.



*Monthly discharge of Clyde River at West Derby (Newport), Vt., for the year ending September 30, 1924*

[Drainage area, 150 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	360	56	149	0.993	1.14
November.....	467	109	252	1.68	1.87
December.....	548	164	331	2.21	2.55
January.....	460	151	293	1.95	2.25
February.....	222	76	157	1.05	1.13
March.....	340	117	182	1.21	1.40
April.....	1,090	286	70.9	4.73	5.28
May.....	1,710	202	813	5.42	6.25
June.....	340	40	120	.800	.89
July.....	192	66	127	.847	.98
August.....	298	68	148	.987	1.14
September.....	1,510	169	523	3.49	3.89
The year.....	1,710	40	317	2.11	28.77

### MISCELLANEOUS DISCHARGE MEASUREMENTS

In addition to the records of flow obtained at the gaging stations and reported in the preceding pages, measurements were made at other points, as shown by the following table:

*Miscellaneous discharge measurements in the St. Lawrence River drainage basin during the year ending September 30, 1924*

Date	Stream	Tributary to—	Locality	Discharge
Oct. 5	Maumee River	Lake Erie.....	Independence Dam 4 miles northeast of Defiance, Ohio.	Sec.-ft. 167
Mar. 18	do	do	do	5,050
Apr. 3	do	do	do	22,190
May 2	do	do	do	3,090
June 10	do	do	do	26,000
July 14	do	do	do	2,210
Oct. 4	Miami & Erie Canal.	Maumee River	do	145
Jan. 22	do	do	do	114
Mar. 17	do	do	do	182
Apr. 3	do	do	do	212
May 2	do	do	do	203
June 10	do	do	do	174
July 14	do	do	do	243
Sept. 10	do	do	do	77
May 9	Honey Creek	Sandusky River	Caroline, 1 mile southwest of Attica, Seneca County, Ohio.	465

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