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DEPARTMENT OF THE INTERIOR

HUBERT WORK, Secretary

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 544

SURFACE WATER SUPPLY OF THE
UNITED STATES

1922

PART IV. ST. LAWRENCE RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer

S. B. SOULÉ, A. H. HORTON, LASLEY LEE, C. C. COVERT, A. W. HARRINGTON
and C. H. PIERCE, District Engineers

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



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**Water Resources Branch,
Geological Survey,
Box 3106, Capitol Station
Oklahoma City, Okla.**



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SURFACE WATER SUPPLY OF ST. LAWRENCE RIVER BASIN, 1922

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, 1922.

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

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

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

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

Annual appropriations for the fiscal years ending June 30, 1895-1923

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

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 5,480 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1922, 1,540 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-feet, gallons per minute, miners’ inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

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

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

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

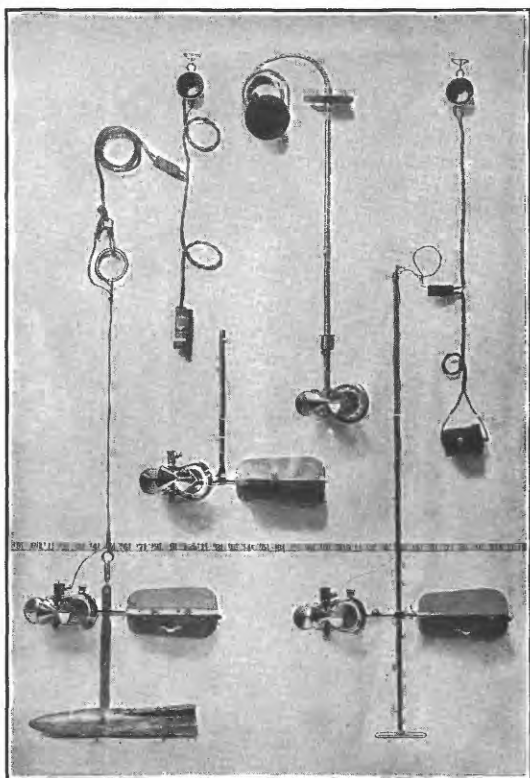
An “acre-foot,” equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

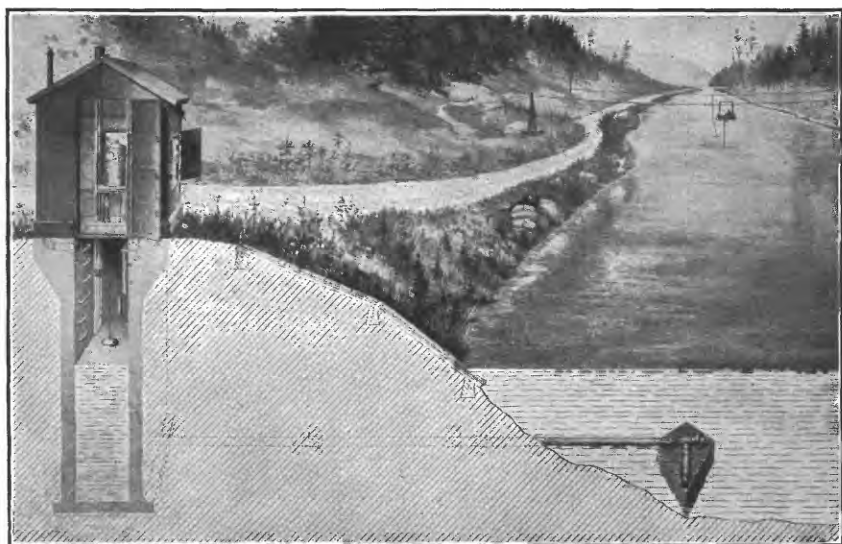
“Stage-discharge relation,” an abbreviation for the term “relation of gage height to discharge.”

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

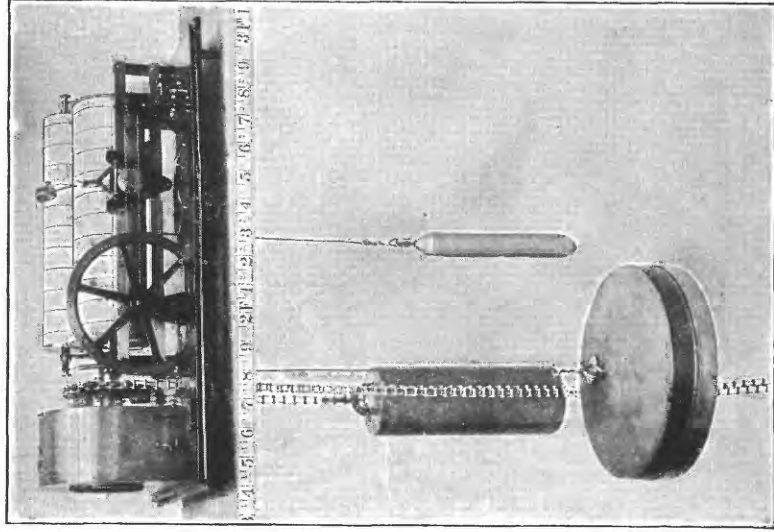
The “point of zero flow” for a gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.



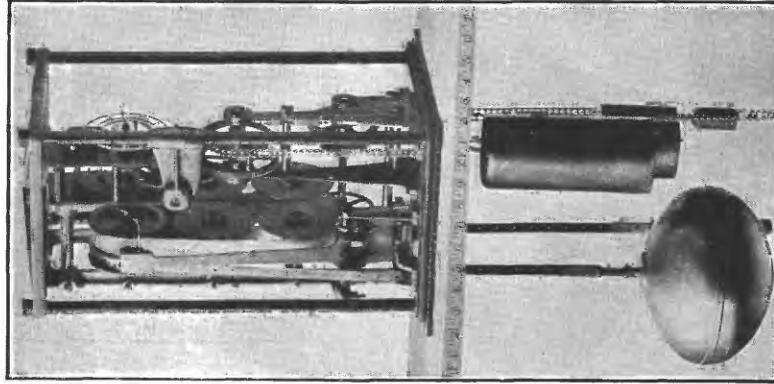
A. PRICE CURRENT METERS.



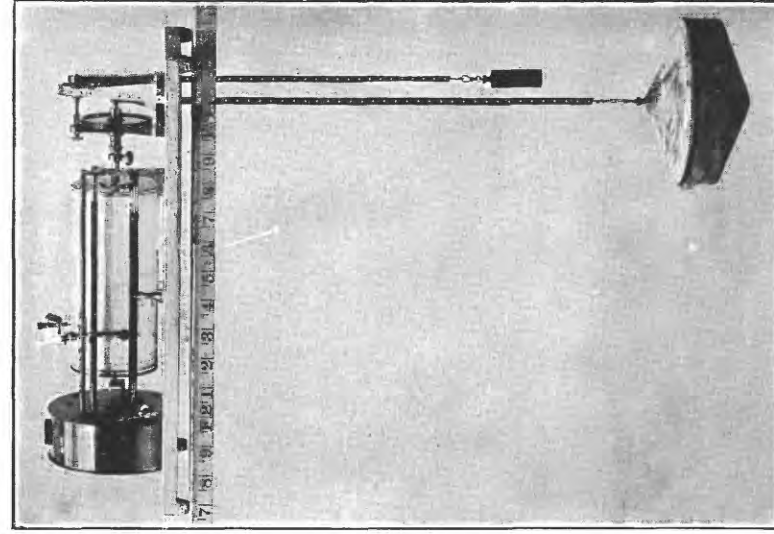
B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.
WATER-STAGE RECORDERS.



C. FRIEZ.

EXPLANATION OF DATA

The data presented in this report cover the year beginning October 1, 1921, and ending September 30, 1922. 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 water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

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

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

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

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

The table of daily discharge, gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuations the discharge obtained from the rating table and the

mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging discharge at regular intervals during the day or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

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

ACCURACY OF FIELD DATA AND COMPUTED RESULTS

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

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

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

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures

representing "second-feet per square mile" and "run-off in inches" published in the earlier reports by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

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

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

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.

II. South Atlantic slope and eastern Gulf of Mexico basins.

III. Ohio River basin.

IV. St. Lawrence River basin.

V. Upper Mississippi River and Hudson Bay basins.

VI. Missouri River basin.

VII. Lower Mississippi River basin.

VIII. Western Gulf of Mexico basins.

IX. Colorado River basin.

X. Great Basin.

XI. Pacific slope basins in California.

XII. North Pacific slope basins, in three 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 obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

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

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

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

Boston, Mass., 2500 Customhouse.

Albany, N. Y., 704 Journal Building.

Trenton, N. J., State House.

Asheville, N. C., 316 Jackson Building.

Chattanooga, Tenn., 37 Municipal Building.

Columbus, Ohio, Brown Hall, Ohio State University.

Chicago, Ill., 1404 Kimball 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., 52 Montana National Bank Building.

Denver, Colo., 403 Post Office Building.

Salt Lake City, Utah, 313 Federal Building.

Idaho Falls, Idaho, 228 Federal Building.

Boise, Idaho, 615 Idaho Building.

Tacoma, Wash., 406 Federal Building.

Portland, Oreg., 606 Post Office Building.

San Francisco, Calif., 328 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 5,480 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 55, 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.

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

Numbers of water-supply papers containing results of stream measurements, 1899-1922

Year	I North Atlantic basins (St. John River to York River)	II South Atlantic and western Gulf of Mexico (James River to the Missis- sippi)	III Ohio River basin	IV St. Lawrence River and Great Lakes basins	V Hudson Bay and upper Missis- sippi River basins	VI Missouri River basin	VII Lower Missis- sippi River basin	VIII Western Gulf of Mexico basins	IX Colorado River basin	X Great Basin	XI Pacific slope basins in Califor- nia	XII North Pacific slope basins		
1899 ^a	35	35, 36	36	36	36	36, 37	37	37	37, 38	38, * 39	38, * 39	Pacific slope basins in Washing- ton and upper Columbia River	Snake River basin	Lower Columbia River and Pacific slope basins in Oregon
1900 ^a	47, * 48	48	48, * 49	49	49	49, * 50	50	50	50	51	51	38	38	38
1901.....	65, 75	65, 75	65, 75	65, 75	65, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	51	51	51
1902.....	82	82	82, 83	82, 83	82, 83	83, 84	83, 84	83, 84	83, 84	85	85	66, 75	66, 75	66, 75
1903.....	97	97, 98	98	98	98	99	99	99	100	100	100	85	85	85
1904.....	* 124, * 125,	* 126, 127	128	129	* 98, 99, * 100	130, * 131	* 128, 131	132	133	133, * 134	134	100	100	100
1905.....	* 165, * 166,	* 167, 168	169	170	171	172	* 169, 173	174	175, * 177	176, * 177	177	178	178	* 177, 178
1906.....	* 201, * 202,	* 203, 204	205	206	207	208	* 205, 209	210	211	212, * 213	213	214	214	214
1907-S.....	241	242	243	244	245	246	247	248	249	250, * 251	251	252	252	252
1909.....	261	262	263	264	265	266	267	268	269	270, * 271	271	272	272	272
1910.....	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911.....	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912.....	321	322	323	324	325	326	327	328	329	330	331	332-A	332-B	332-C
1913.....	351	352	353	354	355	* 356	357	358	359	360	361	362-A	362-B	362-C
1914.....	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915.....	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916.....	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917.....	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918.....	471	472	473	474	475	476	477	478	479	480	481	482	483	484
1919-20.....	501	502	503	504	505	506	507	508	509	510	511	512	513	514
1921.....	521	522	523	524	525	526	527	528	529	530	531	532	533	534
1922.....	541	542	543	544	545	546	547	548	549	550	551	552	553	554

^a Rating tables and index to Water-Supply Papers 35-39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.

^b James River only.

^c Gallatin River.

^d Green and Gunnison rivers and Grand River above junction with Gunnison.

^e Mohave River only.

^f Kings and Kern rivers and south Pacific slope basins.

^g Rating tables and index to Water-Supply Papers 47-52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.

^h Wissahickon and Schuylkill rivers to James River.

ⁱ Scioto River.

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

^k Tributaries of Mississippi from east.

^l Lake Ontario and tributaries to St. Lawrence River proper.

^m Hudson Bay only.

ⁿ New England rivers only.

^o Hudson River to Delaware River, inclusive.

^p Susquehanna River to Yadkin River, inclusive.

^q Platte and Kansas rivers.

^r Great Basin in California, except Truckee and Carson river basins.

^s Below junction with Gila.

^t Rogue, Umpqua, and Siletz rivers only.

COOPERATION

The work in Wisconsin during the year ending September 30, 1922, 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.

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

The gage reader for Huron River at Flat Rock, Mich., was paid by Gardner S. Williams, consulting engineer.

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

Work in New York was done in cooperation with the State of New York, Frank M. Williams, State engineer and surveyor, and at certain stations in cooperation with the following organizations: Rochester Gas & Electric Corporation (Genesee River at Driving Park Avenue, near Rochester); the city of Rochester (Conesus Creek near Lakeville); Black River Regulating District (Black River at Watertown and Moose River at McKeever); Beaver River Power Corporation (Beaver River at Eagle Falls, near Number Four); International Paper Co. (Raquette River at Piercefield); Plattsburg Gas & Electric Co. (Saranac River near Plattsburg).

The work in Vermont has been carried on in cooperation with the State, the cooperating official being George A. Reed, State engineer. The following organizations and individuals cooperated in maintaining one or more gaging stations: Montpelier & Barre Light & Power Co. (Mollys Brook near Marshfield and Jail Brook at East Barre); and Newport Electric Light Co. (Clyde River at West Derby).

DIVISION OF WORK

Data for stations in the Lake Superior and Lake Michigan drainage basins in Wisconsin were collected and prepared for publication under the direction of S. B. Soulé, district engineer, assisted by Arthur O. Olson, Edgar E. Foster, and S. R. Collins.

Data for the station on Little Calumet River at Harvey, Ill., were collected and prepared for publication by H. E. Grosbach, district engineer; for Huron River at Flat Rock, Mich., by A. H. Horton, district engineer.

Data 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 and V. B. Lamoureux.

Data for stations in the St. Lawrence drainage basin in New York were collected and prepared for publication under the direction of C. C. Covert, district engineer until August 1, 1922, and A. W. Harrington, district engineer after that date, assisted by E. B. Shupe. B. F. Howe, H. I. Granger, J. L. Lamson, 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 J. S. S. Jones, J. L. Lamson, W. E. Armstrong, H. I. Granger, and L. H. McCarthy.

The manuscript was assembled and reviewed by B. J. Peterson.

GAGING-STATION RECORDS

STREAMS TRIBUTARY TO LAKE SUPERIOR

BAD RIVER NEAR ODANAH, WIS.

LOCATION.—In sec. 25, T. 47 N., R. 3 W., 8 miles upstream from Odanah, Ashland County, 12 miles above mouth. Potato River enters from right 8 miles above station.

DRAINAGE AREA.—607 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—July 31, 1914, to November 11, 1922, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder, installed March 31, 1915, over a wooden well, just above the first falls in the river above the mouth; a Gurley water-stage recorder at the same site was used July 31, 1914, to March 31, 1915.

DISCHARGE MEASUREMENTS.—Made from a cable or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Rock outcrop at the beginning of rapids about 200 feet below gage forms a permanent control. Right bank high, not subject to overflow; left bank of medium height and may be overflowed during extremely high water.

EXTREMES OF DISCHARGE.—Both maximum and minimum stages for the year probably occurred when no gage heights were available. A minimum mean daily discharge was estimated at 95 second-feet January 25-31.

1914-1922: Maximum stage recorded, 6.66 feet at 1 a. m. April 22, 1916 (discharge, 12,200 second-feet); minimum stage, 0.82 foot during afternoon of August 27, 1918 (discharge, 88 second-feet).

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent, except when affected by ice.

Rating curve well defined through range of stage occurring during year. Operation of water-stage recorder satisfactory about 58 per cent of the year. Daily discharge ascertained by applying to rating table mean daily gage height as taken from the recording gage chart by inspection. Open-water records, when water-stage recorder was working satisfactorily, good; for the remainder of the year roughly approximate.

Discharge measurements of Bad River near Odanah, Wis., during the period Oct. 1, 1921 to Nov. 11, 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
1921		<i>Feet</i>	<i>Sec.-ft.</i>	1922		<i>Feet</i>	<i>Sec.-ft.</i>
Dec. 21	S. B. Soulé.....	* 1.30	128	Aug. 23	E. E. Foster.....	0.93	124
1922				Oct. 23	S. B. Soulé.....	.91	133
Jan. 31	S. R. Collins.....	* 1.72	97.1				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Bad River near Odanah, Wis., for the period Oct. 1, 1921, to Nov. 11, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921-22												
1.....	219		210	115					269	148	209	134
2.....	198		264	115					241	172	214	198
3.....	198		264	110					214	172	203	203
4.....	193		264	110					219	167	177	203
5.....	193		264	110				1,670	214	162	148	198
6.....	193		264	110					177	209	167	198
7.....	188	175	253	110					167	368	162	193
8.....	177		253	110	155				162	348	162	193
9.....	183		253	110					164	329	158	236
10.....	188		253	110				1,140	167	394	153	275
11.....	190		247	110				1,100	188	414	153	342
12.....	190		247	110				810	188	329	148	348
13.....	190		247	110				676	188	281	144	342
14.....	190		247	110				676	188	676	139	329
15.....	190	158	247	110		375	2,050	542	203	167	134	317
16.....	193	158	247	110				486	463	139	129	287
17.....	193	158	245	105				486	622	134	129	269
18.....	193	158	195	105				486	645	129	129	253
19.....	193	158	160	105				568	668	125	139	236
20.....	193		135	105				676	692	120	139	230
21.....	193		150	100				676	716	108	139	219
22.....	198		130	100	215			463	740	129	134	214
23.....	209		125	100				414	526	225	134	198
24.....	209		120	100				394	442	198	129	198
25.....	209	210	120	95				348	394	188	129	177
26.....	209		120	95				287	329	167	129	203
27.....	209		120	95				287	241	148	129	162
28.....	209		120	95				214	209	129	129	158
29.....	198		115	95				225	104	112	129	148
30.....	193		115	95				209	125	112	129	139
31.....	193		115	95				230		120	129	

Day	Oct.	Nov.	Day	Oct.	Nov.	Day	Oct.	Nov.
1922			1922			1922		
1.....	139	139	11.....	116	214	21.....	129	
2.....	139	139	12.....	112		22.....	125	
3.....	134	139	13.....	108		23.....	125	
4.....	129	144	14.....	108		24.....	125	
5.....	129	148	15.....	108		25.....	129	
6.....	125	153	16.....	112		26.....	134	
7.....	120	162	17.....	120		27.....	139	
8.....	120	177	18.....	125		28.....	139	
9.....	120	193	19.....	129		29.....	139	
10.....	116	209	20.....	129		30.....	139	
						31.....	139	

NOTE.—Stage-discharge relation affected by ice Dec. 17 to early in April. Recording gage not in operation Oct. 11-15, Nov. 1-14, Nov. 20 to Dec. 1, Dec. 25 to Jan. 9, Jan. 22 to May 9, and June 17-21; discharge based on records of flow in adjacent drainage basin. Braced figures show mean discharge for period indicated.

Monthly discharge of Bad River near Odanah, Wis., for the period Oct. 1, 1921, to Nov. 11, 1922

[Drainage area, 607 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1921-22					
October.....	219	177	196	0.323	0.37
November.....			185	.305	.34
December.....	264	115	197	.325	.37
January.....		95	105	.173	.20
February.....			183	.301	.31
March.....			375	.618	.71
April.....			2,050	3.38	3.77
May.....		209	853	1.40	1.61
June.....	740	104	329	.542	.60
July.....	676	108	214	.353	.41
August.....	214	129	148	.244	.28
September.....	348	134	227	.374	.42
The year.....			421	.694	9.39
1922					
October.....	139	108	126	.208	.24
November 1-11.....	214	139	165	.272	.11

MONTREAL RIVER AT IRONWOOD, MICH.

LOCATION.—At main highway bridge on State line between Hurley, Wis., and Ironwood, Mich., 8 miles upstream from junction with West Branch.

DRAINAGE AREA.—About 73 square miles (measured on Hixon's County Atlas; scale, 1 inch=2 miles).

RECORDS AVAILABLE.—April 24, 1918, to June 6, 1922, when station was discontinued.

GAGE.—Chain gage fastened to downstream side of main highway bridge; read by W. A. Markert.

DISCHARGE MEASUREMENTS.—Made from wooden bridge at lumber mill, one-fourth mile above gage, or by wading.

CHANNEL AND CONTROL.—Bed at and downstream from gage heavy gravel. Concrete retaining walls on both sides of river below gage prevent overflow at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period October 1, 1921, to June 6, 1922, 3.65 feet 1.30 p. m., April 10 and 11 (discharge, 835 second-feet); minimum stage, 0.91 foot at noon December 6 (discharge, 5.8 second-feet).

1918-1922: Maximum stage recorded, 3.8 feet June 30, 1920, and April 5-7, 1921 (discharge, 910 second-feet); minimum stage, 0.67 foot October 4, 1920 (discharge, 2.3 second-feet).

REGULATION.—Water stored in Pine Lake in secs. 28, 29, 32, and 33, T. 44 N., R. 3 E., is used to increase the water supply for Ironwood and Hurley during periods of low flow; effect of this regulation on the flow at the station probably slight. Considerable diurnal fluctuation seems to be caused at the station owing to operation of gates in a small dam located one-fourth mile upstream from gage. Dam is used to float logs to sawmill.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined from 4 to 610 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records fair.

Discharge measurements of Montreal River at Ironwood, Mich., during 1922

Date	Made by—	Gage height	Dis-charge
Aug. 22	E. E. Foster.....	Feet 0.98	Sec.-ft. • 10.9
Oct. 21	S. B. Soulé.....	1.08	10.1

* Measurement made at poor section.

Daily discharge, in second-feet, of Montreal River at Ironwood, Mich., for the period Oct. 1, 1921, to June 6, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1.....	23	15	12	• 10	-----	-----	140	365	38
2.....	• 16	14	12	10	-----	-----	• 139	345	35
3.....	10	16	27	10	-----	-----	122	345	27
4.....	12	16	• 20	16	-----	-----	115	325	• 18
5.....	10	16	12	-----	-----	-----	248	325	8.9
6.....	10	• 17	5.8	-----	-----	-----	560	230	14
7.....	10	18	8.9	-----	-----	-----	610	• 220	-----
8.....	11	9.8	11	-----	-----	-----	610	209	-----
9.....	• 10	9.2	8.0	-----	-----	-----	• 710	202	-----
10.....	10	9.2	12	-----	-----	-----	810	188	-----
11.....	16	9.8	• 12	-----	-----	-----	810	140	-----
12.....	16	10	12	-----	-----	-----	610	96	-----
13.....	21	• 9.9	12	-----	-----	-----	660	86	-----
14.....	17	9.8	12	-----	-----	67	492	• 64	-----
15.....	16	11	12	-----	-----	77	405	41	-----
16.....	• 16	11	12	-----	-----	81	• 532	39	-----
17.....	16	10	14	-----	-----	85	660	45	-----
18.....	23	11	• 14	-----	-----	85	660	77	-----
19.....	23	11	14	-----	-----	• 74	560	96	-----
20.....	22	• 13	14	-----	-----	63	230	100	-----
21.....	23	15	14	-----	-----	60	365	• 84	-----
22.....	33	17	10	-----	-----	52	269	67	-----
23.....	• 28	18	11	-----	-----	52	• 370	33	-----
24.....	23	17	11	-----	-----	62	470	31	-----
25.....	45	12	• 12	-----	-----	77	515	9.8	-----
26.....	23	11	12	-----	-----	• 111	515	11	-----
27.....	16	• 11	12	-----	-----	145	425	14	-----
28.....	16	11	11	-----	-----	168	273	• 12	-----
29.....	15	11	10	-----	-----	155	265	11	-----
30.....	• 15	11	10	-----	-----	145	• 315	33	-----
31.....	15	-----	11	-----	-----	126	-----	44	-----

* Interpolated.

* NOTE.—No record Jan. 5 to Mar. 13.

Monthly discharge of Montreal River at Ironwood, Mich., for the period Oct. 1, 1921; to June 6, 1922

[Drainage area, 73 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	45	10	18.1	0.248	0.29
November.....	18	9.2	12.7	.174	.19
December.....	27	5.8	12.3	.168	.19
January 1-4.....	16	10	11.5	.158	.02
March 14-31.....	168	52	93.6	1.28	.86
April.....	810	115	449	6.15	6.86
May.....	365	9.8	125	1.71	1.97
June 1-6.....	38	8.9	23.5	.322	.07

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 the mouth.

DRAINAGE AREA.—About 70 square miles (measured from Hixon's County Atlas; scale, 1 inch=2 miles).

RECORDS AVAILABLE.—April 26, 1918, to September 30, 1922.

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 Lang.

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, 6.80 feet April 10 (discharge, 1,200 second-feet); minimum stage, 1.50 feet August 15-17 (discharge, 4.0 second-feet).

1918-1922: Maximum stage recorded, that of April 10, 1922; 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 well defined below 710 second-feet. Gage read to quarter tenths once daily. Daily discharge ascertained by applying gage height to rating table. On dates when gage was not read (generally only Sundays) discharge was interpolated. Records good.

Discharge measurements of West Branch of Montreal River at Gile, Wis., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Discharge
Feb. 1	S. R. Collins	Feet	Sec.-ft.
Aug. 22	E. E. Foster	• 1.79	19.8
		1.63	5.7

* Incomplete ice cover; stage-discharge relation probably not affected by ice.

Daily discharge, in second-feet, of West Branch of Montreal River at Gile, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9.4	14	12	12	11	14	158	385	58	24	36	9.4
2	9.4	14	14	11	11	14	158	385	48	22	32	9.4
3	9.4	14	14	11	11	14	158	385	38	21	24	8.3
4	12	12	14	12	11	14	158	385	33	19	21	7.3
5	14	15	14	12	12	14	214	385	28	17	17	6.3
6	12	14	14	14	12	15	290	385	24	14	16	7.2
7	9.4	14	15	14	12	15	385	338	21	17	15	11
8	11	14	14	13	12	15	530	290	18	21	14	18
9	11	12	14	12	14	15	860	270	18	24	12	40
10	11	11	14	12	12	17	1,200	250	20	26	9.4	42
11	15	11	13	12	12	18	990	214	20	28	7.2	45
12	21	9.4	12	12	12	26	710	184	21	24	6.3	34
13	26	10	12	12	12	34	530	158	20	23	5.8	28
14	30	11	14	12	12	50	415	129	18	21	5.4	24
15	26	11	17	12	12	69	360	100	18	18	4.0	21
16	24	12	17	12	12	87	445	87	125	18	4.0	20
17	21	14	17	12	12	87	539	79	184	18	4.0	19
18	20	14	18	12	12	83	450	96	157	17	5.4	18
19	21	12	18	12	12	76	385	110	130	15	7.2	20
20	24	12	17	12	12	69	335	120	125	14	7.2	21
21	28	11	18	12	12	69	310	101	130	14	7.2	20
22	24	11	17	12	14	72	290	83	115	23	5.4	17
23	24	12	15	11	15	76	312	63	100	26	5.4	14
24	23	12	15	11	15	87	335	55	78	28	4.7	12
25	20	12	14	11	15	105	360	48	57	24	7.2	11
26	18	12	14	11	14	120	385	40	36	21	7.2	9.4
27	15	12	12	11	14	135	415	34	30	15	6.3	8.3
28	17	11	12	9.4	14	146	385	30	28	12	5.4	7.2
29	18	12	12	9.4	-----	158	360	26	24	9.4	5.4	6.3
30	16	12	12	9.4	-----	158	372	38	23	18	4.7	6.8
31	15	-----	12	9.4	-----	158	-----	50	-----	26	4.7	-----

NOTE.—Stage-discharge relation not seriously affected by ice. Gage not read on Sundays; discharge interpolated.

Monthly discharge of West Branch of Montreal River at Gile, Wis., for the year ending Sept. 30, 1922

[Drainage area, 70 square miles]

Month	Discharge in second-feet				Run-off in inches.
	Maximum	Minimum	Mean	Per square mile	
October	30	9.4	17.9	0.256	0.30
November	15	9.4	12.2	.174	.19
December	18	12	14.4	.206	.24
January	14	9.4	11.6	.166	.19
February	15	11	12.5	.179	.19
March	158	14	65.5	.936	1.08
April	1,200	158	426	6.09	6.80
May	385	26	171	2.44	2.81
June	184	18	58.2	.831	.93
July	28	9.4	19.9	.284	.33
August	36	4.0	10.2	.146	.17
September	45	6.3	17.3	.247	.28
The year	1,200	4.0	69.6	9.94	13.51

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 the Peninsular Power Co., $3\frac{1}{2}$ miles north of city of Iron Mountain, Mich., and 3 miles above mouth of Pine River.

DRAINAGE AREA.—1,790 square miles.

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1922.

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

DISCHARGE.—The discharge of the turbines in second-feet corresponding to the number of kilowatts is determined for each hour during the day from a record of the number of wheels in operation and the load. The sum of the discharge divided by 24 gives the average discharge through the turbines. To this quantity is added the leakage through the idle wheels, the water passing over the spillway, through the gates, down the log sluice, and leakage through the dam.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during the year, 9,560 second-feet April 11; minimum mean daily discharge, 606 second-feet January 29.

1914-1922: Maximum mean daily discharge, 16,700 second-feet April 23 and 24, 1916; minimum mean daily discharge, 274 second-feet, August 10, 1919.

REGULATION.—During the summer of 1919 another power plant was placed in operation by the Peninsular Power Co. It is located on Brule River about 5 miles above gage. Owing to variations in demand the daily discharge bears no relation to the natural flow, but the mean monthly discharges probably correspond closely to the natural flow.

ACCURACY.—Discharge records published in the following tables were obtained by adding 10 per cent to discharge as computed from power-plant records. This correction is based upon the 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 and Seastone, consulting engineers, Madison, Wis.

Daily discharge, in second-feet, of Menominee River at Twin Falls, near Iron Mountain, Mich., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	1,620	971	1,060	923	688	703	1,960	5,420	2,270	2,320	987	669
2.....	1,300	995	1,120	747	684	716	1,570	5,320	2,440	2,340	1,170	833
3.....	960	1,200	869	727	692	812	1,440	5,440	2,300	2,400	1,020	760
4.....	974	1,020	791	756	673	962	1,300	5,550	1,230	1,880	1,040	811
5.....	1,060	1,040	870	778	736	971	1,720	5,560	1,810	1,940	957	833
6.....	1,070	817	908	833	722	1,000	1,980	5,780	1,540	1,640	878	1,080
7.....	1,090	957	876	903	812	948	2,730	6,450	1,430	1,440	961	1,310
8.....	1,070	1,050	933	993	782	939	3,660	6,450	1,410	2,140	1,080	2,430
9.....	1,110	1,080	1,060	772	762	873	5,440	6,420	1,400	2,440	1,130	3,080
10.....	1,070	1,110	964	734	739	890	8,500	6,080	1,380	2,890	1,180	3,220
11.....	1,030	1,000	881	728	776	906	9,560	5,610	1,350	2,940	1,110	3,290
12.....	994	862	895	727	749	698	7,520	5,220	1,220	2,090	1,200	2,500
13.....	1,080	791	890	792	700	834	5,720	4,970	1,400	2,480	889	2,190
14.....	1,170	789	876	741	726	935	5,710	4,020	1,430	2,140	1,110	1,420
15.....	967	752	910	890	723	898	5,140	2,730	1,450	1,970	1,150	1,930
16.....	807	693	954	759	716	1,150	4,830	3,330	1,670	1,360	1,040	1,920
17.....	966	690	1,040	746	725	1,900	5,720	3,250	3,600	1,650	1,080	1,550
18.....	972	749	1,120	729	858	1,590	7,650	2,900	7,700	1,420	1,100	1,200
19.....	1,070	894	947	725	722	1,110	7,780	3,010	7,580	1,260	1,080	1,100
20.....	1,120	815	927	749	729	1,020	7,160	2,700	4,830	1,270	933	1,130
21.....	1,160	684	882	764	710	1,070	6,660	2,140	3,380	1,180	934	1,180
22.....	1,170	676	758	947	717	1,140	5,310	2,290	3,360	1,350	1,020	1,140
23.....	911	671	718	708	704	1,180	4,980	1,930	2,780	1,430	921	1,380
24.....	1,020	868	669	714	708	1,710	5,120	1,920	2,520	1,670	960	1,020
25.....	1,040	773	711	716	933	1,510	5,670	2,110	1,740	1,570	944	982
26.....	1,030	766	730	834	852	1,530	6,750	2,150	1,220	1,630	909	979
27.....	1,180	816	704	964	799	1,670	7,130	2,180	1,580	1,380	916	1,110
28.....	1,100	943	680	784	694	1,770	6,920	1,200	1,760	1,560	876	1,150
29.....	994	984	704	606	-----	2,070	6,620	1,460	1,490	1,280	744	1,080
30.....	822	975	696	667	-----	2,060	5,830	1,500	1,530	983	759	1,070
31.....	917	-----	779	693	-----	1,880	-----	1,720	-----	1,070	713	-----

*Monthly discharge of Menominee River at Twin Falls, near Iron Mountain, Mich.,
for the year ending Sept. 30, 1922*

[Drainage area, 1,790 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,620	807	1,060	0.592	0.68
November.....	1,200	671	881	.492	.55
December.....	1,120	669	868	.485	.56
January.....	993	606	779	.435	.50
February.....	933	673	744	.416	.43
March.....	2,070	698	1,210	.676	.78
April.....	9,560	1,300	5,270	2.94	3.28
May.....	6,450	1,200	3,770	2.11	2.43
June.....	7,700	1,220	2,360	1.32	1.47
July.....	2,940	986	1,780	.994	1.15
August.....	1,200	713	993	.555	.64
September.....	3,290	669	1,480	.827	.92
The year.....	9,560	606	1,770	.989	13.39

NOTE.—Monthly discharge computed by U. S. Geol. Survey from daily-discharge record furnished by Mead and Seastone, consulting engineers, Madison, Wis. See "Accuracy."

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, 1922.

DISCHARGE.—The flow is computed by the Menominee & Marinette Light & Traction Co., of Menominee, Mich., as follows: Each hour the load on the generators is noted and gage heights are read of the head and tailwater to determine the head on the spillway of the dam and the acting head on the turbines. The flow through the turbines for each hour is taken from a table giving the discharge corresponding to these loads and heads. The flow over the spillway is taken from a table computed from a weir formula. When water is wasted through the gates, the magnitude and duration of the gate openings are noted and the quantity wasted determined from computed tables. The sum of the hourly discharge through the turbines and over the spillway, plus the quantity wasted through the gates divided by the number of seconds in 24 hours, gives the average discharge in second-feet for the day. No account is taken of the water passing through the exciter turbine, nor waste over the "Trash gate" at the power house. This amount is, however, relatively small.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 20,500 second-feet April 12; minimum mean daily discharge, 926 second-feet November 24.

1913-1922: Maximum mean daily discharge, 23,200 second-feet April 23 and 25, 1916; minimum mean daily discharge, 926 second-feet November 24, 1922.

REGULATION.—Above the 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; Twin Falls, owned by Peninsular Power Co.

With the exception of the Kimberly Clark dam at Little Quinnesec, 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 regulates the flow on Sundays and holidays. The effect of this regulation is generally felt at the stations on Tuesdays. The monthly flow probably represents the natural flow.

ACCURACY.—A discharge measurement on September 12, 1922, at highway bridge 4 miles below station checks the discharge as computed from the 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 the Menominee & Marinette Light & Traction Co.

Daily discharge, in second-feet, of Menominee River below Koss, Mich., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3,020	1,540	1,840	1,180	1,240	1,180	4,580	10,700	3,880	3,400	2,060	1,560
2	2,720	1,680	1,920	1,280	1,180	1,240	4,510	9,910	3,850	3,380	1,980	1,620
3	2,370	1,930	1,880	1,240	1,130	1,230	5,180	9,200	4,680	4,110	1,980	1,450
4	1,910	1,770	1,930	1,520	1,200	1,180	4,850	9,110	3,990	4,120	1,830	1,520
5	2,330	1,720	2,120	1,520	1,100	1,150	4,940	9,610	3,870	4,110	1,930	1,590
6	1,750	1,740	1,850	1,380	1,270	1,260	5,370	9,840	3,180	3,080	1,850	1,660
7	1,810	1,810	1,810	1,270	961	1,390	6,320	10,100	3,160	4,580	2,060	1,670
8	1,750	1,540	1,930	1,250	1,280	1,760	9,000	10,400	2,850	4,170	2,350	2,150
9	1,980	1,600	1,830	1,550	1,180	1,790	14,700	11,000	3,260	4,510	2,200	3,730
10	1,790	1,720	1,700	1,470	1,320	1,680	16,500	11,400	2,930	6,770	2,600	5,860
11	1,540	1,600	1,760	1,610	1,250	1,700	20,400	10,800	2,980	7,740	2,560	5,960
12	1,920	1,490	1,750	1,590	1,080	2,110	20,500	10,200	3,350	8,290	2,600	6,020
13	1,880	1,490	1,490	1,340	1,370	1,790	20,400	9,280	2,920	7,110	2,350	5,090
14	1,790	1,820	1,570	1,480	1,270	1,920	19,400	8,600	3,020	5,890	1,990	4,100
15	1,860	1,490	1,700	1,190	1,260	2,400	16,800	7,470	3,090	5,720	2,030	3,800
16	1,980	1,450	1,710	1,420	1,350	2,550	15,600	5,960	3,660	5,060	1,890	3,480
17	1,640	1,680	1,570	1,260	1,320	2,640	14,600	5,260	3,690	4,800	1,750	3,360
18	1,440	1,600	1,390	1,440	1,220	3,200	15,000	5,500	5,390	3,580	1,720	3,390
19	1,840	1,410	1,700	1,520	1,180	4,010	16,200	5,360	8,950	3,460	1,740	2,670
20	2,060	1,190	1,680	1,490	1,250	3,510	17,000	5,090	11,300	3,580	1,600	2,960
21	2,150	1,540	1,750	1,380	1,320	2,970	16,600	4,770	11,100	2,900	1,600	2,800
22	2,210	1,180	1,530	1,160	1,220	2,700	15,500	4,260	7,520	2,840	1,550	2,040
23	2,060	949	1,420	1,450	1,250	2,680	13,900	4,100	5,860	2,820	1,770	1,990
24	1,750	926	1,310	1,050	1,200	2,840	11,800	3,650	5,260	2,630	1,750	2,360
25	1,890	1,500	1,280	1,380	1,180	3,320	11,100	3,300	4,860	2,800	1,720	2,060
26	1,890	1,420	1,250	1,340	1,040	3,560	10,800	3,420	4,040	2,570	1,740	1,760
27	1,780	1,120	1,200	1,280	1,220	3,950	11,200	4,500	2,920	2,740	1,720	1,860
28	1,790	1,860	1,130	1,200	1,200	4,060	12,000	4,040	2,680	3,010	1,450	1,810
29	2,230	1,710	1,410	960	-----	3,990	12,400	3,590	3,110	2,760	1,610	1,760
30	1,940	1,770	1,550	1,380	-----	4,320	11,900	2,740	3,250	2,380	1,610	1,850
31	1,570	-----	1,300	1,240	-----	6,140	-----	3,550	-----	2,320	1,630	-----

Monthly discharge of Menominee River below Koss, Mich., for the year ending Sept. 30, 1922

[Drainage area, 3,790 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	3,020	1,440	1,960	0.517	0.60
November.....	1,930	926	1,540	.406	.45
December.....	2,120	1,130	1,620	.427	.49
January.....	1,610	960	1,350	.356	.41
February.....	1,370	961	1,220	.322	.34
March.....	6,140	1,150	2,590	.683	.79
April.....	20,500	4,510	12,600	3.32	3.70
May.....	11,400	2,740	6,990	1.84	2.12
June.....	11,300	2,680	4,490	1.18	1.32
July.....	8,290	2,320	4,100	1.08	1.24
August.....	2,600	1,450	1,910	.504	.58
September.....	6,020	1,450	2,800	.739	.82
The year.....	20,500	926	3,600	.950	12.86

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

Days of deficiency in discharge of Menominee River below Koss, Mich., for the years ending Sept. 30, 1914–1922

Discharge in second-feet	Days of deficient discharge										Oct. 1, 1913, to Sept. 30, 1922	
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21	1921-22	Days	Per cent of time	
1,200.....	2	1			3	3		6	23	38	1.2	
1,300.....	6	7			5	7	5	17	51	98	3.0	
1,400.....	26	20	1		19	11	9	32	66	184	5.6	
1,500.....	36	32	1		42	23	20	72	84	310	9.4	
1,600.....	45	49	3	4	61	33	43	108	101	447	13.6	
1,800.....	75	91	27	26	101	67	97	158	154	796	24.2	
2,000.....	96	123	65	65	128	93	130	200	189	1,089	33.1	
2,200.....	108	143	84	82	150	110	158	228	200	1,263	38.4	
2,400.....	119	175	103	103	172	121	179	250	210	1,432	43.6	
2,600.....	139	214	108	132	191	147	196	263	214	1,604	48.8	
2,800.....	162	227	129	145	206	167	205	272	226	1,739	52.9	
3,000.....	192	233	151	162	224	180	217	274	239	1,872	57.0	
3,200.....	233	242	172	179	244	202	230	279	250	2,031	61.8	
3,400.....	250	253	190	197	263	217	241	285	264	2,160	65.7	
3,600.....	263	260	208	210	273	229	251	289	273	2,256	68.6	
4,000.....	289	271	217	223	299	249	260	299	288	2,395	72.9	
4,800.....	308	285	228	238	310	272	275	308	296	2,520	76.7	
5,500.....	318	300	246	268	325	290	292	313	309	2,661	81.0	
6,500.....	329	330	267	291	339	319	326	324	319	2,844	86.5	
8,000.....	342	360	302	334	353	342	340	334	324	3,031	92.2	
10,000.....	354	365	324	343	359	352	350	343	334	3,124	95.0	
13,000.....	358		336	362	365	359	357	357	350	3,209	97.6	
16,000.....	361		350	365		365	360	360	356	3,247	98.8	
20,000.....	363		360				365	363	362	3,273	99.6	
25,000.....	365		366				366	365	365	3,287	100.0	
Mean.....	3,550	3,230	5,260	4,320	3,170	3,760	3,710	3,180	3,600			
Maximum.....	20,800	8,650	23,200	13,800	15,000	14,100	21,800	20,300	20,500			
Minimum.....	1,000	1,170	1,390	1,560	1,160	1,170	1,200	960	926			

NOTE.—Figures in the above table for the year ending Sept. 30, 1918, supersede those published in Water-Supply Paper 504 (p. 25), which are a duplicate of the figures for the year ending Sept. 30, 1914.

PINE RIVER NEAR FLORENCE, WIS.

LOCATION.—In secs. 23 and 26, T. 39 N., R. 17 E., at highway bridge 8 miles southwest of Florence, Florence County, and 12 miles above mouth of river. Popple River enters from right 200 feet above station.

DRAINAGE AREA.—488 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles.)

RECORDS AVAILABLE.—January 22, 1914, to September 30, 1922.

GAGE.—Chain gage fastened to guard rail on upstream side of bridge; read by William Taft.

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

CHANNEL AND CONTROL.—Coarse gravel and stones; left bank high and not subject to overflow; extremely high water may overflow right bank around approach to bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.20 feet at noon April 10 and 11 (discharge, 2,760 second-feet); minimum stage, 1.16 feet September 2 (discharge, 118 second-feet).

1914-1922: Maximum stage recorded, 9.25 feet at noon April 23, 1916 (discharge, about 4,520 second-feet); minimum discharge, 118 second-feet September 6 and 7, 1915, and September 2, 1922.

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent except when affected by ice.

Rating curve well defined between 144 and 1,800 second-feet. Gage read to half-tenths 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 obtained by applying to rating table daily gage height corrected for ice effect by means of discharge measurements, observer's notes, and weather records. Open-water records good; winter records subject to error.

Discharge measurements of Pine River near Florence, Wis., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
Dec. 27	S. R. Collins.....	<i>Feet</i> • 2.32	<i>Sec.-ft.</i> 143	Mar. 11	S. R. Collins.....	<i>Feet</i> • 3.53	197
Jan. 29	.....do.....	• 2.56	158	Sept. 11	E. E. Foster.....	3.91	964

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Pine River near Florence, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sept.
1	274	238	445	170	160	125	542	1,610	476	576	182	126
2	274	250	445	170	160	125	542	1,560	412	610	182	118
3	274	250	445	170	170	135	542	1,560	382	542	172	135
4	274	250	430	180	170	155	542	1,560	382	542	172	153
5	262	250	410	180	170	160	610	1,560	382	542	172	172
6	250	274	395	170	180	170	610	1,560	382	542	172	311
7	250	274	395	160	180	180	990	1,460	367	576	172	397
8	250	298	380	160	180	180	1,460	1,460	352	678	172	610
9	250	298	365	160	195	195	2,690	1,410	352	712	162	780
10	250	324	350	160	205	195	2,760	1,360	352	712	162	780
11	250	324	340	170	205	195	2,760	1,310	352	678	153	746
12	238	338	340	170	205	205	2,030	1,210	352	644	153	746
13	238	298	325	160	205	215	1,860	1,080	352	610	153	746
14	226	324	310	160	190	225	1,610	990	412	542	153	746
15	226	352	310	160	190	240	1,510	945	476	476	153	712
16	226	382	300	160	180	260	1,460	900	746	428	144	644
17	226	412	285	170	170	275	1,460	855	990	397	135	610
18	226	428	275	160	170	285	1,460	815	990	382	135	542
19	215	428	260	170	160	310	1,460	780	945	367	162	542
20	215	444	250	170	160	325	1,410	746	855	367	153	508
21	204	444	225	170	160	350	1,410	712	780	338	153	476
22	204	444	215	155	155	365	1,360	678	712	311	153	476
23	204	445	205	155	155	395	1,410	644	610	286	144	444
24	204	445	180	155	155	410	1,410	610	576	262	144	428
25	204	445	170	155	145	445	1,410	610	610	262	135	397
26	204	445	155	155	145	476	1,460	576	610	250	135	367
27	215	445	145	155	145	492	1,460	576	610	238	135	338
28	226	445	160	160	135	508	1,590	542	610	215	135	311
29	226	445	155	160	-----	525	1,610	508	610	193	135	286
30	226	445	155	160	-----	542	1,610	508	678	193	126	250
31	226	-----	155	160	-----	542	-----	476	-----	193	126	-----

NOTE.—Stage-discharge relation affected by ice Nov. 23 to Mar. 25. Gage not read Mar. 27, 29, and 31; discharge interpolated.

Monthly discharge of Pine River near Florence, Wis., for the year ending Sept. 30, 1922

[Drainage area, 488 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	274	204	233	0.477	0.55
November	445	238	363	.744	.83
December	445	145	290	.594	.68
January	180	155	164	.336	.39
February	205	135	171	.350	.36
March	542	125	297	.609	.70
April	2,760	542	1,430	2.93	3.27
May	1,610	476	1,010	2.07	2.39
June	990	352	557	1.14	1.27
July	712	193	441	.904	1.04
August	182	126	153	.314	.36
September	780	118	463	.949	1.06
The year	2,760	118	464	.951	12.90

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, 1922.

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

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

CHANNEL AND CONTROL.—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, 7.68 feet 5 p. m. April 10 (discharge, about 2,730 second-feet); minimum mean daily discharge 65, second-feet January 27.

1914-1922: Maximum and minimum stages same as given above.

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent excepted when affected by ice.

Rating curve well defined between 120 and 1,120 second-feet. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating curve, except when stage-discharge relation was affected by ice, for which period it was ascertained by applying to rating table daily gage height corrected for ice effect by means of discharge measurements, observer's notes, and weather records. Open-water records good; records for winter period fair.

Discharge measurements of Pike River at Amberg, Wis., during the year ending Sept. 30, 1922

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>
Dec. 28	S. R. Collins.....	* 1.92	112	Sept. 10	E. E. Foster.....	2.58	355
Jan. 28	do.....	* 2.63	108		do.....	2.50	332

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Pike River at Amberg, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	162	158	162	90	105	105	405	546	348	230	165	169
2.....	160	154	180	80	105	105	420	546	333	230	158	217
3.....	158	154	192	75	105	110	440	546	318	217	154	204
4.....	154	148	190	75	105	115	428	546	303	204	148	192
5.....	148	148	185	75	105	115	510	546	273	190	148	187
6.....	142	148	180	80	105	115	582	546	258	178	150	176
7.....	142	154	180	90	105	120	738	582	244	217	204	244
8.....	148	158	190	80	105	120	1,080	546	217	364	258	303
9.....	154	162	204	95	105	125	1,750	546	217	217	217	396
10.....	148	160	204	110	105	130	2,400	510	244	620	204	380
11.....	154	155	199	105	105	135	2,620	476	273	582	187	364
12.....	162	150	158	100	100	145	2,150	444	303	546	176	333
13.....	154	148	170	100	95	150	1,450	412	273	476	165	288
14.....	158	148	170	100	90	160	1,300	396	244	380	158	258
15.....	154	148	170	100	85	170	1,160	380	230	348	154	230
16.....	154	154	170	100	80	180	1,040	348	303	273	144	230
17.....	154	154	170	100	80	185	1,300	348	546	273	154	217
18.....	158	154	170	100	80	195	1,350	348	658	244	144	217
19.....	162	158	160	100	80	205	1,120	348	546	230	144	204
20.....	169	169	150	100	80	220	1,040	348	460	217	148	204
21.....	176	180	140	100	85	230	904	333	428	217	148	204
22.....	176	180	135	100	85	245	820	318	380	194	148	199
23.....	169	180	130	90	85	245	778	273	303	217	148	192
24.....	162	180	125	80	90	260	738	348	273	217	144	180
25.....	158	180	120	80	90	280	698	396	244	190	154	176
26.....	154	180	120	75	95	295	698	364	217	185	154	169
27.....	158	169	115	65	100	310	658	348	230	178	154	162
28.....	162	162	110	105	100	325	658	333	230	167	144	160
29.....	169	162	90	105	-----	360	658	318	217	167	158	158
30.....	169	162	90	105	-----	375	582	348	204	162	154	158
31.....	162	-----	95	105	-----	390	-----	380	-----	171	148	-----

NOTE.—Stage-discharge relation affected by ice Nov. 10-12, 22-25, Dec. 4-8, and Dec. 13 to Apr. 3. Discharge interpolated Oct. 20, 27, Nov. 20, and May 14; gage not read.

Monthly discharge of Pike River at Amberg, Wis., for the year ending Sept. 30, 1922

[Drainage area, 240 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	176	142	158	0.658	0.76
November.....	180	148	161	.671	.75
December.....	204	90	156	.650	.75
January.....	110	65	92.4	.385	.44
February.....	105	80	94.8	.395	.41
March.....	390	105	201	.838	.97
April.....	2,620	405	1,020	4.25	4.74
May.....	582	273	422	1.76	2.03
June.....	658	204	311	1.30	1.45
July.....	620	162	268	1.12	1.29
August.....	258	144	162	.675	.78
September.....	396	158	226	.942	1.05
The year.....	2,620	65	272	1.13	15.42

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, a quarter of a mile downstream from power house of Wisconsin Public Service Co., 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 map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—August 3, 1912, to September 30, 1922.

GAGE.—Gurley water-stage recorder on left bank a quarter of a mile downstream from power house; replaced a Barrett & Lawrence water-stage recorder about May 1, 1918.

DISCHARGE MEASUREMENTS.—Made from cable half a mile below gage. About 2 second-feet of seepage water enters river below gage but above the cable and is included in the determined discharge as published.

CHANNEL AND CONTROL.—Banks high and not subject to overflow. Control at low stages is a small gravel riffle about 50 feet downstream from the gage; at medium and high stages this control is drowned out and is probably formed by some section farther downstream.

EXTREMES OF DISCHARGE.—Maximum stage during the year from water-stage recorder, 7.80 feet at 4.30 p. m. April 11 (discharge, 3,860 second-feet); minimum mean daily discharge from power-house records, 56 second-feet on December 24, 25, and 26.

1912-1922: Maximum stage, that of April 11, 1922; 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 the natural flow.

ICE.—Because of the relatively warm water in the large service reservoir, ice does not form on the river near gage.

REGULATION.—Considerable diurnal fluctuation caused by the operation of the 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.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined above 145 second-feet. Daily discharge during periods when recording gage was in operation ascertained by use of the discharge integrator; discharge for period when gage was not in operation based on power-plant records corrected by comparison with records from water-stage recorder during times when gage was in operation. Records for medium and high stages good; for extreme low stages fair.

The following discharge measurement was made by E. E. Foster:

September 9, 1922: Gage height 3.17 feet; discharge, 869 second-feet.

Daily discharge, in second-feet, of Peshtigo River at High Falls, near Crivitz, Wis.; for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	434	260	354	89	314	494	665	1,440	600	218	413	518
2.....	219	299	337	324	349	596	165	1,450	638	349	335	347
3.....	391	314	355	485	208	650	885	1,250	552	420	331	526
4.....	435	291	84	348	304	640	1,130	1,380	435	450	276	413
5.....	422	198	307	359	124	208	822	1,470	628	280	293	404
6.....	416	75	291	294	223	584	960	1,480	550	305	350	265
7.....	426	265	326	180	236	859	1,180	1,490	488	915	349	405
8.....	391	261	226	67	270	849	1,020	1,340	480	1,140	362	692
9.....	98	269	318	178	242	785	832	1,300	460	900	580	868
10.....	343	286	215	430	429	731	2,180	1,190	560	1,220	350	620
11.....	524	136	85	379	186	822	2,860	1,190	225	1,130	385	575
12.....	452	240	298	244	94	214	3,670	1,230	425	1,080	375	914
13.....	399	82	348	230	272	263	3,140	1,100	442	838	100	740
14.....	395	286	331	235	248	572	2,460	625	420	578	262	861
15.....	348	284	394	80	286	510	2,930	1,040	473	526	292	486
16.....	227	334	286	242	232	465	2,560	1,180	572	410	295	601
17.....	278	319	324	244	249	612	2,550	1,040	880	463	380	535
18.....	271	294	104	232	188	644	2,750	875	405	498	372	623
19.....	284	160	314	304	370	226	2,880	695	760	439	218	377
20.....	379	115	309	272	223	234	2,660	648	1,030	408	310	371
21.....	264	281	422	337	317	613	2,670	455	758	391	268	525
22.....	258	283	338	148	855	760	2,120	590	598	370	294	417
23.....	91	430	110	260	412	856	2,000	565	645	90	299	353
24.....	275	165	56	315	209	889	1,860	572	500	342	360	457
25.....	265	234	56	255	372	1,000	2,040	560	375	406	267	315
26.....	265	270	56	219	155	368	1,850	710	450	365	315	342
27.....	324	143	270	208	395	662	1,700	585	492	406	265	391
28.....	243	298	306	188	467	680	1,660	510	440	364	364	373
29.....	286	304	272	90	-----	670	2,120	725	375	503	327	349
30.....	88	350	304	241	-----	630	1,660	435	840	122	312	328
31.....	285	-----	154	271	-----	658	-----	590	-----	313	440	-----

NOTE.—Water-stage recorder did not operate satisfactorily, Oct. 16-19, Nov. 20-25, Dec. 4-10, 22-26, Jan. 7, 8, 11-13, Feb. 26, July 2, 15-31, Aug. 1-8, 11, 12, 19-31, Sept. 1-5 and 12-30; daily discharge determined from records of power plant.

Monthly discharge of Peshtigo River at High Falls, near Crivitz, Wis., for the year ending Sept. 30, 1922

[Drainage area, 520 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	524	88	315	0.606	0.70
November.....	430	75	251	.483	.54
December.....	422	56	260	.500	.58
January.....	485	67	250	.451	.55
February.....	855	94	297	.571	.59
March.....	1,000	208	605	1.16	1.34
April.....	3,070	165	1,830	3.71	4.14
May.....	1,490	435	963	1.85	2.13
June.....	1,080	225	533	1.02	1.14
July.....	1,220	90	524	1.01	1.16
August.....	530	100	325	.625	.72
September.....	914	265	500	.962	1.07
The year.....	3,670	56	562	1.08	14.66

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 map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch = 6 miles).

RECORDS AVAILABLE.—June 7, 1906, to March 30, 1909; January 6, 1914, to September 30, 1922.

GAGE.—Chain gage attached to iron railing on upstream side of bridge; read by Harvey Gilbertson. Zero of gage was raised 4.0 feet January 6, 1914.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Gravel; fairly 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, 9.10 feet at 3 p. m., April 11, caused by failure of dam at Pulcifer, 4 miles upstream (discharge, 6,470 second-feet); minimum discharge, about 290 second-feet January 30 to February 2.

1906-1922: Maximum stage, that of April 11, 1922; minimum open-water discharge, 95 second-feet June 3 and 6, 1907.

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 300 and 1,850 second-feet, and fairly well defined between 1,850 and 6,500 second-feet. Gage read to quarter-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 ascertained by applying to rating table daily gage height corrected for ice effect by means of discharge measurements, observer's notes, and weather records. Open-water records excellent, except for extremely high stages for which they are good; records for winter period are fair.

Discharge measurements of Oconto River near Gillett, Wis., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
Jan. 17	S. B. Soulé.....	<i>Feet</i> • 2.69	<i>Sec.-ft.</i> 358	Apr. 13	S. B. Soulé.....	<i>Feet</i> • 8.88	<i>Sec.-ft.</i> 6,270
Feb. 9	S. R. Collins.....	• 2.58	364	July 25do.....	1.99	764

• Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Oconto River near Gillett, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	516	563	493	365	290	365	1,930	1,610	695	539	539	640
2	348	428	614	365	290	385	2,090	1,610	725	449	563	587
3	367	407	908	365	285	405	2,170	1,530	698	471	563	539
4	428	428	815	365	300	430	2,330	1,530	640	449	539	493
5	493	428	785	365	310	450	2,410	1,450	640	449	493	449
6	493	471	407	365	320	470	2,370	1,610	668	449	563	449
7	493	516	405	365	330	515	2,730	1,770	587	695	695	471
8	471	471	405	365	350	565	4,490	1,770	539	845	695	640
9	387	407	405	365	365	585	4,490	1,450	755	875	668	785
10	471	407	405	365	365	640	6,020	1,220	1,010	1,690	614	785
11	471	407	405	365	365	695	6,470	1,150	1,150	2,570	587	755
12	493	365	407	365	365	755	6,380	1,040	1,080	2,570	539	755
13	449	329	428	365	365	785	6,290	1,150	1,040	2,570	539	668
14	449	329	428	365	365	845	6,110	1,150	940	2,170	516	640
15	449	292	428	365	365	910	6,020	1,040	845	1,610	493	640
16	449	310	449	365	365	940	3,850	1,010	1,080	1,370	493	614
17	449	407	407	365	365	1,010	3,530	1,010	1,010	1,202	449	587
18	539	449	405	350	365	1,080	3,530	975	1,220	1,080	449	587
19	640	449	385	360	365	1,150	3,530	940	1,290	908	387	587
20	539	367	385	365	365	1,150	3,370	875	1,370	908	428	563
21	587	367	385	350	365	1,220	3,210	845	1,450	940	428	563
22	539	387	365	330	365	1,290	2,890	815	1,150	908	449	539
23	449	367	365	330	365	1,290	2,730	785	1,010	875	516	539
24	471	292	365	330	365	1,370	2,570	755	875	815	493	516
25	493	310	365	320	365	1,370	2,330	785	725	755	471	493
26	493	329	365	310	365	1,450	2,090	815	640	695	449	471
27	493	493	365	310	365	1,530	1,770	845	587	640	428	471
28	348	516	365	310	365	1,610	1,690	815	587	587	407	493
29	428	587	365	300	-----	1,690	1,610	785	563	539	428	449
30	449	725	365	290	-----	1,770	1,610	695	539	516	407	407
31	449	-----	365	290	-----	1,850	-----	695	-----	539	407	-----

NOTE.—Stage-discharge relation affected by ice Nov. 12, Dec. 7-11, and Dec. 18 to Apr. 6.

Monthly discharge of Oconto River near Gillett, Wis., for the year ending Sept. 30, 1922

[Discharge area, 678 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	640	348	471	0.695	0.80
November	725	292	420	.619	.69
December	908	365	445	.656	.76
January	365	290	347	.512	.59
February	365	290	349	.515	.54
March	1,850	365	986	1.45	1.67
April	6,470	1,610	3,430	5.06	5.64
May	1,770	695	1,110	1.64	1.89
June	1,450	539	869	1.28	1.43
July	2,570	449	1,020	1.50	1.73
August	695	387	506	.746	.86
September	785	407	572	.844	.94
The year	6,470	290	877	1.29	17.54

FOX RIVER AT BERLIN, WIS.

LOCATION.—In sec. 16, T. 17 N., R. 13 E., at Government lock and dam, $2\frac{1}{2}$ 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.—1898 to September 30, 1922.

GAGE.—Staff gage located 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 city of Berlin about $2\frac{1}{2}$ miles downstream from gage. Rating curves for gage corrected for any small inflow between the gage and measuring section.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge recorded during year, 5,920 second-feet, March 16; minimum mean daily discharge, 465 second-feet, January 26 and 27.

1898-1922: Maximum mean daily discharge, 6,400 second-feet, March 28, 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 of ice effect 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.

The following discharge measurement was made by S. B. Soulé:

July 22, 1922: Gage height, 9.00 feet; discharge, 1,160 second-feet.

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	735	800	830	800	510	1,220	4,020	2,830	1,420	1,220	905	975
2.....	735	905	1,100	765	535	1,320	3,920	2,670	1,420	1,180	940	940
3.....	705	830	1,140	705	535	1,320	3,820	2,600	1,360	1,100	940	905
4.....	675	830	1,060	735	535	1,360	3,720	2,520	1,320	1,060	905	865
5.....	675	830	1,020	765	535	1,360	3,530	2,380	1,270	905	905	800
6.....	675	830	1,060	705	535	1,420	3,530	2,310	1,220	975	1,140	765
7.....	705	765	1,220	675	535	1,850	3,530	2,240	1,180	1,020	1,100	735
8.....	705	800	1,420	615	535	2,170	3,440	2,100	1,140	1,020	975	830
9.....	705	765	1,360	615	535	2,670	3,620	2,040	1,270	1,100	940	1,020
10.....	705	800	1,270	615	560	3,000	3,820	1,980	1,360	1,180	940	1,020
11.....	735	830	1,180	615	560	3,080	4,020	1,910	1,850	1,140	905	975
12.....	705	765	1,140	590	590	3,530	4,450	1,800	2,040	1,270	905	940
13.....	705	800	1,100	590	590	4,020	4,450	1,680	2,240	1,360	865	975
14.....	705	765	1,140	590	560	4,910	4,340	1,520	2,380	1,320	830	1,180
15.....	705	800	1,100	590	535	5,650	4,230	1,360	2,450	1,320	800	1,220
16.....	705	735	1,140	560	535	5,920	4,020	1,320	2,450	1,320	800	1,180
17.....	705	800	1,180	535	535	5,650	4,230	1,270	2,450	1,320	765	1,140
18.....	765	800	1,140	535	560	5,520	4,560	1,270	2,380	1,270	765	1,140
19.....	800	830	1,270	535	560	5,650	4,560	1,270	2,310	1,270	735	1,100
20.....	800	800	1,270	535	560	5,270	4,450	1,270	2,240	1,220	765	1,100
21.....	800	765	1,220	535	560	5,270	4,340	1,270	2,170	1,180	765	1,060
22.....	800	735	1,140	535	705	5,390	4,230	1,180	2,040	1,180	735	1,060
23.....	800	865	1,100	510	830	5,390	4,020	1,140	1,980	1,140	735	1,020
24.....	765	940	1,060	490	940	5,150	3,820	1,180	1,850	1,140	865	975
25.....	765	905	1,020	490	1,020	5,150	3,720	1,270	1,740	1,100	905	940
26.....	765	940	940	465	1,020	5,030	3,530	1,420	1,570	1,100	830	905
27.....	765	940	940	465	1,100	4,790	3,350	1,420	1,460	1,060	800	905
28.....	800	830	865	490	1,140	4,790	3,260	1,420	1,360	1,020	765	905
29.....	800	830	830	510	-----	4,560	3,080	1,360	1,320	975	735	865
30.....	800	830	800	510	-----	4,340	2,910	1,320	1,270	940	735	865
31.....	765	-----	800	510	-----	4,230	-----	1,420	-----	905	735	-----

NOTE.—Daily discharge computed by United States Engineer Corps from tables based on measurement made by engineers of U. S. Geol. Survey.

Monthly discharge of Fox River at Berlin, Wis., for the year ending Sept. 30, 1922

[Drainage area, 1,430 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	800	675	741	0.518	0.60
November.....	940	735	822	.575	.64
December.....	1,420	800	1,090	.762	.88
January.....	800	465	586	.410	.47
February.....	1,140	510	652	.456	.47
March.....	5,920	1,220	3,900	2.73	3.15
April.....	4,560	2,910	3,880	2.71	3.02
May.....	2,830	1,140	1,700	1.19	1.37
June.....	2,450	1,140	1,750	1.22	1.36
July.....	1,360	965	1,140	.797	.92
August.....	1,140	735	853	.696	.69
September.....	1,220	735	977	.683	.76
The year.....	5,920	465	1,510	1.06	14.33

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, 1922.

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 United States 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, 20,100 second-feet April 23; minimum mean daily discharge, 1,240 second-feet October 9.

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

REGULATION.—The flow past the 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.—The 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 Sept. 30, 1921

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,560	3,230	3,640	3,290	4,050	3,920	10,800	17,800	6,750	4,480	4,260	3,360
2	1,260	3,460	3,320	3,300	3,900	3,980	9,930	18,000	6,490	3,500	4,310	3,330
3	1,450	3,370	2,590	3,600	3,600	3,970	10,700	17,500	5,710	3,730	4,260	2,380
4	1,440	3,320	1,810	3,460	3,520	3,950	10,900	17,500	4,010	4,130	4,280	1,360
5	1,480	3,220	1,780	3,670	3,100	3,000	11,100	17,200	3,490	4,940	4,260	2,420
6	1,420	2,370	2,890	3,530	3,580	3,870	11,600	16,600	4,590	4,490	3,390	3,180
7	1,370	1,920	3,330	3,840	4,020	4,670	12,000	16,000	4,270	4,570	3,330	3,160
8	1,400	3,040	3,300	2,920	3,960	4,530	12,400	16,000	4,250	4,410	3,900	3,140
9	1,240	3,170	3,340	4,000	4,010	4,500	14,700	16,200	4,240	3,660	4,080	3,100
10	1,380	3,410	3,360	3,770	3,770	4,600	15,500	15,300	9,200	4,060	4,090	2,160
11	1,380	3,230	2,010	3,730	3,670	4,640	16,700	15,000	12,300	4,810	4,090	2,040
12	1,350	3,070	1,910	3,810	2,510	3,910	17,200	14,400	4,280	4,800	4,080	3,100
13	1,520	2,170	3,560	3,970	3,060	6,440	17,600	13,800	5,000	4,860	3,660	3,260
14	1,670	1,810	3,680	3,970	3,840	7,590	17,800	13,000	7,420	4,920	2,980	3,160
15	1,630	3,400	3,700	2,810	3,490	6,650	18,100	12,800	8,540	4,740	3,730	3,150
16	1,320	3,570	3,730	3,400	3,860	6,290	16,800	13,100	8,710	3,950	3,860	3,090
17	1,370	3,340	3,480	3,760	3,680	5,940	17,700	12,700	8,460	3,930	3,800	2,060
18	1,380	3,430	2,060	3,570	3,690	5,660	19,100	11,800	7,490	4,110	3,790	2,040
19	1,340	3,390	2,020	3,810	2,830	5,040	19,500	10,300	7,540	4,340	3,650	2,960
20	1,390	2,350	3,680	2,670	3,100	5,570	19,400	9,470	8,530	4,550	2,700	3,580
21	1,730	2,080	3,630	3,790	3,930	6,430	19,800	7,550	8,390	4,620	2,700	3,800
22	1,820	3,230	3,620	2,280	4,190	6,750	20,000	6,900	8,560	4,650	3,550	3,740
23	1,240	2,450	3,650	3,170	3,890	7,470	20,100	7,420	8,560	3,620	3,500	3,760
24	1,610	3,020	3,400	4,020	3,800	8,550	19,900	7,390	8,200	3,770	3,620	2,740
25	1,480	2,980	2,740	3,980	4,230	9,050	19,700	7,330	7,090	4,300	3,450	2,730
26	1,740	2,960	3,520	4,030	3,340	8,000	19,100	7,240	6,780	4,580	3,290	3,160
27	1,800	1,890	3,920	4,060	3,630	7,850	19,700	6,960	6,960	4,200	2,640	2,940
28	1,770	1,820	3,900	3,940	3,560	9,660	18,900	5,980	5,790	4,150	2,450	2,950
29	1,590	3,530	3,590	3,030	-----	10,700	18,600	6,020	4,390	4,110	3,580	2,840
30	1,300	3,640	3,450	3,640	-----	10,800	18,100	6,540	4,430	3,420	3,460	2,810
31	1,640	-----	3,520	4,140	-----	10,800	-----	6,550	-----	3,470	3,440	-----

Monthly discharge of Fox River at Rapide Croche dam, near Wrightstown, Wis., for the year ending Sept. 30, 1922

[Drainage area, 6,150 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,820	1,240	1,490	0.242	0.28
November	3,640	1,810	2,930	.476	.53
December	3,920	1,780	3,170	.515	.59
January	4,140	2,280	3,580	.582	.67
February	4,230	2,510	3,640	.592	.62
March	10,800	3,000	6,280	1.02	1.18
April	20,100	9,930	16,400	2.67	2.98
May	18,000	5,930	11,900	1.93	2.22
June	12,300	3,490	6,680	1.09	1.22
July	4,940	3,420	4,260	.698	.80
August	4,310	2,480	3,620	.589	.68
September	3,800	1,360	2,920	.475	.53
The year	20,100	1,240	5,560	.902	12.30

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, coming in from right.

DRAINAGE AREA.—840 square miles.

RECORDS AVAILABLE.—May 9, 1907, to March 31, 1909; February 10, 1911, to September 30, 1922.

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, 7.30 feet at 6.30 p. m. April 10 (discharge, 4,390 second-feet); minimum discharge, estimated 410 second-feet February 6 and 7.

1907-1909 and 1911-1922: Maximum stage recorded, that of April 10, 1922; 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 between 300 and 2,000 second-feet; extended above and below these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height, except for period when stage-discharge relation was affected by ice, for which it was ascertained by applying to rating table mean daily gage height corrected for ice effect by means of discharge measurements, observer's notes, and weather records. Open-water records excellent; winter records fair.

Discharge measurements of Wolf River at Keshena, Wis., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
Jan. 18	S. B. Soule	Feet • 2.31	Sec.-ft. 478	Apr. 6	S. B. Soule	Feet • 3.64	Sec.-ft. 1,390
Feb. 8	S. R. Collins	• 2.52	444	July 24	do	2.28	854

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Wolf River at Keshena, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	630	552	630	515	445	480	1,050	1,990	950	760	760	950
2	630	552	672		445	480	1,110	1,990	806	715	760	950
3	630	552	630		445	480	1,160	1,850	950	672	760	853
4	630	552	590		445	480	1,160	1,990	901	672	715	760
5	630	552	590		445	480	1,280	2,260	853	672	715	715
6	590	552	630	410	410	480	1,390	1,990	853	715	1,000	672
7	552	552	672		410	515	1,590	1,920	760	1,050	1,110	715
8	552	515	630		515	515	2,550	1,850	760	1,110	1,110	901
9	552	479	590		515	515	3,680	1,660	853	1,340	1,000	1,160
10	590	479	552		515	515	4,390	1,660	1,220	2,470	950	1,280
11	590	479	590	480	445	515	4,310	1,660	1,460	2,400	806	1,220
12	630	479	590			550	3,830	1,590	1,400	1,720	760	1,050
13	630	479	552			550	3,290	1,460	1,000	1,400	715	950
14	630	552	552			590	3,140	1,530	901	1,110	672	901
15	630	590	552			590	3,060	1,460	853	1,110	672	853
16	630	552	590	445	445	590	2,990	1,220	950	1,000	630	853
17	590	590	552			630	3,140	1,220	1,530	853	630	806
18	672	590	550			630	3,220	1,280	1,720	760	630	760
19	630	590	515			670	3,060	1,280	1,340	760	590	806
20	630	515	515			670	2,920	1,280	1,160	715	590	760
21	630	444	480	445	445	715	2,690	1,160	1,110	901	630	760
22	590	479	480			760	2,470	1,110	1,110	1,050	630	760
23	590	515	480			760	2,330	950	1,050	1,050	630	715
24	590	515	480			805	2,330	901	853	901	590	672
25	590	550	480			805	2,260	1,280	760	866	590	672
26	590	590	480	445	445	855	2,470	1,280	806	806	590	672
27	590	590	515			900	2,400	1,110	806	760	590	672
28	630	630	515			900	2,260	1,050	806	715	590	630
29	630	672	515			950	2,190	950	806	715	590	630
30	590	672	515			950	2,060	853	806	715	590	630
31	590	-----	515			1,000	-----	950	-----	853	590	-----

NOTE.—Stage-discharge relation affected by ice Nov. 23-28 and Dec. 18 to Apr. 7. Braced figures show mean discharge for periods indicated.

Monthly discharge of Wolf River at Keshena, Wis., for the year ending Sept. 30, 1922
 [Drainage area, 840 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	672	552	608	0.724	0.88
November.....	672	444	547	.651	.73
December.....	672	480	555	.661	.76
January.....	515	445	477	.568	.65
February.....	445	410	442	.526	.55
March.....	1,000	480	656	.781	.90
April.....	4,390	1,050	2,530	3.01	3.36
May.....	2,260	853	1,440	1.71	1.97
June.....	1,720	760	1,000	1.19	1.33
July.....	2,470	672	1,010	1.20	1.38
August.....	1,110	590	716	.852	.98
September.....	1,280	630	824	.981	1.09
The year.....	4,390	410	901	1.07	14.53

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, and Little Wolf River, also from right, 5 miles below station.

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, 1922. Unpublished gage heights March 1, 1899, to September 30, 1913, are in files of the office of the 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 information furnished by the United States Engineer Corps. Zero of present 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, hard pan, and mud; not permanent. Control not well defined. Banks at the gage fairly high. During flood stages the water from Embarrass River flows across the city of New London into the channel of Wolf River below the gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 11.4 feet at 8 a. m. April 13 (discharge, 15,500 second-feet); minimum discharge estimated 780 second-feet January 28 to February 13.

1914-1922: Maximum discharge that of April 13, 1922; minimum discharge, 700 second-feet February 6-9, 1918. The United States Engineer's office reports a stage of 11.6 feet on April 16, 1888.

ICE.—Stage-discharge relation affected by ice.

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

ACCURACY.—Stage-discharge relation not permanent; rating curve well defined. Gage read to tenths 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 obtained by applying to rating table mean daily gage height 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 Wolf River at New London, Wis., during the year ending Sept. 30, 1922

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. 19	S. B. Soule.....	2.50	841	June 13	A. O. Olson.....	8.20	4,790
Feb. 7	S. R. Collins.....	2.51	652	July 24	S. B. Soule.....	5.89	2,850
Mar. 10	S. B. Soule.....	3.88	988	Sept. 7	E. E. Foster.....	3.10	1,500
Apr. 8	do.....	9.84	8,920				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Wolf River at New London, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	1,180	995	1,260	995	780	855	6,590	4,570	2,000	1,690	1,570	1,020
2.....	1,140	995	1,340	995	780	855	6,590	4,360	1,850	1,570	1,690	1,060
3.....	1,100	995	1,380	1,030	780	855	6,590	4,260	1,770	1,530	1,770	1,090
4.....	1,060	995	1,380	960	780	870	7,440	3,990	1,730	1,490	1,770	1,450
5.....	1,060	960	1,380	960	780	885	7,440	3,900	1,730	1,450	1,770	1,530
6.....	1,060	960	1,770	960	780	900	7,750	3,810	1,650	1,290	1,690	1,570
7.....	1,060	900	1,680	960	780	915	8,070	3,650	1,570	1,410	1,850	1,530
8.....	1,030	930	1,640	960	780	930	8,740	3,650	1,570	1,450	2,000	1,570
9.....	1,030	960	1,680	900	780	960	10,600	3,650	1,530	1,730	2,100	1,570
10.....	995	995	1,590	900	780	995	12,200	3,650	1,730	2,300	2,100	1,490
11.....	960	995	1,540	900	780	1,030	13,500	3,650	3,570	2,710	2,150	1,900
12.....	995	930	1,500	900	780	1,100	15,000	3,490	4,260	2,950	2,000	2,000
13.....	960	930	1,500	870	780	1,180	15,500	3,490	4,690	3,200	1,900	2,100
14.....	1,030	900	1,420	840	795	1,240	15,000	3,490	4,960	3,490	1,730	2,100
15.....	1,060	930	1,380	840	795	1,340	13,500	3,410	4,960	3,810	1,610	2,050
16.....	1,060	930	1,420	780	795	1,420	12,200	3,200	4,820	3,900	1,530	2,000
17.....	1,060	960	1,420	810	795	1,500	10,600	3,130	4,570	4,170	1,330	2,000
18.....	1,060	930	1,420	780	810	1,640	10,600	3,010	4,280	4,170	1,330	1,810
19.....	1,100	960	1,420	840	810	1,770	10,200	2,950	4,170	4,080	1,290	1,690
20.....	1,140	930	1,380	825	810	1,900	9,820	2,890	3,810	3,650	1,210	1,570
21.....	1,100	930	1,300	825	810	2,000	9,090	2,770	3,810	3,570	1,210	1,610
22.....	1,100	830	1,260	810	810	2,190	8,740	2,710	3,650	3,270	1,170	1,610
23.....	1,100	930	1,180	810	825	2,340	8,070	2,500	3,490	3,070	1,170	1,570
24.....	1,060	930	1,100	810	825	2,600	7,440	2,450	3,200	2,890	1,170	1,490
25.....	1,030	960	1,100	795	825	2,820	6,860	2,350	3,070	2,710	1,130	1,410
26.....	1,060	960	1,030	795	840	2,990	6,340	2,300	2,830	2,550	1,130	1,290
27.....	1,100	1,030	1,030	795	840	3,220	5,660	2,200	2,650	2,400	1,130	1,290
28.....	1,100	1,140	1,060	780	840	3,510	5,280	2,150	2,400	2,200	1,060	1,250
29.....	1,060	1,220	1,060	780	-----	4,360	4,960	2,150	2,150	2,000	1,060	1,210
30.....	1,060	1,260	995	780	-----	5,390	4,690	2,050	1,900	1,850	1,060	1,210
31.....	995	-----	995	780	-----	6,350	-----	2,020	-----	1,730	1,020	-----

NOTE.—Stage-discharge relation affected by ice Dec. 20 to Mar. 31.

Monthly discharge of Wolf River at New London, Wis., for the year ending Sept. 30, 1922

[Drainage area, 2,240 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,180	960	1,060	0.473	0.55
November.....	1,260	900	979	.437	.49
December.....	1,770	995	1,340	.598	.69
January.....	1,030	780	863	.385	.44
February.....	840	780	799	.357	.37
March.....	6,350	855	1,960	.875	1.01
April.....	15,500	4,690	9,170	4.09	4.56
May.....	4,570	2,020	3,160	1.41	1.63
June.....	4,960	1,530	3,010	1.34	1.50
July.....	4,170	1,290	2,590	1.16	1.34
August.....	2,150	1,020	1,510	.674	.78
September.....	2,100	1,020	1,570	.701	.78
The year.....	15,500	780	2,330	1.04	14.14

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., 1 mile downstream from mouth of Mill Creek, coming in from left, and 4 miles upstream from Embarrass, Waupaca 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, 1922.

GAGE.—Chain gage fastened to downstream handrail; read by Charles Muraski.

CHANNEL AND CONTROL.—Bed of channel at gage and downstream heavy gravel. Riffle 100 feet downstream forms the 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, 11.50 feet at 4 p. m., April 10 (discharge, 6,760 second-feet); minimum discharge estimated, 68 second-feet January 20–25.

1919–1922: Maximum stage recorded, that of April 10, 1922; minimum stage recorded, 2.52 feet at 7.05 a. m. August 2, 1920 (discharge, 52 second-feet).

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

REGULATION.—Several dams above station are used for development of power but they do not have enough storage to cause any but slight daily fluctuation in stage.

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 during period when stage-discharge relation was affected by ice for which it was obtained by applying to rating table mean daily gage height corrected for ice effect by means of discharge measurements, observer's notes, and weather records. Open-water records, except at extremely high stages, good; winter records fair.

Discharge measurements of Embarrass River near Embarrass, Wis., during the year ending Sept. 30, 1922

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. 18	S. B. Soule.....	• 3.66	120	July 24	S. B. Soule.....	3.65	417
Feb. 8	S. R. Collins.....	• 3.63	118	Sept. 8	E. E. Foster.....	3.24	237
Mar. 11	S. B. Soule.....	• 4.10	156				

• Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Embarrass River near Embarrass, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	180	177	183	130	140	80	645	647	455	173	270	247
2	170	180	217	130	140	90	695	598	409	193	338	259
3	158	180	210	125	102	90	770	578	342	177	432	235
4	155	173	247	125	114	102	900	672	320	170	247	228
5	164	161	270	125	114	114	1,060	798	282	173	196	228
6	158	173	262	125	127	140	1,240	850	239	186	247	232
7	158	173	247	125	140	155	1,600	902	235	303	386	217
8	155	186	173	125	114	155	2,020	824	235	598	409	303
9	155	155	164	125	127	155	4,520	798	342	1,010	364	455
10	158	124	155	125	278	155	6,280	747	697	1,600	286	672
11	161	155	137	120	203	155	6,120	672	1,120	1,900	286	722
12	164	146	173	120	170	170	4,860	598	1,240	1,840	266	647
13	158	140	177	120	170	185	3,220	526	1,360	1,420	232	432
14	161	146	170	120	170	205	2,660	432	955	902	217	338
15	161	152	167	120	114	220	2,980	386	598	798	221	329
16	161	132	155	120	90	240	1,900	409	647	432	206	282
17	167	135	137	120	102	260	1,840	409	798	386	203	274
18	173	164	135	120	102	280	1,840	409	850	303	186	266
19	164	161	135	90	102	280	1,700	455	798	270	177	266
20	164	161	135	68	114	280	1,600	478	578	286	170	262
21	161	161	135	68	114	280	1,240	409	478	338	167	232
22	158	161	135	68	114	320	1,120	364	409	409	173	269
23	173	152	135	68	114	365	1,010	270	329	455	180	214
24	161	152	135	68	114	410	955	409	346	432	183	206
25	155	146	135	68	102	455	902	502	239	386	173	200
26	164	137	130	90	90	500	902	455	274	262	164	193
27	173	193	130	90	90	550	850	360	210	247	173	180
28	164	155	130	90	90	580	798	320	247	247	173	146
29	173	173	130	102	-----	600	747	299	190	235	173	186
30	180	183	130	114	-----	600	672	282	170	239	167	177
31	170	-----	130	127	-----	620	-----	355	-----	251	221	-----

NOTE.—Stage-discharge relation affected by ice Dec. 18 to Apr. 8.

Monthly discharge of Embarrass River near Embarrass, Wis., for the year ending Sept. 30, 1922

[Drainage area, 395 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	180	155	164	0.415	0.48
November	193	124	160	.405	.45
December	270	130	165	.418	.48
January	130	68	107	.271	.31
February	278	80	127	.322	.34
March	620	80	284	.719	.83
April	6,280	645	1,890	4.78	5.33
May	902	270	523	1.32	1.52
June	1,360	170	513	1.30	1.45
July	1,900	179	536	1.36	1.57
August	432	164	235	.595	.69
September	722	146	296	.749	.84
The year	6,280	68	416	1.05	14.29

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 map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch = 6 miles).

RECORDS AVAILABLE.—January 13, 1914, to September 30, 1922.

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 the sloping gage is 0.75 foot higher than that of the chain gage; owing to change in slope, however, difference between the readings on the 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 measuring section bed is fine, smooth gravel. Neither bank is overflowed to any extent at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.92 feet at 7 a. m. April 10 and at 5 p. m. April 11 (discharge, 5,780 second-feet); minimum discharge, 120 second-feet January 20.

1914-1922: Maximum stage recorded, 7.5 feet at 7.15 p. m. June 7, 1914 (discharge, 5,350 second-feet); minimum discharge, 120 second-feet January 20, 1922.

ICE.—Stage-discharge relation affected by ice.

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

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,220 second-feet; gage read to quarter-tenths 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 by applying to rating table mean daily gage height 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 Sept. 30, 1922

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. 26	A. O. Olson.....	1.28	183	Apr. 7	S. B. Soulé.....	4.69	2,770
Jan. 19	S. B. Soulé.....	* 1.92	125	8	do.....	4.79	3,050
Feb. 7	S. R. Collins.....	* 2.46	226	14	A. O. Olson.....	4.61	2,810
Mar. 10	S. B. Soulé.....	* 2.79	233	July 23	S. B. Soulé.....	2.09	497

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Little Wolf River at Royalton, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	197	197	310	145	240	225	1,570	680	501	323	590	266
2.....	204	204	342	140	255	200	1,670	620	412	361	590	273
3.....	211	204	472	140	270	195	1,870	650	323	402	560	280
4.....	204	197	560	140	240	205	1,970	680	501	412	472	293
5.....	250	192	530	140	225	215	2,180	650	386	402	402	323
6.....	250	197	444	140	210	240	2,400	710	361	314	472	305
7.....	221	192	428	140	225	245	2,740	710	337	323	560	371
8.....	238	197	417	135	210	225	2,980	710	352	293	650	530
9.....	230	216	407	135	210	235	4,600	740	386	1,010	650	650
10.....	238	211	391	135	220	240	5,600	740	800	970	620	620
11.....	243	192	342	135	205	245	5,750	740	2,620	1,090	650	501
12.....	221	204	238	130	205	260	4,870	620	2,080	1,210	560	472
13.....	211	204	280	130	205	275	3,950	590	2,860	1,130	530	439
14.....	216	221	250	130	180	295	2,860	590	2,290	1,010	456	456
15.....	211	221	269	130	190	320	2,510	530	1,770	800	530	412
16.....	204	204	328	130	160	345	2,600	560	1,210	620	439	422
17.....	197	197	318	125	165	380	1,870	501	865	472	386	402
18.....	238	192	240	125	155	415	1,870	500	800	439	352	412
19.....	216	197	200	125	155	470	1,670	650	770	456	337	456
20.....	192	192	180	120	155	530	1,670	530	710	466	280	439
21.....	197	197	165	130	165	620	1,670	530	650	472	273	422
22.....	192	204	160	130	155	680	1,480	456	530	501	280	402
23.....	188	204	155	150	170	740	1,210	560	472	530	305	386
24.....	197	204	155	170	170	830	1,050	590	361	472	280	323
25.....	204	221	150	170	190	900	970	590	273	422	293	305
26.....	197	250	150	180	185	970	770	650	402	314	266	266
27.....	192	269	150	170	195	1,050	530	530	412	209	373	235
28.....	197	260	150	170	215	1,130	900	560	402	280	280	240
29.....	188	276	145	170	-----	1,300	800	530	466	280	293	246
30.....	192	250	145	160	-----	1,390	740	560	466	314	280	246
31.....	188	-----	145	215	-----	1,480	-----	560	-----	402	273	-----

NOTE.—Stage-discharge relation affected by ice Dec. 18 to Apr. 6.

Monthly discharge of Little Wolf River at Royalton, Wis., for the year ending Sept. 30, 1922

[Drainage area, 485 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	250	188	210	0.433	0.50
November.....	276	192	212	.437	.49
December.....	590	145	278	.573	.66
January.....	215	120	145	.299	.34
February.....	270	155	197	.406	.42
March.....	1,480	195	544	1.12	1.29
April.....	5,750	530	2,230	4.60	5.13
May.....	740	456	609	1.28	1.45
June.....	2,980	273	856	1.76	1.96
July.....	1,210	209	539	1.11	1.28
August.....	650	266	425	.876	1.01
September.....	650	235	380	.784	.87
The year.....	5,750	120	551	1.14	15.40

WAUPACA RIVER NEAR WAUPACA, WIS.

LOCATION.—Near north line of 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 map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—October 18, 1917, to September 30, 1922. 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. 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, 4.60 feet at 9.30 a. m. April 11 (discharge, 1,690 second-feet); minimum discharge estimated 100 second-feet February 18.

1918-1922: 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 the various plants is small so that mean monthly discharge represents closely the natural flow.

ACCURACY.—Stage-discharge relation changed slightly during winter; rating curve used October 1 to December 16 fairly well defined; curve used March 24 to September 30 fairly well defined between 184 and 331 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except for periods of ice effect for which it was determined by applying to rating table the daily gage height corrected for ice effect by means of discharge measurements, observer's notes, and weather records. Open-water records fair; winter records poor.

Discharge measurements of Waupaca River near Waupaca, Wis., during the year ending Sept. 30, 1922

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. 26	A. O. Olson.....	1.75	176	June 13	A. O. Olson.....	3.08	637
Jan. 20	S. B. Soulé.....	* 3.00	211	July 23	S. B. Soulé.....	2.02	230
Feb. 6	S. R. Collins.....	* 3.14	150	Sept. 7	E. E. Foster.....	1.76	191
Mar. 9	S. B. Soulé.....	* 3.92	242				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Waupaca River near Waupaca, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept
1.	193	168	193	155	145	205	494	329	296	250	265	209
2.	193	168	234	145	205	220	574	329	280	250	250	209
3.	193	168	248	170	195	205	780	329	250	250	265	209
4.	180	168	248	170	155	205	730	329	250	222	265	209
5.	180	168	234	145	155	195	730	329	265	222	222	209
6.	180	180	278	180	150	205	730	346	265	222	250	209
7.	180	193	248	155	130	265	780	346	250	265	595	209
8.	180	180	193	170	145	280	840	329	236	265	265	280
9.	180	168	180	180	145	240	1,450	329	236	296	312	312
10.	180	180	168	155	130	265	1,370	346	418	400	280	280
11.	180	168	180	180	130	280	1,690	329	1,160	475	250	265
12.	180	180	193	195	130	295	1,300	296	1,450	400	236	265
13.	180	180	168	170	130	310	960	312	1,160	364	236	236
14.	180	168	193	170	130	325	595	329	730	312	222	222
15.	193	168	193	155	130	340	534	329	730	296	236	250
16.	193	168	206	170	130	360	514	296	437	280	236	265
17.	180	180	205	170	130	375	636	280	364	265	236	222
18.	180	168	205	170	100	395	680	312	346	250	222	236
19.	193	180	205	190	130	395	554	346	312	236	222	209
20.	193	180	195	210	145	395	475	329	329	236	222	236
21.	193	180	195	170	130	410	475	296	296	236	222	236
22.	180	193	195	155	175	410	400	280	296	265	222	222
23.	168	195	195	110	220	410	490	280	265	280	222	236
24.	168	195	195	180	235	400	400	346	265	265	222	236
25.	168	180	195	170	250	400	364	329	265	236	250	236
26.	193	180	195	155	205	437	364	312	265	222	250	209
27.	180	155	180	130	205	554	346	280	280	222	222	209
28.	180	193	195	145	205	595	346	265	250	222	222	209
29.	193	168	180	130	-----	554	346	265	265	222	196	209
30.	193	168	195	130	-----	475	312	280	236	222	209	222
31.	193	-----	170	130	-----	475	-----	280	-----	265	209	-----

NOTE.—Stage-discharge relation affected by ice Nov. 23-25 and Dec. 17 to Mar. 23. Gage not read Nov. 8; discharge interpolated.

Monthly discharge of Waupaca River near Waupaca, Wis., for the year ending Sept. 30, 1922

[Drainage area, 305 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	193	168	184	0.603	0.70
November	195	155	176	.577	.64
December	278	168	196	.642	.74
January	210	110	162	.531	.61
February	250	100	159	.521	.54
March	595	195	351	1.15	1.33
April	1,690	312	672	2.20	2.46
May	346	265	313	1.03	1.19
June	1,450	236	415	1.36	1.52
July	475	222	271	.889	1.02
August	595	196	249	.816	.94
September	312	209	232	.761	.85
The year	1,690	100	282	.925	12.54

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 map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—June 30, 1916, to September 30, 1922.

GAGE.—Chain gage fastened to upstream side of bridge; read by Wilma Opge-north.

DISCHARGE MEASUREMENTS.—From highway bridge or by wading. At extreme flood stages, measurement may be made from Chicago & North Western 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, 7.20 feet at 5.15 p. m., March 7 (discharge, 3,500 second-feet); minimum stage, 1.48 feet at 4.30 p. m., August 27 (discharge, about 1 second-foot).

1916–1922: 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 defined below 3,000 second-feet. Gage read to hundredths twice daily; slight diurnal fluctuation during low-water periods may somewhat impair the accuracy of the daily mean gage height. 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 by applying to rating table mean daily gage height corrected for ice effect by means of discharge measurements, observer's notes, and weather records. Open-water records fair; winter record roughly approximate.

Discharge measurements of Sheboygan River near Sheboygan, Wis., during the year ending Sept. 30, 1922

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. 25	A. O. Olson.....	2.30	98.8	Mar. 7	S. B. Soule.....	6.90	3,040
Jan. 16	S. B. Soule.....	*3.40	78.1	Apr. 5	.....do.....	3.48	593
Feb. 21	.....do.....	*3.62	83.0	June 16	.....do.....	2.97	352

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Sheboygan River near Sheboygan, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	68	98	98		72	295	475	176	115	41	52	54
2.....	66	79	132		125	360	525	179	93	43	66	58
3.....	56	68	112		75	525	550	190	96	54	72	66
4.....	52	74	118		75	525	560	182	76	32	70	40
5.....	60	81	186		125	500	600	168	88	54	56	49
6.....	62	93	120		160	1,780	850	1,250	64	48	70	40
7.....	70	81	220		160	3,500	1,100	243	76	51	58	30
8.....	74	81	193	65	125	1,780	1,350	204	70	72	81	33
9.....	64	98	227		100	1,540	1,600	212	88	51	72	139
10.....	68	91	165		125	1,540	1,860	193	272	132	93	191
11.....	76	44	148		125	1,620	2,850	186	405	176	86	74
12.....	84	88	129		125	2,940	2,400	193	382	208	79	60
13.....	70	70	158		105	1,950	1,540	148	428	223	54	86
14.....	74	76	204		150	1,950	1,110	93	500	235	84	129
15.....	74	68	172		130	2,040	1,050	136	405	179	56	152
16.....	72	81	231	75	130	1,780	788	112	382	148	70	142
17.....	66	84	285	65	100	1,620	732	86	351	86	32	98
18.....	74	91	285	45	75	1,050	705	93	281	96	29	112
19.....	142	101	275	55	80	1,700	650	112	216	91	28	93
20.....	136	120	235	46	120	1,780	550	129	298	88	8	84
21.....	132	126	195	55	85	1,050	525	145	129	84	23	91
22.....	86	72	160	55	90	870	500	136	165	66	23	86
23.....	123	118	125	40	100	930	450	115	101	86	23	101
24.....	112	86	105	25	110	990	360	96	115	86	38	70
25.....	115	123	90	40	125	990	256	112	112	88	49	60
26.....	112	118	85	45	160	1,180	223	120	81	68	30	70
27.....	118	98	85	40	195	1,050	243	76	64	66	1	62
28.....	96	96	80	45	230	930	235	93	93	54	9	66
29.....	101	118	80	55		1,110	220	88	64	49	26	66
30.....	84	104	80	65		990	197	93	60	62	24	70
31.....	104		80	65		990		106		48	37	

NOTE.—Stage-discharge relation affected by ice Dec. 18 to Mar. 2. Gage not read Apr. 6-9 discharge interpolated. The low discharge on Aug. 27 was caused by shut-down of power plants.

Monthly discharge of Sheboygan River near Sheboygan, Wis., for the year ending Sept. 30, 1922

[Drainage area, 403 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	142	52	86.8	0.215	0.25
November.....	126	44	90.9	.226	.25
December.....	285	80	157	.390	.45
January.....	75	25	57.7	.143	.16
February.....	230	72	121	.300	.31
March.....	3,500	295	1,350	3.35	3.86
April.....	2,850	197	835	2.07	2.31
May.....	1,250	76	176	.437	.50
June.....	500	60	189	.469	.52
July.....	235	32	92.4	.229	.26
August.....	93	1	48.4	.120	.14
September.....	152	30	79.1	.196	.22
The year.....	3,500	1	275	.682	9.23

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 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 map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—April 30, 1914, to September 30, 1922.

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

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 the control, and is fairly permanent, changing only during exceptionally heavy floods. Below the control the river flows in an artificial channel, which at one time was a quarry. Left bank above and below the control high and not subject to overflow; right bank above control of medium height; below the control the right bank is artificial and of such height that overflows will seldom occur.

DISCHARGE MEASUREMENTS.—Made by wading immediately above the gage section; at medium and high stages from a concrete highway bridge about 1 mile upstream from the gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.6 feet at 3 p. m. February 24 (discharge, 4,150 second-feet); minimum stage, 0.40 foot at 5 p. m. September 7 (discharge, about 39 second-feet).

1914-1922: Maximum stage recorded, 9.00 feet March 20, 1918 (discharge, about 12,100 second-feet); minimum discharge, about 26 second-feet August 2, 1916.

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

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

ACCURACY.—Stage-discharge relation well defined throughout range of stage which occurred during the year. Stage-discharge relation permanent. Gage read to quarter-tenths twice daily. Practically no diurnal fluctuation due to artificial regulation. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records excellent; winter records fair.

Discharge measurements of Milwaukee River near Milwaukee, Wis., during the year ending Sept. 30, 1922

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. 24	A. O. Olson.....	1.04	224	Mar. 7	S. B. Soulé.....	3.55	2,610
Jan. 16	S. B. Soulé.....	1.32	* 112	June 17	do.....	1.67	592

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Milwaukee River near Milwaukee, Wis., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	145	426	414	460	90	855	810	348	217	118	152	87
2.....	137	370	1,000	325	150	655	855	323	208	87	114	148
3.....	156	261	1,000	250	190	552	1,000	323	208	130	89	148
4.....	99	239	900	210	195	615	1,160	348	183	102	75	130
5.....	85	239	810	445	160	730	1,050	323	114	65	80	148
6.....	156	226	692	490	150	364	1,050	298	114	65	75	105
7.....	328	208	460	190	125	2,680	950	298	105	148	89	47
8.....	217	284	414	135	110	3,540	1,000	261	148	94	137	55
9.....	208	552	308	110	145	2,960	1,430	275	105	75	130	230
10.....	239	443	414	100	170	2,680	1,900	275	137	175	171	243
11.....	370	359	333	110	185	1,900	2,680	298	208	171	160	252
12.....	386	217	239	130	165	1,900	2,960	261	348	381	130	270
13.....	280	208	239	120	210	1,900	1,660	230	585	348	137	234
14.....	234	239	359	95	190	1,900	1,260	208	692	328	114	298
15.....	196	239	333	85	165	1,900	1,160	148	730	275	80	490
16.....	175	270	443	110	185	1,660	1,050	148	730	208	71	460
17.....	183	359	1,780	80	155	1,260	950	208	585	230	59	403
18.....	270	460	552	70	220	900	1,000	230	490	208	111	261
19.....	520	615	585	50	210	1,000	1,160	230	552	188	105	257
20.....	490	655	655	110	405	1,660	1,000	252	308	167	118	252
21.....	370	520	730	80	520	1,780	855	252	243	148	114	230
22.....	298	386	770	80	2,410	1,430	810	252	230	134	80	212
23.....	261	414	810	110	3,690	1,210	692	252	208	130	80	243
24.....	217	414	900	175	4,150	1,100	655	208	167	114	67	217
25.....	183	261	855	45	3,240	1,100	552	348	124	99	75	152
26.....	183	348	810	65	2,680	1,430	585	520	114	94	102	230
27.....	183	359	730	85	1,900	1,210	520	432	148	94	77	171
28.....	152	359	692	150	1,210	1,430	490	376	130	87	67	167
29.....	196	359	655	130	-----	1,780	348	252	105	80	65	152
30.....	490	359	443	65	-----	1,540	432	208	99	105	87	127
31.....	460	-----	333	135	-----	1,100	-----	208	-----	118	77	-----

NOTE.—Stage-discharge relation affected by ice Jan. 1 to Feb. 20.

Monthly discharge of Milwaukee River near Milwaukee, Wis., for the year ending Sept. 30, 1922

[Drainage area, 661 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	520	85	254	0.384	0.44
November.....	655	208	355	.537	.60
December.....	1,780	239	634	.959	1.11
January.....	490	50	154	.233	.27
February.....	4,150	90	835	1.26	1.31
March.....	3,540	364	1,510	2.28	2.63
April.....	2,960	348	1,070	1.62	1.81
May.....	520	148	277	.419	.48
June.....	730	99	278	.421	.47
July.....	381	65	154	.233	.27
August.....	171	59	100	.151	.17
September.....	490	47	214	.324	.36
The year.....	4,150	47	483	.731	9.92

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 147th Street, Harvey, Cook County, and 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, 1922. Daily gage heights June 10, 1907, to September 30, 1916, were collected by the Sanitary District of Chicago.

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 at gage composed of clay and gravel.

Low-water control is at The Rocks, about a mile below gage where bed of river is heavy gravel; somewhat shifting. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.95 feet at 8 a. m. April 12 (discharge, 3,550 second-feet); minimum stage, 2.94 feet August 21 and 22 (discharge, 48 second-feet).

1907-1922: Maximum stage recorded, 13.4 feet March 6, 1908 (discharge not determined). Minimum discharge from 1917 to 1922, estimated at less than 25 second-feet in January, 1918.

ACCURACY.—Stage-discharge relation affected by remains of cofferdam at highway bridge 2,000 feet below gage from October 1 to about December 31; seriously affected by ice for short periods during the winter and changed slightly by high water of April. Rating curve used October 1 to April 12 well defined above, and fairly well defined below, 60 second-feet; curve used April 13 to September 30 well defined throughout. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating tables, correction for backwater October 1 to December 31 estimated from results of discharge measurements. Records good for open-water periods after December 31, fair for period October 1 to December 31, poor for period of ice effect.

Discharge measurements of Little Calumet River at Harvey, Ill., during the year ending Sept. 30, 1922

[Made by H. E. Grosbach]

Date	Gage height	Discharge
	<i>Feet</i>	<i>Sec.-ft.</i>
Oct. 13.....	3.38	102
Mar. 8.....	4.07	315
Aug. 11.....	3.00	56.2

* Backwater from clay cofferdam at highway bridge 0.4 mile below gage.

Daily discharge, in second-feet, of Little Calumet River at Harvey, Ill., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	106	142	431	370	1,220	468	2,330	815	412	84	66	59
2-----	96	142	770			394	2,080	770	376	81	70	56
3-----	104	131	725			376	1,840	770	358	77	66	53
4-----	107	131	590			357	1,780	770	324	73	63	51
5-----	106	125	590			340	1,720	725	308	70	63	51
6-----	98	121	508	200	200	340	1,670	680	277	66	59	53
7-----	111	115	468			322	1,570	590	248	66	56	59
8-----	107	111	468			340	1,420	590	234	66	56	63
9-----	102	125	431			322	1,420	548	220	70	56	63
10-----	98	125	431			322	1,320	508	194	59	56	77
11-----	98	121	412	200	200	680	3,130	508	157	96	56	88
12-----	96	146	412			725	3,550	468	143	123	56	88
13-----	96	146	394			590	2,590	431	134	110	56	66
14-----	96	157	376			590	2,330	431	123	112	55	66
15-----	96	157	376			590	2,260	412	110	110	53	66
16-----	94	168	357	200	200	590	2,080	394	102	104	53	70
17-----	94	180	860			590	2,080	376	92	96	53	66
18-----	96	180	905			590	2,080	357	92	92	51	63
19-----	96	770	770			590	1,840	412	84	84	51	63
20-----	96	860	680			1,720	1,520	508	84	81	51	70
21-----	96	590	635	200	200	1,320	1,420	508	81	73	48	70
22-----	96	468	548			1,130	1,420	431	77	77	48	66
23-----	96	431	590			1,040	1,320	376	77	92	51	66
24-----	94	431	508			431	995	1,220	376	73	77	53
25-----	91	431	508			357	950	548	73	73	73	63
26-----	91	431	508	200	200	357	1,040	1,130	1,520	73	73	66
27-----	88	468	468			394	1,040	995	1,130	71	73	66
28-----	84	431	431			340	1,040	950	770	70	73	66
29-----	84	431	590			1,130	905	548	73	73	63	56
30-----	129	412	468			1,130	860	508	81	70	66	56
31-----	135	---	394	---	---	2,080	---	431	---	70	63	---

NOTE.—Discharge estimated Jan. 1-4 and Jan. 20 to Feb. 22, on account of ice, from gage-height record, observer's notes, and weather records. Braced figures show mean discharge for periods included.

Monthly discharge of Little Calumet River at Harvey, Ill., for the year ending Sept. 30, 1922

[Drainage area, 570 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October-----	135	84	99.3	0.174	0.20
November-----	860	111	289	.507	.57
December-----	905	357	536	.940	1.08
January-----	1,220	---	400	.702	.81
February-----	431	---	240	.421	.44
March-----	2,080	322	766	1.34	1.54
April-----	3,550	860	1,730	3.04	3.39
May-----	1,520	357	587	1.08	1.19
June-----	412	70	161	.282	.31
July-----	123	59	82.1	.144	.17
August-----	73	48	58.4	.102	.12
September-----	88	51	63.4	.111	.12
The year-----	3,550	48	418	.733	9.94

STREAMS 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, 1922.

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 Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.	1,050	1,170	4,250	2,250	1,432	3,770	5,640	2,150	1,340	1,020	620	1,235
2.	1,480	1,170	4,250	2,222	1,432	2,860	5,125	2,105	1,377	990	592	1,300
3.	1,825	1,200	5,000	2,100	1,455	2,515	6,750	2,065	1,410	990	592	1,410
4.	1,785	1,200	5,060	2,000	1,455	2,380	7,215	2,065	1,377	1,020	566	1,235
5.	1,600	1,235	4,750	1,930	1,390	2,405	8,100	2,065	1,377	990	540	1,140
6.	1,410	1,235	4,250	1,855	1,342	3,620	8,700	2,230	1,362	930	566	1,020
7.	1,480	1,200	3,285	1,760	1,300	5,010	8,100	2,355	1,340	900	620	930
8.	1,600	1,170	2,400	1,665	1,224	8,550	6,535	2,570	1,300	930	700	1,235
9.	1,520	1,140	1,985	1,593	1,165	7,980	6,090	2,400	1,520	960	845	1,450
10.	1,560	1,110	1,865	1,455	1,112	6,115	7,390	2,270	2,835	930	870	1,600
11.	1,600	1,080	1,825	1,390	1,093	7,500	7,985	2,150	6,590	1,235	870	1,985
12.	1,600	1,080	1,745	1,300	1,075	8,950	10,440	2,025	12,050	2,576	845	4,250
13.	1,600	1,050	1,705	1,185	1,093	9,440	14,700	1,905	15,300	2,400	760	3,760
14.	1,560	1,235	1,705	1,150	1,075	9,560	9,560	1,825	9,760	2,270	592	2,235
15.	1,520	1,600	1,825	1,130	1,093	9,760	6,930	1,785	7,270	1,945	489	2,400
16.	1,450	1,965	2,400	1,112	1,112	8,700	5,700	1,745	5,275	1,635	489	2,400
17.	1,235	2,400	3,475	1,112	1,130	6,930	5,125	1,745	3,910	1,480	465	2,230
18.	1,140	3,475	6,700	1,130	1,165	5,865	7,860	1,985	4,250	1,450	513	1,945
19.	1,110	4,250	10,560	1,130	1,185	4,600	10,680	2,920	3,965	1,270	540	1,600
20.	1,480	3,285	9,870	1,112	1,201	4,750	9,320	3,760	3,475	1,080	489	1,480
21.	1,480	3,150	7,735	1,112	1,432	10,680	5,425	4,950	2,965	990	440	1,450
22.	1,520	3,100	5,275	1,112	2,460	8,700	5,125	4,250	2,920	930	465	1,270
23.	1,110	2,965	3,760	1,130	4,700	6,930	4,250	3,760	2,875	845	489	1,170
24.	1,110	2,835	3,285	1,112	7,130	6,800	4,250	3,150	2,835	815	489	1,050
25.	1,110	2,655	2,515	1,130	6,850	7,390	4,150	2,570	2,400	830	465	930
26.	1,089	2,520	2,645	1,300	6,250	7,795	4,200	2,400	2,025	815	440	845
27.	1,080	2,400	2,725	1,522	5,590	8,455	3,760	2,270	1,705	815	465	730
28.	1,080	2,835	2,670	1,545	4,890	7,500	3,100	1,985	1,410	760	465	700
29.	1,050	3,430	2,515	1,522	-----	6,930	2,400	1,785	1,235	730	930	646
30.	1,140	3,810	2,380	1,522	-----	6,480	2,230	1,600	1,050	646	1,450	646
31.	1,140	-----	2,250	1,455	-----	5,805	-----	1,410	-----	646	1,785	-----

Monthly discharge of Tittabawassee River at Freeland, Mich., for the year ending Sept. 30, 1922

[Drainage area, 2,530 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,825	1,050	1,370	0.542	0.62
November	4,250	1,050	2,100	.830	.93
December	10,560	1,705	3,770	1.49	1.72
January	2,250	1,112	1,450	.573	.66
February	7,130	1,075	2,280	.901	.94
March	10,680	2,380	6,600	2.61	3.01
April	14,700	2,230	6,560	2.59	2.89
May	4,950	1,410	2,400	.949	1.09
June	15,300	1,050	3,620	1.43	1.60
July	2,570	646	1,160	.458	.53
August	1,785	440	660	.261	.30
September	4,250	646	1,540	.609	.68
The year	15,300	440	2,790	1.10	14.97

NOTE.—Monthly and yearly discharge computed by U. S. Geol. 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, 1922.

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. The flow through the 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 $\frac{1}{4}$ -inch 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 foundations, and this flow is determined from a weir calibration of the sluices. Water flows over crest of dam only a few days during the 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 Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	328	284	788	493	276	758	1,733	952	465	191	127	131
2	296	257	788	351	355	690	1,606	880	460	149	145	200
3	309	245	795	412	277	600	1,406	848	417	214	128	10
4	260	252	784	548	316	568	1,353	851	318	130	127	132
5	278	235	671	776	283	577	1,238	835	374	172	115	153
6	233	227	701	653	324	597	1,131	843	298	162	105	139
7	305	243	688	601	298	773	1,074	758	280	141	151	131
8	402	227	634	623	290	673	1,069	707	293	162	128	137
9	384	303	628	540	296	713	1,034	650	318	137	121	140
10	448	247	565	529	278	698	977	613	306	151	146	119
11	451	263	566	522	362	854	1,664	635	306	124	131	212
12	396	300	584	476	318	1,069	1,897	578	298	158	63	171
13	393	297	585	450	319	989	1,711	577	260	128	97	162
14	390	304	556	334	276	981	1,493	506	272	169	161	163
15	386	285	541	405	290	939	1,442	512	248	116	130	146
16	378	340	539	330	283	924	1,333	459	243	151	127	187
17	330	382	751	382	244	853	2,839	498	198	135	131	176
18	342	542	942	340	263	837	3,357	434	267	156	144	178
19	330	835	999	372	317	811	2,748	756	246	128	69	175
20	320	1,078	978	291	443	826	2,277	806	222	128	35	176
21	340	1,070	911	305	391	769	2,092	725	257	128	128	176
22	322	1,066	753	295	926	762	1,966	710	197	140	129	167
23	314	973	724	296	1,364	742	1,865	662	197	131	127	173
24	297	931	695	289	1,182	784	1,689	664	179	125	130	177
25	306	878	617	296	1,017	779	1,598	681	118	124	128	165
26	274	920	647	247	904	810	1,461	649	166	129	73	160
27	276	969	599	274	829	831	1,383	600	134	130	6	149
28	272	982	548	277	789	835	1,150	599	165	130	129	140
29	282	927	567	225	-----	819	967	569	165	107	130	151
30	240	843	499	256	-----	968	945	540	159	61	139	147
31	259	-----	505	250	-----	1,558	-----	418	-----	129	130	-----

Monthly discharge of Huron River at Barton, Mich., for the year ending Sept. 30, 1922

[Drainage area, 723 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	451	233	327	0.452	0.52
November.....	1,078	227	557	.770	.86
December.....	999	499	682	.943	1.09
January.....	776	225	401	.555	.64
February.....	1,364	244	482	.667	.70
March.....	1,558	568	819	1.13	1.30
April.....	3,357	945	1,620	2.24	2.50
May.....	952	418	661	.914	1.05
June.....	465	118	261	.361	.40
July.....	214	61	140	.194	.22
August.....	161	6	117	.162	.19
September.....	212	10	155	.215	.24
The year.....	3,357	6	517	.715	9.71

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

HURON RIVER AT FLAT ROCK, MICH.

LOCATION.—At highway bridge at Flat Rock, 2,000 feet below crossing of Detroit, Toledo & Ironton Railway.

DRAINAGE AREA.—1,000 square miles.

RECORDS AVAILABLE.—August 6, 1904, to March 4, 1922, when station was discontinued.

GAGE.—Staff; read daily to tenths, occasionally to half-tenths twice daily, by John Vincent.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during the period October 1, 1921, to March 4, 1922, 8.60 feet December 25 (stage-discharge relation affected by ice); minimum stage, 1.40 feet October 31.

ICE.—Ice jams form below station and cause backwater at the gage; in general, the section above the station is kept open by the power plant.

REGULATION.—At ordinary stages flow of the river is controlled by a dam and power plant immediately above station, but operation of this plant is assumed to have little effect on diurnal fluctuations of stage.

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

Daily gage height, in feet, of Huron River at Flat Rock, Mich., for the period Oct. 1, 1921, to Mar. 4, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	1.80	1.60	4.20	-----	2.80	5.40	16	-----	1.70	3.00	3.50	2.50	-----
2	-----	2.00	4.00	-----	3.00	5.00	17	2.00	1.80	3.20	3.50	2.50	-----
3	1.70	1.80	3.80	4.60	4.10	4.70	18	2.60	2.00	-----	3.50	2.50	-----
4	1.70	1.60	-----	5.00	2.70	4.60	19	1.90	3.00	5.00	3.40	-----	-----
5	1.70	1.60	3.50	5.90	-----	-----	20	1.90	-----	4.50	3.00	3.20	-----
6	1.70	-----	3.50	6.80	2.80	-----	21	1.70	5.00	4.50	3.00	4.00	-----
7	1.80	1.60	3.50	6.40	3.00	-----	22	1.70	5.00	4.30	-----	3.80	-----
8	1.80	1.60	3.50	-----	3.00	-----	23	-----	4.80	4.00	3.00	6.00	-----
9	-----	1.60	3.30	-----	2.90	-----	24	1.60	-----	4.00	3.00	7.30	-----
10	2.00	1.70	3.30	-----	3.00	-----	25	1.60	4.50	8.60	3.00	7.50	-----
11	2.10	1.70	-----	-----	2.80	-----	26	1.60	4.50	7.50	2.90	-----	-----
12	2.30	1.70	3.20	-----	-----	-----	27	1.60	-----	-----	2.90	6.00	-----
13	2.20	-----	3.20	-----	3.00	-----	28	1.50	4.80	7.00	2.90	5.80	-----
14	2.20	1.60	3.00	-----	3.00	-----	29	1.50	4.40	6.00	-----	-----	-----
15	2.00	1.70	3.00	-----	3.00	-----	30	-----	4.20	5.60	2.90	-----	-----
							31	1.40	-----	5.50	2.80	-----	-----

NOTE.—Gage not read on days for which no gage height is given. Stage-discharge relation probably affected by ice during latter part of December, most of January, and part of February.

MAUMEE RIVER AT ANTWERP, OHIO

LOCATION.—At highway bridge 1 mile north of Antwerp, Paulding County.

DRAINAGE AREA.—2,130 square miles (area in Ohio measured on topographic maps, area in Michigan on United States Geological Survey map of Michigan, and area in Indiana on General Land Office map).

RECORDS AVAILABLE.—September 1, 1921, to September 30, 1922.

GAUGE.—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 half a mile below gage; control for high water is long stretch of river below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 16.8 feet at 7.30 a. m. April 2 (discharge, 14,700 second-feet); minimum stage, 1.08 feet at 6 p. m. September 9, 1921 (discharge, 133 second-feet)

ICE.—Stage-discharge relation affected by ice; flow estimated by study of observer's notes and weather records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent except when affected by ice.

Rating curve well defined. 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 Maumee River at Antwerp, Ohio, during the years ending Sept. 30, 1921 and 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
1921		<i>Feet</i>	<i>Sec.-ft.</i>	1922		<i>Feet</i>	<i>Sec.-ft.</i>
Sept. 1	Lee and Lamoureux	1.16	149	May 4	E. E. R. Dornbach	3.76	1,260
Oct. 27	-----do-----	1.37	191	June 1	-----do-----	4.39	1,610
				July 13	-----do-----	4.35	1,580
1922				Sept. 15	Lasley Lee	1.65	282
Mar. 16	Lasley Lee	12.28	9,040				

Daily discharge, in second-feet, of Maumee River at Antwerp, Ohio, for the period Sept. 1, 1921, to Sept. 30, 1922

Day	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	148	219	1,260	2,510	890	1,700	1,620	14,400	1,200	1,620	355	232	194
2-----	148	206	1,320	2,090	640		1,260	14,700	1,140	1,260	408	219	194
3-----	170	194	1,740	2,230	890		940	14,200	1,090	1,040	550	219	181
4-----	158	181	1,500	2,670	1,200		890	13,200	1,200	890	790	206	181
5-----	148	170	1,090	2,300	3,770		890	11,600	1,810	790	595	194	181
6-----	181	170	940	1,950	4,900	900	1,140	8,590	2,300	690	465	194	219
7-----	170	170	790	1,680	4,220		2,160	5,500	1,950	640	390	194	372
8-----	158	306	640	1,500	3,230		2,910	3,770	1,680	595	338	194	390
9-----	148	595	485	1,260	2,990		2,590	3,150	1,500	550	322	260	355
10-----	148	595	425	1,140	2,590		2,370	3,950	1,560	940	485	219	275
11-----	158	550	355	1,090	2,090	900	4,700	6,610	4,220	1,500	790	194	322
12-----	170	445	445	1,040	1,560		8,370	10,400	6,300	1,500	1,880	181	372
13-----	194	372	550	1,090	1,200		7,380	11,800	6,610	1,260	1,560	181	306
14-----	338	322	840	1,260	890		6,500	11,600	5,500	940	1,040	181	290
15-----	390	275	940	1,500	890		9,060	12,400	4,040	790	890	170	275
16-----	322	260	1,040	1,680	840	600	9,060	12,700	2,910	640	990	170	306
17-----	275	246	1,320	1,880	940		7,820	12,500	2,670	595	1,260	170	290
18-----	246	219	2,090	3,770	940		6,610	12,900	3,320	550	1,380	170	246
19-----	232	219	1,560	5,700	940		3,500	12,400	5,800	550	1,260	170	219
20-----	194	206	528	5,200			3,230	11,800	8,700	505	1,040	158	206
21-----	194	194	890	4,220		2,370	3,230	10,900	9,060	465	740	158	181
22-----	194	181	790	3,860			3,230	10,100	7,820	425	550	158	181
23-----	181	181	322	3,590			3,410	8,590	5,800	408	445	158	170
24-----	181	181	4,400	2,990			3,590	4,400	5,700	4,700	355	390	158
25-----	194	170	5,600	2,370			3,500	5,600	3,320	4,130	338	290	158
26-----	275	170	4,310	2,160		2,510	2,750	4,500	2,440	4,600	322	275	206
27-----	445	194	3,860	1,740			2,510	5,400	2,020	4,800	306	260	194
28-----	290	170	3,770	1,500			2,230	8,150	1,740	4,700	338	232	194
29-----	260	181	3,770	1,440			8,370	1,560	4,400	338	219	206	148
30-----	232	425	3,070	1,380			8,150	1,380	2,990	322	206	219	148
31-----		1,090		1,090			12,400		2,090		206	219	

NOTE.—Stage-discharge relation affected by ice Jan. 20 to Feb. 22; discharge estimated by study of observer's notes and weather records. Braced figures show mean discharge for periods indicated.

Monthly discharge of Maumee River at Antwerp, Ohio, for the period Sept. 1, 1921, to Sept. 30, 1922

[Drainage area, 2,130 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
September-----1921	445	148	218	0.102	0.11
October-----1921-22	1,090	170	292	.137	.16
November-----	5,600	322	1,690	.793	.88
December-----	5,700	1,040	2,250	1.06	1.22
January-----	4,900		1,380	.648	.75
February-----	3,590		1,630	.765	.80
March-----	12,400	890	4,830	2.27	2.62
April-----	14,700	1,380	8,530	4.00	4.46
May-----	9,060	1,090	3,890	1.83	2.11
June-----	1,620	306	715	.336	.37
July-----	1,880	206	665	.312	.36
August-----	260	158	191	.090	.10
September-----	390	148	232	.109	.12
The year-----	14,700	148	2,190	1.03	13.95

LOCATION.—At highway bridge at Waterville, Lucas County.

RECORDS AVAILABLE.—November 19, 1898, to December 31, 1901, and August 26, 1921, to September 30, 1922.

GAGE.—Chain gage on upstream side of highway bridge, at the same datum as gage used 1898-1901; 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 1.0 foot.

ICE.—Stage-discharge relation affected by ice; flow estimated from observer's notes, weather records, and records of flow of Maumee River and tributaries above station.

EXTREMES OF DISCHARGE.—Maximum combined discharge of river and canal during period of records in 1921 and 1922, 41,700 second-feet on April 2, 1922; 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 and Erie Canal at Grand Rapids and carried past station. See record of Miami and Erie Canal at Waterville.

ACCURACY.—Stage-discharge relation permanent except when affected by ice. Rating curve well defined up to 25,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good except those for extremely low water and for period of ice effect, which are fair.

Discharge measurements of Maumee River at Waterville, Ohio, during the years ending Sept. 30, 1921 and 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
1921 Sept. 3	Lamoureux and Lee	<i>Feet</i> 1.38	<i>Sec.-ft.</i> 52.0	1922 May 30	E. E. R. Dornbach	<i>Feet</i> 5.36	<i>Sec.-ft.</i> 11,200
1922 Mar. 14	Lesley Lee	6.62	17,700	July 11	do	2.82	1,820
May 2	E. E. R. Dornbach	2.97	2,280	Aug. 24	do	1.46	85.5
				Sept. 13	Lee and Sherman	3.79	4,440

*Daily discharge, in second-feet, of Maumee River at Waterville, Ohio, for the period
Aug. 26, 1921, to Sept. 30, 1922*

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1921			1921			1921		
1	-----	45	11	-----	48	21	-----	55
2	-----	45	12	-----	55	22	-----	51
3	-----	50	13	-----	42	23	-----	42
4	-----	45	14	-----	42	24	-----	40
5	-----	42	15	-----	45	25	-----	45
6	-----	36	16	-----	45	26	-----	48
7	-----	36	17	-----	58	27	-----	50
8	-----	40	18	-----	40	28	-----	50
9	-----	42	19	-----	33	29	-----	45
10	-----	42	20	-----	36	30	-----	42
						31	-----	48

Daily discharge, in second-feet, of Maumee River at Waterville, Ohio, for the period Aug. 26, 1921, to Sept. 30, 1922—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921-22												
1-----	42	1,950	6,400	1,740	3,600	2,780	39,600	2,530	3,750	484	113	67
2-----	45	2,290	5,230	1,170		3,600	41,300	2,290	2,910	484	68	99
3-----	40	2,180	5,230	1,540		3,310	37,800	2,180	2,410	337	167	99
4-----	45	3,310	5,230	734	6,820	1,840	30,400	2,180	1,540	337	68	134
5-----	48	3,040	5,990	7,690	9,500	1,270	23,700	3,040	1,170	316	113	75
6-----	48	1,950	5,230	14,900	7,250	1,740	19,800	4,530	910	664	113	2,910
7-----	51	1,170	4,060	15,400	6,820	3,460	14,400	4,570	611	337	47	2,060
8-----	75	1,240	3,180	11,900	5,600	6,820	10,400	3,600	880	390	62	1,170
9-----	55	1,270	3,180	7,250	3,750	8,580	8,580	3,040	890	358	84	611
10-----	40	1,080	2,410	5,600	3,310	7,690	9,960	3,180	1,640	228	62	546
11-----	45	390	1,950	4,530	2,780	10,400	19,800	27,100	2,910	1,640	62	1,170
12-----	51	940	2,060	1,640	3,900	19,200	32,700	22,600	3,900	1,450	84	3,040
13-----	113	484	2,660	1,700	4,870	19,800	32,700	16,500	3,600	2,530	84	4,530
14-----	84	1,170	4,060		4,530	17,600	28,800	15,400	2,780	3,180	58	3,180
15-----	84	2,180	4,530		3,600	23,200	31,600	12,400	2,060	3,460	58	1,950
16-----	67	2,660	4,870	1,700	3,040	25,400	33,300	7,690	1,540	2,780	62	1,170
17-----	99	3,180	5,230		2,530	22,600	33,300	5,230	1,950	1,740	58	598
18-----	118	4,530	13,400		2,530	14,900	34,400	4,210	1,740	1,360	58	337
19-----	84	12,400	15,400	1,300	1,020	8,580	32,100	8,130	805	1,640	84	368
20-----	62	24,300	18,200		1,170	8,130	31,600	25,400	664	1,540	75	424
21-----	55	26,500	17,600		2,060	7,250	28,800	20,900	805	1,360	42	400
22-----	62	22,600	9,960	1,300	2,910	8,690	22,000	20,300	484	1,270	58	337
23-----	45	17,600	8,130		4,870	8,130	15,400	24,300	484	611	55	748
24-----	48	13,400	6,820		13,400	9,500	13,400	16,500	390	295	68	118
25-----	33	12,400	6,400	1,300	13,400	13,400	10,400	13,400	295	295	67	238
26-----	45	10,400	4,870		14,400	14,900	6,400	13,900	228	484	62	60
27-----	58	10,900	3,310		4,530	15,400	4,870	22,000	3,310	358	62	89
28-----	62	10,400	3,900	1,300	3,900	23,700	3,900	20,900	460	210	67	84
29-----	60	9,040	1,740		-----	26,500	3,180	17,000	546	75	75	80
30-----	67	7,690	3,040		-----	24,800	2,780	11,900	664	184	75	80
31-----	58	-----	2,530	-----	-----	36,700	-----	5,990	-----	53	75	-----

NOTE.—Stage-discharge relation affected by ice Jan. 13 to Feb. 3; flow estimated from observer's notes, weather records, and comparison with records of flow of Maumee River at Antwerp and Auglaize River near Defiance, which contribute about 70 per cent of the combined flow of river and canal at Waterville. Braced figures show mean discharge for periods included. Figures in the above do not include the water diverted by the Miami and Erie Canal.

Monthly discharge, in second-feet, of Maumee River and Miami and Erie Canal at Waterville, Ohio, for the period Aug. 26, 1921, to Sept. 30, 1922

Month	Maximum (combined)	Minimum (combined)	Mean		
			River	Canal	Combined
1921					
August 26-31-----	408	323	47.2	333	380
September-----	469	299	44.0	354	398
1921-22					
October-----	605	387	60.8	422	482
November-----	27,000	840	7,090	474	7,560
December-----	18,700	2,160	6,030	506	6,530
January-----	15,900	-----	3,320	505	3,820
February-----	14,900	1,540	5,120	533	5,650
March-----	37,100	1,720	12,900	475	13,300
April-----	41,700	3,180	21,900	361	22,300
May-----	30,200	2,620	12,300	411	12,700
June-----	4,230	664	1,540	458	1,980
July-----	3,920	531	982	480	1,460
August-----	645	345	73.7	382	456
September-----	5,010	337	892	466	1,360
The year-----	41,700	337	6,000	454	6,460

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.—383 square miles (area in Ohio measured on topographic maps; area in Michigan on United States Geological Survey map, scale, 1:1,000,000).

RECORDS AVAILABLE.—September 1, 1921, to September 30, 1922.

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

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel straight for about 400 feet above and below gage. One channel at all stages. Banks high and brushy. Control for low water is ruins of old timber milldam 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 period of record, 13.0 feet at 5.30 p. m. April 1 (discharge, 1,990 second-feet); minimum stage, 1.10 feet at 8.35 a. m. August 16 (discharge, 15 second-feet). Discharge may have been as low or lower during January when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation affected by ice; flow estimated from discharge measurements, observer's notes, and weather records.

ACCURACY.—Stage-discharge relation permanent except when affected by leaves on control October 14–31, by ice January 13 to February 8, and by limbs blown into creek July 11–18. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily height to rating table. Records good, except for period of ice effect and periods when leaves and limbs were lodged on control for which they are fair.

Discharge measurements of Tiffin River near Stryker, Ohio, during the years ending Sept. 30, 1921 and 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1921		<i>Feet</i>	<i>Sec.-ft.</i>	1922		<i>Feet</i>	<i>Sec.-ft.</i>
Sept. 2	Lamoureux and Lee.....	1.50	41.0	May 3	E. E. R. Dornbach.....	3.00	224
Oct. 26	Lee and Lamoureux.....	*1.63	34.4	May 31	do.....	2.77	202
				July 12	do.....	*1.73	52.3
1922				Aug. 25	do.....	1.24	22.3
Feb. 4	Lasley Lee.....	*5.34	424	Sept. 15	Lasley Lee.....	1.56	47.9
Mar. 15	do.....	9.43	1,320				

* Stage-discharge relation affected by leaves lodged on control.

† Stage-discharge relation affected by ice.

• Stage-discharge relation affected by brush lodged on control.

Daily discharge, in second-feet, of Tiffin River near Stryker, Ohio, for the period Sept. 1, 1921, to Sept. 30, 1922

Day	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	40	52	275	335	152		275	1,950	412	173	57	31	24
2	40	43	201	320	152		290	1,930	365	152	46	39	78
3	40	44	140	365	107		275	1,780	275	133	61	35	305
4	40	39	114	380	275		260	1,590	412	120	78	36	133
5	43	40	101	290	808	290	275	1,260	524	107	72	33	78
6	72	39	78	230	916		335	1,130	412	101	66	26	53
7	72	47	72	230	1,020		790	880	320	83	54	31	44
8	56	120	61	230	688		844	654	260	78	46	33	37
9	51	133	52	215	476	201	705	508	230	72	42	29	32
10	46	126	66	215	396	245	722	476	604	101	46	33	35
11	51	107	89	187	320	350	916	1,350	572	146	41	26	89
12	95	89	66	173	275	476	1,240	1,760	428	107	51	26	166
13	61	83	66	230		412	1,380	1,700	350	61	52	25	114
14	54	72	83	305		320	1,400	1,800	320	78	47	25	72
15	37	72	72	305		230	1,330	1,760	201	78	36	22	47
16	37	53	83	290		173	1,100	1,690	159	83	40	19	42
17	37	53	89	588	130	120	880	1,670	146	101	38	27	36
18	46	41	173	1,170		107	540	1,650	146	101	57	24	32
19	32	45	620	1,240		78	492	1,670	260	101	140	22	29
20	33	50	1,130	1,310		95	508	1,650	916	83	107	24	26
21	38	47	1,220	1,080		126	540	1,570	970	78	72	28	32
22	40	46	934	705		230	492	1,440	688	66	48	23	32
23	37	46	637	508		335	492	1,170	412	66	44	21	28
24	32	50	350	365		476	588	705	335	57	42	25	24
25	45	41	444	290		476	671	604	444	42	39	24	26
26	51	36	556	230	30	335	671	540	808	46	44	28	26
27	48	39	826	201		275	952	508	970	40	40	28	20
28	53	44	688	215		260	1,100	460	637	66	36	33	26
29	44	54	524	201			1,290	380	350	72	36	36	25
30	47	120	396	187			1,380	412	245	66	32	28	21
31		215		133			1,720		201		34	31	

NOTE.—Discharge Sept. 1, 1921, estimated. Stage-discharge relation affected by leaves on control Oct 14-31; discharge ascertained by shifting-control method Oct. 14-25 and by rating curve parallel to standard curve Oct. 26-31. Stage-discharge relation affected by ice Jan. 13 to Feb. 8; flow estimated by study of observer's notes, weather records, and a discharge measurement made during period. Stage-discharge relation affected July 11-18 by limbs blown into river; discharge ascertained from rating curve parallel to standard curve. Braced figures are mean discharge for period indicated.

Monthly discharge of Tiffin River near Stryker, Ohio, for the period Sept. 1, 1921, to Sept. 30, 1922

[Drainage area, 383 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1921					
September	95	32	47.3	0.123	0.14
1921-22					
October	215	36	67.3	.176	.20
November	1,220	52	340	.888	.99
December	1,310	133	410	1.07	1.23
January	1,020		228	.595	.69
February	476		273	.713	.74
March	1,720	260	789	2.06	2.38
April	1,950	380	1,220	3.19	3.56
May	970	146	431	1.13	1.30
June	173	40	88.6	.231	.26
July	140	32	53.0	.138	.16
August	39	19	28.1	.073	.08
September	305	20	57.7	.151	.17
The year	1,950	19	332	.867	11.76

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.—2,320 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 13, 1915, to September 30, 1922.

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 and top of flashing 689.75 feet above mean sea level. Gages read hourly by attendants of power plant.

DISCHARGE MEASUREMENTS.—Made from highway bridge $1\frac{3}{4}$ miles below dam or by wading.

CHANNEL AND CONTROL.—Channel slightly curved above and below dam. Banks high. The dam and power plant form the control for the gage. Daily discharge ascertained by power company from hourly readings on head and tail gages, log sheets of power plant, and ratings of crest of dam, Taintor gates, and turbines.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during period of record, 36,100 second-feet on March 18, 1919; minimum mean daily discharge, 7 second-feet on June 30, 1918.

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

DIVERSIONS.—None.

REGULATION.—Flow regulated by operation of power plant of the Defiance Gas & Electric Co. Record of discharge not corrected for storage.

ACCURACY.—Daily discharge ascertained by power company from readings on head and tail gages, and ratings of crest of dam, Taintor gates, and turbines. The discharge computed by the power company has been checked at various stages by current-meter measurements made below dam by engineers of the United States Geological Survey and found to be accurate. The leakage through dam and plant has been determined for various stages below crest level by current-meter measurements made by wading below the dam when power plant was shut down. The leakage varies from 7 second-feet at headwater elevation 679 feet to 41 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, uncorrected for leakage, furnished by Defiance Gas & Electric Co. All records of daily discharge below 300 second-feet corrected for leakage by engineers of the United States Geological Survey.

Discharge measurements of Auglaize River near Defiance, Ohio, during the year ending Sept. 30, 1922

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. 28	Lasley Lee.....	85.60	37.1	June 2	E. E. R. Dornbach.....	90.21	1,020
Mar. 17	do.....	90.99	9,130	July 14	do.....	90.92	2,520
May 5	E. E. R. Dornbach.....	90.80	2,240	Aug. 26	do.....	86.50	621

Daily discharge, in second-feet, of Auglaize River near Defiance, Ohio, for the years ending Sept. 30, 1915-1922

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1915							1915						
1.....		456	586	584	1,010	907	16.....	303	42	2,120	4,050	2,580	942
2.....		321	766	872	1,780	861	17.....	344	175	2,010	9,690	1,650	936
3.....		431	813	523	2,220	733	18.....	300	158	1,560	16,000	2,970	2,100
4.....		677	1,520	293	7,780	733	19.....	304	171	1,140	14,800	3,640	9,330
5.....		636	2,200	489	13,500	35	20.....	269	175	1,090	11,800	2,420	12,200
6.....		324	1,440	1,050	10,800	801	21.....	224	162	1,530	9,410	4,380	9,980
7.....		212	1,170	766	5,270	7,480	22.....	332	82	1,440	8,050	8,940	6,150
8.....		346	1,210	803	2,720	7,680	23.....	312	24	1,020	6,380	13,200	2,790
9.....		106	949	900	2,610	5,220	24.....	354	179	541	3,650	10,900	1,590
10.....		277	776	1,190	1,710	2,490	25.....	599	188	357	1,650	5,810	1,160
11.....		289	704	1,210	1,230	1,940	26.....	844	200	567	1,770	4,340	345
12.....		317	495	1,920	3,610	1,230	27.....	1,010	183	12	739	2,040	1,320
13.....	482	359	408	2,170	7,560	1,280	28.....	731	187	252	456	1,890	3,120
14.....	304	659	2,270	1,770	6,770	974	29.....	622	513	250	623	711	1,700
15.....	382	318	2,050	2,040	4,900	970	30.....	607	348	248	450	1,600	2,110
							31.....		391		1,210	906	

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1915-16												
1.....	2,340	420	889	3,550	25,900	899	7,380	3,890	957	557	342	29
2.....	2,680	360	792	14,700	24,400	807	4,240	1,660	815	115	387	29
3.....	3,160	385	1,010	29,600	13,300	759	3,430	3,350	876	521	272	88
4.....	2,660	387	775	32,200	5,560	726	1,940	6,490	877	44	174	30
5.....	1,840	374	33	25,200	3,290	37	752	3,600	1,110	690	136	30
6.....	1,160	312	336	16,500	1,940	851	558	3,520	1,440	600	27	31
7.....	1,020	336	327	10,200	1,780	775	1,020	5,080	4,140	584	157	108
8.....	956	359	315	5,040	1,170	1,880	853	7,650	6,520	390	154	31
9.....	949	326	331	4,000	759	2,850	843	6,170	6,900	37	153	31
10.....	882	287	338	3,160	629	2,230	1,040	3,240	4,930	219	152	105
11.....	816	380	312	2,650	942	1,490	1,480	1,440	3,770	191	155	32
12.....	943	230	34	3,350	894	1,150	2,840	1,170	2,220	157	148	85
13.....	807	235	341	8,970	168	1,300	1,280	1,870	1,910	201	28	76
14.....	734	223	334	13,000	592	1,120	1,330	675	2,260	168	160	57
15.....	958	211	435	11,300	813	1,130	1,340	1,180	1,950	300	160	100
16.....	4,330	167	345	7,660	825	929	1,010	1,320	1,180	51	143	32
17.....	3,980	195	353	3,490	865	840	1,130	1,020	1,060	314	153	58
18.....	3,910	318	630	2,340	449	804	870	900	932	163	158	32
19.....	3,670	696	1,860	1,420	672	534	804	853	1,070	200	158	33
20.....	4,420	3,480	2,450	1,220	676	771	688	543	1,100	159	30	33
21.....	2,800	6,640	1,420	1,860	680	780	735	344	3,850	339	160	33
22.....	2,210	4,020	1,170	6,850	615	1,970	1,150	706	6,260	461	162	33
23.....	1,220	1,500	1,050	11,800	1,530	11,000	1,700	711	6,990	287	149	33
24.....	693	1,660	1,080	8,460	2,500	14,700	1,440	770	3,900	453	161	172
25.....	1,020	910	456	4,820	3,320	12,400	996	870	2,760	625	160	98
26.....	988	1,140	1,200	3,790	2,550	6,760	1,770	970	892	418	143	82
27.....	826	863	3,330	7,700	1,590	16,000	7,140	1,290	958	550	29	106
28.....	902	856	2,180	5,950	1,280	21,800	11,400	4,290	832	558	164	106
29.....	852	953	2,110	6,480	1,060	18,900	10,500	3,500	769	329	147	116
30.....	801	911	1,700	9,070		16,000	3,840	1,655	799	88	90	143
31.....	610		1,400	17,600		13,100		1,320		375	29	

Daily discharge, in second-feet, of Auglaize River near Defiance, Ohio, for the years ending Sept. 30, 1915-1922—Continued

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1916-17												
1.....	369	34	160	810	3,920	2,140	8,300	705	1,780	2,400	171	129
2.....	163	56	27	801	2,630	1,600	13,100	485	1,900	1,220	516	45
3.....	44	115	135	598	1,940	1,100	17,400	426	1,430	1,000	164	38
4.....	47	221	28	673	1,180	641	16,400	330	1,190	494	189	214
5.....	31	156	29	1,230	1,080	1,320	11,800	1,380	644	546	32	291
6.....	32	31	77	4,620	950	1,230	11,200	7,660	865	469	186	241
7.....	108	24	29	7,660	853	1,150	12,200	6,640	1,870	505	175	277
8.....	192	24	31	7,660	910	1,090	10,200	3,350	3,380	433	169	31
9.....	32	302	319	5,170	960	919	5,180	1,700	1,470	801	167	117
10.....	103	79	123	3,790	966	810	2,960	1,600	1,310	816	165	32
11.....	468	24	67	2,080	380	4,760	2,090	1,370	1,320	927	163	61
12.....	130	128	32	1,500	476	8,900	1,510	1,030	1,110	391	104	33
13.....	65	40	106	1,280	391	12,200	1,270	615	892	434	245	33
14.....	43	26	394	621	389	10,900	1,010	866	1,230	429	27	34
15.....	54	103	283	1,130	301	10,200	602	707	1,510	393	28	35
16.....	29	119	30	831	286	8,560	1,030	643	1,130	423	338	35
17.....	29	86	73	995	129	5,020	1,220	649	636	401	29	74
18.....	56	43	31	937	11	3,340	1,080	431	756	402	30	62
19.....	229	128	31	603	232	2,050	831	447	474	1,150	80	86
20.....	399	49	31	469	277	1,620	998	785	562	1,020	58	36
21.....	654	81	32	41	287	1,470	710	1,450	661	787	84	36
22.....	77	113	32	222	456	1,410	274	2,510	666	392	108	93
23.....	20	117	32	237	579	1,460	844	5,280	473	646	124	169
24.....	59	606	33	296	795	4,410	692	4,980	455	642	31	182
25.....	157	24	92	752	3,680	5,310	603	3,020	1,750	522	45	328
26.....	48	98	40	1,010	2,590	2,730	602	1,720	1,180	648	81	57
27.....	22	25	256	1,100	2,900	3,110	598	1,000	1,080	731	74	84
28.....	34	38	248	759	2,260	3,450	475	1,390	888	683	50	34
29.....	78	26	706	1,060		1,930	345	2,800	1,210	344	54	35
30.....	24	27	1,320	2,220		1,640	619	3,900	4,100	236	307	208
31.....	24		1,020	4,380		1,320		1,900		305	287	
1917-18												
1.....	42	8,550	668	471	157	1,480	327	1,050	573	14	28	134
2.....	228	5,410	129	786	329	4,910	389	1,380	337	18	303	28
3.....	267	3,090	31	719	18	6,130	386	854	759	23	103	29
4.....	88	1,260	48	695	265	3,840	386	574	667	28	28	355
5.....	35	1,350	49	643	282	1,230	411	194	614	30	376	1,040
6.....	49	1,000	50	177	17	4,610	658	597	607	31	357	1,010
7.....	243	867	90	48	19	4,430	144	556	748	253	264	948
8.....	70	663	325	49	157	3,020	403	409	878	212	403	862
9.....	199	638	417	49	363	2,210	404	419	1,030	31	345	1,140
10.....	219	572	302	51	236	3,830	395	478	1,430	31	96	465
11.....	83	122	186	302	610	6,830	401	248	942	100	14	635
12.....	419	637	147	496	5,500	5,540	399	337	831	213	150	924
13.....	271	652	134	226	9,900	4,200	343	418	846	116	26	897
14.....	214	480	137	444	23,200	7,900	320	644	839	234	63	676
15.....	217	658	111	440	20,000	10,400	388	870	768	362	15	108
16.....	230	631	174	432	19,800	8,600	376	897	317	457	16	753
17.....	214	544	42	414	11,600	4,980	447	893	385	303	17	803
18.....	313	206	43	103	6,450	3,140	382	685	206	305	17	832
19.....	308	377	69	107	4,460	1,890	386	328	218	282	18	924
20.....	355	346	45	24	8,420	1,080	276	870	224	93	108	850
21.....	182	310	319	179	10,100	1,720	122	873	206	18	18	722
22.....	414	315	811	196	7,250	1,320	402	878	17	60	18	145
23.....	519	69	570	275	4,360	1,320	401	852	18	32	19	836
24.....	440	31	1,450	287	3,260	456	319	812	286	20	21	448
25.....	459	150	2,130	312	3,020	1,240	396	643	418	21	23	315
26.....	546	55	1,460	303	2,230	1,070	379	176	171	22	24	234
27.....	547	83	1,360	93	2,400	615	504	382	232	56	25	204
28.....	175	81	1,210	218	1,890	443	342	384	480	24	41	189
29.....	1,900	161	1,080	287		391	903	472	8	26	42	169
30.....	7,730	58	416	280		365	903	111	7	26	26	248
31.....	9,140		959	276		26		798		28	28	

Daily discharge, in second-feet, of Auglaize River near Defiance, Ohio, for the years ending Sept. 30, 1915-1922—Continued

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918-19												
1-----	257	475	403	1,120	687	867	837	937	342	872	313	29
2-----	297	420	897	3,500	449	756	810	779	811	690	589	30
3-----	361	160	932	4,180	627	908	782	847	910	787	384	31
4-----	22	479	978	2,550	605	862	738	669	831	392	295	32
5-----	24	36	1,060	1,400	533	798	677	3,060	494	329	302	33
6-----	82	57	765	1,010	584	791	474	5,300	612	255	557	33
7-----	24	37	612	1,180	623	799	795	5,080	719	159	996	354
8-----	25	116	415	1,130	632	780	835	2,670	430	100	931	188
9-----	26	447	401	1,000	391	1,120	805	1,930	372	97	891	173
10-----	27	110	417	973	494	6,850	808	1,630	379	104	499	31
11-----	28	343	377	1,020	532	9,100	819	1,640	570	317	627	31
12-----	29	490	596	755	488	6,820	802	1,920	327	227	377	32
13-----	57	485	896	368	506	5,180	553	1,650	497	317	344	32
14-----	57	473	6,900	457	520	2,460	842	1,420	640	65	200	154
15-----	31	474	10,800	638	655	6,680	802	1,150	441	263	237	32
16-----	32	576	11,600	378	512	16,900	5,540	1,210	416	115	113	100
17-----	32	527	7,000	392	452	31,900	7,950	2,430	57	36	374	49
18-----	33	934	4,300	548	491	36,100	10,600	2,550	167	36	233	33
19-----	50	981	1,900	408	484	30,000	8,170	2,230	230	37	282	33
20-----	289	894	1,490	512	461	15,700	5,990	1,440	403	332	276	33
21-----	48	1,420	3,520	567	479	8,360	2,520	2,030	111	36	150	307
22-----	289	1,520	7,990	524	490	3,770	1,080	1,960	478	36	151	164
23-----	369	1,130	9,600	309	563	1,600	1,720	2,270	88	37	37	226
24-----	356	641	9,200	664	839	1,290	1,820	1,990	212	94	81	190
25-----	32	899	8,000	744	868	970	1,810	1,470	381	38	393	273
26-----	403	901	4,780	1,190	873	909	1,620	1,890	268	38	343	288
27-----	1,070	871	3,830	1,610	1,000	1,140	1,310	1,580	86	373	268	91
28-----	58	439	2,440	1,350	946	1,730	1,220	1,210	718	87	204	372
29-----	51	865	1,580	1,200	-----	1,740	902	937	854	93	29	127
30-----	56	764	1,330	975	-----	1,280	797	509	1,220	64	39	171
31-----	345	-----	1,140	845	-----	1,020	-----	476	-----	291	180	-----
1919-20												
1-----	663	11,000	8,440	300	303	442	1,080	1,230	305	335	101	35
2-----	941	11,100	4,120	330	265	435	1,030	1,470	253	670	354	35
3-----	483	10,300	2,730	306	131	928	932	1,610	170	853	347	36
4-----	495	7,600	1,170	313	73	4,800	583	1,200	145	648	364	261
5-----	363	3,170	1,250	313	144	7,230	901	989	99	1,050	357	106
6-----	546	2,100	1,110	309	116	8,220	985	999	135	1,230	373	117
7-----	547	2,020	876	301	96	8,190	1,090	928	32	2,540	320	447
8-----	637	1,540	1,116	245	124	4,880	1,060	855	67	5,620	107	486
9-----	321	1,260	1,140	184	363	3,450	789	724	192	3,890	819	599
10-----	116	1,460	1,120	108	369	2,400	315	972	195	2,570	209	579
11-----	655	1,060	1,050	118	420	3,180	503	1,010	193	2,160	10	399
12-----	524	1,670	1,070	216	494	7,910	240	992	98	1,360	11	40
13-----	1,620	2,210	664	214	916	12,200	217	994	176	816	12	462
14-----	2,320	1,850	457	217	988	9,550	365	1,010	363	712	13	451
15-----	1,760	1,400	388	221	983	4,850	914	947	191	1,396	14	270
16-----	1,120	918	421	217	1,480	4,380	1,090	1,010	201	1,980	395	428
17-----	913	1,090	579	54	1,120	9,140	8,000	1,260	120	1,730	1,460	422
18-----	780	876	526	102	1,040	8,640	14,800	1,070	168	1,300	1,460	355
19-----	499	962	420	227	1,040	4,040	11,200	949	563	3,710	1,250	87
20-----	969	929	413	244	1,020	4,520	13,300	927	376	6,380	717	125
21-----	786	1,020	435	73	919	2,120	17,800	924	838	4,170	502	166
22-----	382	515	440	79	392	2,750	17,600	819	840	2,160	637	166
23-----	224	156	430	104	327	2,110	19,800	742	488	1,510	652	97
24-----	204	265	462	416	530	1,740	14,100	895	484	917	574	32
25-----	335	465	356	281	645	1,360	8,980	949	477	644	27	33
26-----	474	586	329	238	994	1,160	3,940	973	412	907	67	131
27-----	658	690	315	238	1,020	1,030	2,050	964	277	869	30	33
28-----	1,090	989	360	247	796	795	1,650	959	157	403	31	48
29-----	8,290	3,100	335	220	469	1,550	1,450	559	163	411	32	34
30-----	11,600	4,380	337	258	-----	2,080	1,180	383	351	523	33	35
31-----	11,000	-----	314	98	-----	1,420	-----	328	-----	533	34	-----

Daily discharge, in second-feet, of Auglaize River near Defiance, Ohio, for the years ending Sept. 30, 1915-1922—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1920-21												
1	13	739	2,080	844	1,390	507	7,290	9,220	1,130	332	31	33
2	35	994	3,780	2,910	1,310	484	2,930	10,600	1,150	268	385	33
3	106	1,160	5,490	5,020	1,340	835	1,960	7,050	939	262	419	33
4	36	1,220	5,520	3,980	1,380	1,490	1,480	3,790	1,060	549	28	75
5	149	904	7,600	2,770	2,480	1,430	1,050	1,640	766	562	29	151
6	301	438	8,800	2,170	6,030	2,710	782	1,130	1,190	263	30	84
7	89	361	6,370	1,800	8,390	7,180	542	995	1,350	176	31	33
8	34	576	5,100	2,050	10,500	10,700	693	586	1,240	163	31	171
9	35	576	2,180	2,300	11,800	11,400	4,360	493	743	354	32	32
10	363	512	1,780	2,800	9,870	13,400	6,340	404	249	29	60	354
11	35	382	1,560	1,800	6,350	13,700	4,120	586	92	231	34	300
12	33	363	1,400	1,380	3,870	10,300	2,330	436	19	254	35	29
13	33	315	1,630	957	3,070	9,860	1,790	573	250	100	313	70
14	33	332	1,640	601	3,940	10,000	1,360	815	53	27	131	31
15	36	383	1,910	652	7,370	8,030	1,300	529	49	28	34	32
16	34	588	2,240	604	6,110	5,480	4,060	598	267	28	34	32
17	233	331	1,790	827	3,380	5,050	8,500	503	24	28	79	181
18	33	325	1,090	548	2,940	3,030	11,400	335	252	77	155	279
19	34	327	1,080	494	1,880	1,930	11,500	268	25	56	248	31
20	34	273	979	443	1,340	2,110	7,440	368	77	29	99	32
21	35	1,120	758	333	1,120	1,270	4,370	521	31	29	32	33
22	70	3,820	770	2,280	960	1,150	1,320	238	158	111	32	99
23	35	8,030	1,810	7,310	914	1,150	3,020	329	52	29	33	34
24	35	12,000	3,110	8,280	653	1,770	1,920	840	41	46	33	34
25	36	9,010	2,530	4,270	692	5,930	2,840	10,400	528	29	33	303
26	84	5,770	1,810	2,980	703	8,390	1,650	15,300	404	29	122	34
27	762	3,460	1,290	1,510	658	8,610	1,110	9,280	429	30	33	35
28	1,180	1,830	1,150	1,260	657	13,800	1,710	4,770	532	30	60	35
29	1,060	1,610	904	1,200	2,020	20,200	2,420	4,710	331	30	33	36
30	803	1,160	816	1,290	20,600	5,900	2,090	329	31	87	37	36
31	386	-----	992	1,380	-----	13,700	-----	1,660	-----	31	33	-----
1921-22												
1	36	364	1,680	724	596	1,310	22,100	685	1,400	468	542	70
2	327	514	1,450	451	616	1,020	22,200	696	1,000	58	276	255
3	35	1,580	2,050	828	2,400	838	15,900	566	886	354	206	307
4	35	1,520	2,570	817	3,860	865	8,850	1,020	608	193	203	1,340
5	78	1,020	2,070	2,940	3,280	771	5,420	2,030	709	184	254	3,080
6	35	610	1,460	5,900	2,610	784	2,480	1,600	609	29	68	1,800
7	36	681	1,130	4,640	1,720	1,170	2,220	1,130	534	199	151	912
8	653	698	1,030	2,660	1,280	2,380	2,460	1,120	776	210	286	700
9	385	621	795	2,320	1,020	2,550	3,990	1,010	934	287	238	510
10	137	630	665	1,530	939	2,280	4,940	5,830	983	1,490	44	257
11	34	401	587	1,220	860	4,860	10,300	7,340	1,870	1,240	111	906
12	35	451	765	1,020	993	6,500	13,600	7,220	2,490	1,080	97	3,020
13	36	812	1,330	731	1,120	6,080	14,300	6,490	1,520	1,620	132	2,800
14	36	1,410	1,750	610	1,060	7,020	11,100	5,760	1,050	2,230	32	1,880
15	264	1,580	2,300	444	910	9,940	12,900	3,040	837	2,220	32	1,020
16	306	1,920	2,270	629	758	12,000	16,300	2,290	670	1,160	32	552
17	98	2,180	3,010	716	574	8,060	16,600	1,570	756	727	47	283
18	86	4,830	5,490	727	552	3,960	15,000	1,300	470	675	48	478
19	46	9,680	9,990	623	440	2,100	16,200	5,680	460	512	35	582
20	45	12,400	7,250	655	680	2,160	16,800	12,300	383	461	505	567
21	35	12,300	4,360	1,200	1,870	2,390	11,100	17,200	378	454	101	502
22	136	7,720	2,740	1,160	2,510	2,610	4,340	17,300	424	318	33	333
23	431	4,090	1,910	1,060	4,960	2,670	2,340	11,600	372	82	33	320
24	104	2,670	1,730	839	6,780	4,290	1,920	7,140	396	389	34	79
25	157	2,710	1,930	648	7,120	6,150	1,570	5,150	301	434	35	431
26	63	2,720	2,370	646	1,960	6,130	1,240	8,920	376	413	185	571
27	131	2,470	1,850	634	1,260	8,180	1,130	11,400	429	386	35	487
28	111	2,310	1,410	613	1,250	11,600	758	10,900	464	436	36	465
29	94	2,510	1,010	446	-----	13,300	729	7,530	480	379	36	547
30	308	2,380	840	627	-----	13,500	433	3,760	479	81	37	25
31	123	-----	707	643	-----	16,700	-----	2,010	-----	443	38	-----

Monthly discharge, in second-feet, of Auglaize River near Defiance, Ohio, for the year ending Sept. 30, 1915-1922

Month	Maximum	Minimum	Mean
1915			
April 13-30.....	1,010	224	462
May.....	677	24	287
June.....	2,270	12	1,050
July.....	16,000	293	3,480
August.....	13,500	711	4,580
September.....	12,200	35	2,970
1915-16			
October.....	4,420	610	1,780
November.....	6,640	167	953
December.....	3,330	33	946
January.....	32,200	1,220	9,160
February.....	25,900	168	3,470
March.....	21,800	37	5,010
April.....	11,400	558	2,520
May.....	7,650	344	2,260
June.....	6,990	769	2,470
July.....	690	37	327
August.....	387	27	150
September.....	172	29	65.6
The year.....	32,200	27	2,430
1916-17			
October.....	654	20	123
November.....	606	24	98.1
December.....	1,320	27	189
January.....	7,660	41	1,790
February.....	3,920	11	1,140
March.....	12,200	641	3,480
April.....	17,400	274	4,200
May.....	7,660	330	1,990
June.....	4,100	455	1,260
July.....	2,400	236	664
August.....	516	27	138
September.....	325	31	104
The year.....	17,400	11	1,260
1917-18			
October.....	9,140	35	842
November.....	8,550	31	979
December.....	2,130	31	483
January.....	786	24	303
February.....	23,200	17	5,220
March.....	10,400	26	3,200
April.....	903	122	412
May.....	1,380	111	615
June.....	1,430	7	502
July.....	457	14	112
August.....	403	14	97.8
September.....	1,140	28	564
The year.....	23,200	7	1,080
1918-19			
October.....	1,070	22	157
November.....	1,520	36	599
December.....	11,600	377	3,420
January.....	4,180	309	1,080
February.....	1,000	391	599
March.....	36,100	756	6,420
April.....	10,600	474	2,150
May.....	5,300	476	1,830
June.....	1,220	57	469
July.....	872	36	217
August.....	996	29	345
September.....	372	29	122
The year.....	36,100	22	1,470
1919-20			
October.....	11,600	116	1,650
November.....	11,100	156	2,560
December.....	8,440	314	1,070
January.....	416	54	219
February.....	1,480	73	604
March.....	12,200	435	4,110
April.....	19,800	217	4,930
May.....	1,610	328	956
June.....	840	32	284
July.....	6,380	335	1,740
August.....	1,460	10	365
September.....	599	32	217
The year.....	19,800	10	1,560

Monthly discharge, in second-feet, of Auglaize River near Defiance, Ohio, for the years ending Sept. 30, 1915-1922—Continued

Month	Maximum	Minimum	Mean
1920-21			
October.....	1,180	13	200
November.....	12,000	273	1,960
December.....	8,800	758	2,580
January.....	8,280	333	2,160
February.....	11,800	653	3,610
March.....	20,060	484	6,970
April.....	11,500	542	3,580
May.....	15,300	238	2,940
June.....	1,330	19	458
July.....	562	27	137
August.....	419	28	89.3
September.....	354	29	89.8
The year.....	20,000	13	2,060
1921-22			
October.....	653	34	143
November.....	12,400	364	2,860
December.....	9,990	587	2,270
January.....	5,900	444	1,250
February.....	7,120	440	1,930
March.....	16,700	771	5,300
April.....	22,200	433	8,640
May.....	17,300	566	5,540
June.....	2,490	301	768
July.....	2,230	58	626
August.....	542	32	127
September.....	3,080	25	836
The year.....	22,200	25	2,520

NOTE.—Monthly discharge computed by U. S. Geol. Survey from daily-discharge record furnished by the Defiance Gas & Electric Co.

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.

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

RECORDS AVAILABLE.—August 30, 1921, to September 30, 1922.

GAGE.—Chain gage on highway bridge; read to hundredths twice daily 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.

EXTREMES OF STAGE.—Maximum stage recorded during period of record, 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, and at 6 a. m. August 31, 1921.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

Discharge not determined owing to lack of current-meter measurements to define rating curve at high stages.

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Discharge measurements of Blanchard River at Glandorf, Ohio, during the years ending Sept. 30, 1921 and 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
1921		<i>Feet</i>	<i>Sec.-ft.</i>	1922		<i>Feet</i>	<i>Sec.-ft.</i>
Aug. 30	Lee and Lamoureux	1.58	9.0	Mar. 18	Lasley Lee	7.32	824
Oct. 25	do.	1.83	16.1	May 2	E. E. R. Dornbach	8.36	153
				30	do.	8.53	954
1922				July 11	do.	4.91	376
Mar. 14	Lasley Lee	7.36	794	Aug. 24	do.	1.83	19.1
14	do.	7.68	841	Sept. 16	Lasley Lee	2.40	57.3

Daily gage height, in feet, of Blanchard River at Glandorf, Ohio, for the period Aug. 30, 1921, to Sept. 30, 1922

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1921			1921			1921		
1		1.76	11		1.82	21		2.39
2		1.74	12		2.95	22		2.22
3		1.72	13		2.39	23		2.17
4		1.79	14		2.13	24		2.21
5		1.85	15		1.92	25		2.11
6		2.45	16		1.81	26		2.00
7		2.18	17		1.80	27		1.94
8		1.92	18		1.90	28		1.93
9		1.78	19		2.69	29		1.85
10		1.71	20		2.48	30	1.58	1.84
						31	1.67	

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921-22												
1	1.79	3.42	4.8	3.7	3.8	4.0	22.3	3.48	5.0	2.40	2.08	2.00
2	1.80	5.5	5.1	3.6	10.9	3.9	21.6	3.37	4.3	2.40	2.42	2.10
3	1.96	5.2	6.0	3.6	13.5	3.8	18.9	3.48	3.8	2.40	2.36	5.0
4	1.90	4.6	5.2	4.5	13.1	3.7	14.3	3.8	3.8	2.38	2.38	4.4
5	1.86	4.1	4.4	8.3	11.0	3.6	9.3	4.4	3.5	2.44	2.44	4.3
6	1.90	3.4	4.2	9.7	7.5	3.6	7.2	5.0	3.45	2.38	2.30	3.21
7	2.10	2.24	4.0	7.9	6.0	4.1	6.3	5.0	4.43	2.30	2.14	2.86
8	2.23	2.24	4.0	6.1	5.4	4.8	7.6	5.0	3.70	2.44	2.12	2.62
9	2.66	2.24	4.0	5.0	4.9	5.6	9.4	5.5	3.44	9.4	2.02	2.40
10	2.57	2.49	3.8	4.4	4.9	5.4	9.3	12.2	6.2	7.8	2.08	3.38
11	2.21	2.65	3.8	4.0	4.8	6.9	15.1	18.0	9.0	4.9	2.12	4.7
12	2.04	4.1	4.0	4.0	4.9	8.7	18.2	18.0	6.8	4.0	2.02	4.0
13	2.01	4.4	4.7	3.9	5.0	7.3	17.0	12.8	5.4	5.2	1.98	3.9
14	2.00	4.6	5.9	3.7	4.6	7.9	16.1	10.4	4.3	7.4	1.92	3.14
15	1.95	5.2	6.5	3.7	4.4	14.2	17.9	8.9	3.7	5.6	1.88	2.72
16	1.90	5.4	6.5	3.6	3.9	14.4	19.3	6.6	3.43	5.7	1.82	2.40
17	1.86	6.0	6.5	3.21	3.6	10.5	18.8	5.5	3.33	4.4	1.82	2.24
18	1.79	8.4	10.7	3.6	3.4	7.2	18.4	7.1	3.18	4.0	1.82	2.10
19	1.78	11.5	15.3	4.6	4.3	5.3	19.8	12.4	4.3	3.04	1.80	2.04
20	1.84	14.9	14.4	5.5	6.8	5.9	19.3	18.0	3.6	2.92	1.78	1.96
21	1.86	11.5	9.1	6.1	9.3	6.1	16.2	21.1	3.23	2.98	1.76	1.94
22	1.86	8.0	6.3	5.3	8.9	6.4	10.4	20.6	3.00	2.92	1.82	1.92
23	1.86	6.6	4.9	4.2	9.2	6.8	7.2	18.2	2.84	2.76	1.86	1.91
24	1.86	5.8	5.2	3.8	10.2	8.0	5.6	13.2	2.67	2.54	1.84	1.88
25	1.83	6.2	4.9	3.45	9.6	10.7	5.0	16.4	2.58	2.41	1.86	1.86
26	1.78	5.8	4.6	3.31	7.9	9.9	4.6	19.8	2.39	2.32	1.88	1.84
27	1.78	4.9	4.2	3.17	5.1	11.3	4.5	19.3	2.36	2.22	1.86	1.80
28	1.78	5.7	4.2	3.06	4.2	17.0	4.1	16.3	2.36	2.20	1.80	1.80
29	1.83	6.2	4.1	3.04		18.4	3.9	14.2	2.38	2.18	1.80	1.78
30	1.99	5.4	3.8	3.01		18.2	3.6	8.7	2.40	2.12	1.80	1.72
31	2.78		3.7	3.08		20.8		5.4		2.08	1.88	

MIAMI AND ERIE CANAL AT WATERVILLE, OHIO

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

RECORDS AVAILABLE.—August 26, 1921, to September 30, 1922.

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 bridge at gage, or 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.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 7.07 feet at 9 a. m. March 2 (discharge, 610 second-feet); minimum stage 4.30 feet at 7.30 a. m. April 27 (discharge, 238 second-feet).

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

REGULATION.—The flow in the canal is regulated at the head gate at Grand Rapids about 9 miles upstream. The water is used for power at Maumee and Toledo.

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

Discharge measurements of Miami and Erie Canal at Waterville, Ohio, during the years ending Sept. 30, 1921 and 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
1921		<i>Feet</i>	<i>Sec.-ft.</i>	1922		<i>Feet</i>	<i>Sec.-ft.</i>
Aug. 27	V. B. Lamoureux.....	5.04	338	May 2	E. E. R. Dornbach.....	6.06	443
Oct. 29	Lasley Lee.....	5.42	367	.....do.....	.....do.....	6.20	413
				July 11	.....do.....	6.18	496
1922				Aug. 24	.....do.....	6.84	307
Mar. 14	.....do.....	6.01	450	Sept. 13	Lee and Sherman.....	6.16	493

Daily discharge, in second-feet, of Miami and Erie Canal at Waterville, Ohio, for the period Aug. 26, 1921, to Sept. 30, 1922

Day	Aug.	Sept.	Day	Aug.	Sept.	Day	Aug.	Sept.
1921			1921			1921		
1.-----		372	11-----		292	21-----		410
2.-----		336	12-----		360	22-----		397
3.-----		314	13-----		384	23-----		372
4.-----		303	14-----		384	24-----		360
5.-----		292	15-----		372	25-----		372
6.-----		281	16-----		397	26-----	348	372
7.-----		270	17-----		397	27-----	336	372
8.-----		259	18-----		423	28-----	336	384
9.-----		259	19-----		436	29-----	336	372
10.-----		281	20-----		410	30-----	281	397
						31-----	360	

Daily discharge, in second-feet, of Miami and Erie Canal at Waterville, Ohio, for the period Aug. 26, 1921, to Sept. 30, 1922—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921-22												
1.....	397	464	535	450	535	450	478	384	423	464	464	270
2.....	397	450	520	410	565	610	372	436	436	478	478	292
3.....	372	478	535	492	550	436	410	450	423	478	478	336
4.....	372	464	535	506	565	436	423	436	450	450	464	410
5.....	384	450	506	506	565	450	436	423	423	464	450	478
6.....	360	464	506	506	565	478	372	436	450	464	464	506
7.....	336	464	464	492	550	450	360	436	450	464	464	478
8.....	348	464	478	520	520	492	360	464	464	464	436	464
9.....	384	464	520	535	535	478	384	423	492	478	423	450
10.....	450	436	506	506	535	464	372	423	506	506	423	464
11.....	478	450	535	492	550	492	436	436	436	506	436	478
12.....	520	450	520	384	580	450	384	423	384	478	436	464
13.....	492	478	506	535	580	478	360	348	436	478	423	478
14.....	492	492	506	535	565	450	336	314	450	492	423	520
15.....	492	478	506	520	550	423	410	410	436	464	384	506
16.....	478	492	520	520	565	464	436	423	423	506	372	506
17.....	464	478	520	506	535	478	450	423	372	506	372	492
18.....	478	450	436	506	520	464	360	410	336	464	336	506
19.....	464	478	520	506	520	464	325	436	436	450	436	478
20.....	450	506	492	506	520	492	314	372	450	450	436	478
21.....	436	506	478	520	565	506	314	348	450	492	325	478
22.....	423	492	506	535	580	478	314	336	450	506	325	520
23.....	450	478	492	520	535	492	303	423	464	506	314	520
24.....	450	506	492	506	397	492	259	478	464	506	303	506
25.....	423	506	520	520	492	492	248	410	436	492	303	506
26.....	384	450	580	520	478	520	248	436	436	478	292	478
27.....	384	478	535	520	450	478	238	450	436	478	292	478
28.....	372	478	520	506	464	450	348	372	450	478	281	478
29.....	372	478	423	520	-----	478	372	384	450	478	270	478
30.....	372	506	506	520	-----	492	397	410	436	478	270	492
31.....	397	-----	478	520	-----	436	-----	384	-----	478	270	-----

Monthly discharge, in second-feet, of Miami and Erie Canal at Waterville, Ohio, for the period Aug. 26, 1921, to Sept. 30, 1922

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
1921				1921-22			
August 26-31.....	360	281	333	March.....	610	423	475
September.....	436	259	354	April.....	478	238	361
1921-22				May.....	478	314	411
October.....	520	336	422	June.....	506	336	438
November.....	506	436	474	July.....	506	450	480
December.....	580	423	506	August.....	478	270	382
January.....	535	384	505	September.....	520	270	466
February.....	580	397	533	The year.....	610	238	454

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, 1922.

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 0.75 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 8.0 feet on April 18 (discharge, 4,060 second-feet); minimum stage, 1.10 feet on October 20, August 23, and September 27–30 (discharge, 10 second-feet).

ICE.—Stage-discharge relation affected by ice; flow estimated from observer's notes, weather records, and comparison with records of flow of near-by streams.

REGULATION.—None.

DIVERSIONS.—None.

ACCURACY.—Stage-discharge relation permanent except when affected by ice. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Sandusky River near Upper Sandusky, Ohio, during the year ending Sept. 30, 1922

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. 20	Lamoureux and Lee	1.11	7.6	May 19	E. E. R. Dornbach	3.60	825
Mar. 13	E. E. R. Dornbach	2.84	497	May 20	do	7.15	3,310
Apr. 12	do	4.85	1,580	Aug. 18	do	1.10	11.3
16	do	6.30	2,610	30	Lee and Sherman	1.23	17.5

Daily discharge, in second-feet, of Sandusky River near Upper Sandusky, Ohio, for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.		50	217	64	132	185	2,690	80	127	84	293	17
2.		459	191	107	1,600	112	1,180	70	98	240	127	35
3.		552	207	80	1,500	102	646	102	89	84	50	437
4.		204	275	82	1,450	138	459	194	74	154	39	143
5.		112	185	482	1,420	89	352	223	40	72	24	132
6.		72	160	742	1,300	293	293	149	60	43	28	60
7.		51	138	293	694	895	223	352	45	24	26	62
8.		40	140	1,240	505	1,360	223	415	43	2,090	22	26
9.		40	149	792	437	552	257	505	68	1,810	21	21
10.		53	143	482	166	459	293	646	70	482	20	18
11.		332	132	240	293	599	646	1,810	84	240	17	26
12.		332	154	80	1,240	1,060	1,480	742	332	1,240	16	332
13.		373	240	312	505	505	599	459	169	599	14	140
14.		275	394	352	552	459	950	312	98	293	13	60
15.		352	415	223	223	1,680	3,350	210	53	179	12	36
16.		437	394	154	275	742	2,310	146	40	127	12	31
17.		646	415	127	223	415	1,060	124	1,180	82	12	21
18.		1,060	2,020	154	217	293	4,060	112	1,680	76	11	18
19.		2,240	1,300	895	135	223	3,260	950	373	127	11	16
20.	10	2,020	505	1,300	1,300	293	842	3,180	223	138	12	16
21.	11	842	332	576	792	394	459	2,380	132	74	18	15
22.	11	437	197	599	792	293	394	792	93	50	12	14
23.	12	293	172	293	950	312	352	528	64	45	10	14
24.	13	257	257	505	1,060	505	275	352	50	33	12	13
25.	11	552	599	312	415	599	204	394	39	29	18	12
26.	12	373	332	257	223	394	172	1,060	32	27	17	12
27.	14	599	217	160	179	646	154	3,520	35	22	17	10
28.	12	505	154	138	197	2,090	127	646	149	21	13	10
29.	14	373	127	143	-----	1,680	107	415	160	21	22	10
30.	18	257	127	114	-----	1,240	91	210	127	19	18	10
31.	19	-----	122	114	-----	3,350	-----	172	-----	19	25	-----

NOTE.—Stage-discharge relation affected by ice jam Feb. 2–4; discharge estimated by comparison with record of flow of near-by streams.

Monthly discharge of Sandusky River near Upper Sandusky, Ohio, for the year ending Sept. 30, 1922

[Drainage area, 299 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October 20-31.....	19	10	13.1	0.044	0.02
November.....	2,240	40	473	1.55	1.76
December.....	2,020	122	336	1.12	1.29
January.....	1,300	64	366	1.23	1.42
February.....		132	671	2.24	2.33
March.....	3,350	89	708	2.37	2.73
April.....	4,060	91	917	3.07	3.42
May.....	3,520	70	685	2.29	2.64
June.....	1,680	32	194	.649	.72
July.....	2,090	19	276	.923	1.06
August.....	293	10	31.0	.104	.12
September.....	437	10	58.9	.197	.22

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, 1922.

GAGE.—Chain gage on highway bridge, read by N. A. Bucklin and William Shaffer.

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 recorded during period of record, 7.2 feet on March 31 (discharge, 2,130 second-feet); minimum stage, 1.04 feet on August 6 (discharge, 69 second-feet).

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

DIVERSIONS.—Municipal water supply for Akron is diverted from headwaters of this stream. A small amount of water is diverted into this basin from Tuscarawas River by the Ohio Canal.

REGULATION.—Flow regulated at reservoir above Akron.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined up to 1,200 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for low water when, on account of diurnal fluctuation, they are only fair.

Discharge measurements of Cuyahoga River at Old Portage, Ohio, during the years ending Sept. 30, 1921 and 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
1921 Sept. 27	V. B. Lamoureux	Feet 2.06	Sec.-ft. 283	1922 Apr. 6	E. E. R. Dornbach	Feet 4.40	Sec.-ft. 981
1922 Mar. 9	E. E. R. Dornbach	3.74	694	May 25	do	3.09	554
				July 29	do	1.64	178

Daily discharge, in second-feet, of Cuyahoga River at Old Portage, Ohio, for the period Sept. 27, 1921, to Sept. 30, 1922

Day	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		91	530	590	208	220	472	1,840	501	359	208	91	94
2		231	875	590	280	231	415	1,760	472	346	112	91	680
3		220	840	560	359	243	387	1,640	501	319	443	91	443
4		387	910	472	387	280	306	1,520	501	332	91	91	1,120
5		319	910	590	945	231	231	1,280	443	306	280	79	710
6		268	980	560	945	472	280	980	443	293	243	69	
7		231	875	472	770	359	770	770	332	280	280	79	
8		443	680	443	710	280	770	710	501	186	387	115	
9		472	710	415	1,020	293	740	590	472	155	231	94	180
10		472	770	359	770	359	740	620	443	165	268	82	
11		472	770	415	650	710	1,200	980	359	306	186	255	
12		359	710	415	501	740	1,050	1,120	306	280	119	94	
13		319	650	387	590	650	1,050	980	231	293	98	82	
14		280	620	387	359	560	1,160	1,240	359	280	145	88	
15		208	650	415	280	620	1,200	1,980	387	280	136	98	150
16		186	710	443	387	501	945	1,640	415	280	126	91	
17		165	1,160	501	306	472	875	1,240	332	359	145	88	
18		208	1,560	620	359	415	650	1,600	332	197	443	79	
19		359	1,400	590	359	145	710	1,320	560	197	620	186	136
20		359	1,400	650	387	186	710	980	501	176	560	165	112
21		186	1,360	680	387	530	650	910	590	186	472	186	76
22		108	1,050	560	359	501	443	840	620	208	136	306	108
23		186	840	560	415	840	387	620	590	243	136	115	
24		332	980	650	387	805	359	590	530	88	122	136	90
25		280	910	560	231	770	443	530	650	82	126	231	
26		306	805	472	197	770	359	472	710	186	306	101	119
27	268	306	770	472	231	650	710	443	650	208	112	91	105
28	243	220	910	387	186	560	1,080	501	387	208	231	85	119
29	280	197	650	387	231		1,200	387	359	197	136	88	108
30	280	145	650	387	306		1,640	472	332	220	145	91	94
31	122			332	231		2,130		319		82	79	

NOTE.—Daily gage readings, Sept. 6-18 and 23-25, made during peak period of day; mean discharge estimated by comparison with combined records of flow of Cuyahoga River and Ohio Canal at Independence.

Monthly discharge, in second-feet, of Cuyahoga River at Old Portage, Ohio, for the year ending Sept. 30, 1922

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	472	91	272	May	710	231	456
November	1,560	530	888	June	359	82	240
December	680	332	494	July	620	82	230
January	1,020	186	443	August	306	69	117
February	840	145	478	September	1,120	76	214
March	2,130	231	776				
April	1,980	387	1,020	The year.	2,130	69	468

CUYAHOGA RIVER AT INDEPENDENCE, OHIO

LOCATION.—In T. 6 N., R 12 W., at highway bridge three-eighths mile northwest of Thornburg, 1 mile north of Independence, Cuyahoga County.

DRAINAGE AREA.—709 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 21, 1903, to July 21, 1906, and September 28, 1921, to September 30, 1922.

GAGE.—Chain gage on highway bridge; read by Martin Walter and John Zimmerman.

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

CHANNEL AND CONTROL.—Channel straight for 500 feet above and 3,000 feet below gage. Banks fairly high. One channel at all stages. Bed of stream composed of gravel and small boulders. Control for low water is riffle about 700 feet below gage. Control for high water is long stretch of channel.

EXTREMES OF DISCHARGE.—Maximum combined discharge of river and canal during 1921-22, 6,190 second-feet on April 15; minimum combined discharge, 116 second-feet on October 3.

ICE.—Stage-discharge relation affected by ice; flow estimated from observer's notes, weather records, and record of flow of Cuyahoga River at Old Portage.

DIVERSIONS.—Water is diverted into the Ohio Canal at Brecksville about 6 miles upstream and carried past station. See record of flow of Ohio Canal at Independence. A small amount of water is diverted into this basin from Tuscarawas River by the Ohio Canal.

REGULATION.—Flow is regulated at reservoir above Akron.

ACCURACY.—Stage-discharge relation changed during high water on April 15; affected by ice January 24 to February 3. Rating curves well defined up to 3,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying daily mean gage height to rating table. Records for period of ice effect and period in which gage was not read, fair; for remainder of year, good.

Discharge measurements of Cuyahoga River at Independence, Ohio, during the years ending Sept. 30, 1921 and 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
1921 Sept 28	Lasley Lee.....	<i>Feet</i> 1.84	<i>Sec.-ft.</i> 134	1922 Apr. 5	E. E. R. Dornbach.....	<i>Feet</i> 5.15	<i>Sec.-ft.</i> 1,660
				May 24	.....do.....	2.97	561
1922 Mar. 8	E. E. R. Dornbach....	4.28	1,150	July 28	.....do.....	1.73	130

Daily discharge, in second-feet, of Cuyahoga River at Independence, Ohio, for the period Sept. 28, 1921, to Sept. 30, 1922

Day	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....		137	1,750	655	330	250	570	4,700	345	275	126	82	160
2.....		53	3,080	700	222	1,070	530	4,000	328	224	208	97	925
3.....		40	1,690	700	310	570	410	2,900	345	205	192	70	495
4.....		145	1,330	790	1,070	450	390	2,100	555	149	192	71	1,270
5.....		370	1,070	655	2,920	410	390	1,630	535	183	88	120	745
6.....		243	1,120	570	1,890	410	610	1,270	435	157	152	78	398
7.....		180	1,020	655	1,170	410	1,510	1,020	435	155	142	73	292
8.....		1,020	835	530	1,020	350	1,170	925	455	139	258	535	241
9.....		610	700	490	1,070	330	1,020	925	435	116	122	196	189
10.....		490	2,030	470	925	290	1,020	790	435	310	95	152	132
11.....		450	1,120	470	745	970	3,800	2,240	380	292	166	166	202
12.....		450	1,330	530	570	1,120	2,170	2,030	310	380	120	155	241
13.....		390	1,120	530	470	1,120	1,570	1,510	208	292	495	92	224
14.....		310	970	530	390	835	1,510	3,000	166	310	120	68	192
15.....		215	1,330	530	350	745	1,960	6,130	258	258	111	107	241
16.....		168	1,170	530	290	655	1,390	3,320	275	202	116	67	180
17.....		97	3,800	1,570	240	655	1,070	1,960	258	328	79	67	136
18.....		132	3,880	2,030	270	470	835	3,240	258	292	790	74	84
19.....		270	3,240	1,220	330	580	745	1,960	970	155	880	310	103
20.....		290	2,520	745	655	1,070	655	1,330	1,220	186	575	139	86
21.....		310	1,960	835	700	835	610	1,120	925	129	380	94	71
22.....		290	1,630	655	530	970	530	1,070	745	97	398	122	142
23.....		174	1,330	655	570	1,820	530	835	655	129	149	160	88
24.....		140	1,330	925		1,510	790	745	575	124	118	122	97
25.....		190	1,220	925		1,020	835	615	835	79	199	126	68
26.....		236	1,020	745		925	745	535	970	50	189	126	109
27.....		222	1,120	610	440	880	1,820	495	880	166	149	99	142
28.....	140	168	1,120	530		790	2,170	455	615	328	139	79	114
29.....	129	180	1,020	430			3,000	398	435	189	139	139	101
30.....	145	132	835	350			4,400	380	362	149	103	88	67
31.....		101		250			5,900		292		71	82	

NOTE.—Stage-discharge relation affected by ice Jan. 24 to Feb. 3; flow estimated from observer's notes, weather records, and records of flow of Cuyahoga River at Old Portage. Gage not read Mar. 30 to Apr. 4, flow estimated by comparison with records of flow of Cuyahoga River at Old Portage. Braced figure shows mean discharge for period indicated.

Monthly discharge, in second-feet, of Cuyahoga River and Ohio canal at Independence, Ohio, for the year ending Sept. 30, 1922

Month	Maximum combined	Minimum combined	Mean		
			River	Canal	Combined
October.....	1,090	116	265	73.4	338
November.....	3,960	783	1,590	77.8	1,670
December.....	2,100	321	704	73.5	777
January.....	2,990		663	71.0	734
February.....	1,890		766	69.6	836
March.....		459	1,440	66.5	1,510
April.....	6,190	440	1,790	60.3	1,850
May.....	1,280	233	516	65.6	562
June.....	467	133	202	85.9	288
July.....	949	140	228	76.1	304
August.....	606	136	128	70.9	199
September.....	1,340	132	251	71.0	322
The year.....	6,190	116	708	71.8	780

OHIO CANAL AT INDEPENDENCE, OHIO

LOCATION.—At highway bridge 1 mile north of Independence, Cuyahoga County, 7 miles southeast of Cleveland.

RECORDS AVAILABLE.—September 28, 1921, to September 30, 1922.

GAGE.—Chain gage on highway bridge; read by Martin Walter and John Zimmerman.

DISCHARGE MEASUREMENTS.—Made from bridge at gage.

98099—25†—WSP 544—6

CHANNEL AND CONTROL.—Channel straight for 600 feet above and 2,000 feet below gage. One channel at all stages. Bed of stream silt and fine gravel. Control is long stretch of channel below gage. Considerable aquatic growth in canal during summer.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during period of record, 92 second-feet on June 13 and 15-17; minimum mean daily discharge, 54 second-feet on October 9.

ICE.—Stage-discharge relation affected by ice for short periods; flow estimated from observer's notes and weather records.

ACCURACY.—Stage-discharge relation affected by aquatic growth during summer and by ice for short periods. Rating curve fairly well defined. Gage read to half-tenths twice daily. Daily discharge during winter except for period of ice effect ascertained by applying mean daily gage height to rating table; shifting-control method used September 28 to November 9, 1921, and March 9 to September 30, 1922. Records fair.

Discharge measurements of Ohio Canal at Independence, Ohio, during the years ending Sept. 30, 1921 and 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
1921 Sept. 28	V. B. Lamoureux.....	Feet 5.64	Sec.-ft. 74.1	1922 Apr. 5	E. E. R. Dornbach....	Feet 3.98	Sec.-ft. 60.5
1922 Mar. 8	E. E. R. Dornbach....	4.10	70.9	May 24	.....do.....	4.43	67.1
				July 28	.....do.....	5.44	65.9

Daily discharge, in second-feet, of Ohio Canal at Independence, Ohio, for the period Sept. 28, 1921, to Sept. 30, 1922

Day	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		74	83	74	74	65	71	65	62	78	83	74	71
2		74	76	74	87		71	60	65	83	85	74	69
3		76	78	74	78		69	60	65	83	83	78	74
4		76	83	74	74		69	60	65	85	80	74	71
5		76	80	74	74		69	60	62	87	83	74	71
6		67	80	74	69	71	71	58	62	87	83	74	74
7		65	80	74	74	74	71	58	65	87	83	74	74
8		67	80	74	76	74	71	60	65	87	80	71	74
9		54	83	74	74	74	69	60	67	87	83	76	76
10		67	85	74	74	74	69	60	67	89	83	78	74
11		67	85	71	74	74	71	62	67	87	83	76	76
12		69	83	74	71	62	60	60	67	87	87	69	76
13		67	78	74	74	69	67	60	67	92	85	69	71
14		69	80	74	65	69	67	65	67	89	83	69	71
15		69	78	74	74	65	69	62	67	92	83	69	74
16		71	78	74	74	71	67	58	65	92	83	69	71
17		69	78	74	76	58	67	62	62	92	80	69	71
18		76	76	74	76	71	67	65	65	69	71	67	71
19		76	74	74	74	65	62	60	62	89	69	67	71
20		76	76	74	69	74	65	58	65	89	69	67	71
21		78	76	74	67	71	67	60	60	87	71	67	69
22		76	74	74	67	71	65	60	65	83	69	69	71
23		67	74	74	71	71	65	60	65	87	69	69	69
24		89	76	74	65	69	65	60	67	83	69	69	69
25		78	69	74		69	62	58	65	85	67	71	69
26		80	74	74		67	65	58	67	83	65	69	69
27		80	76	71	65	71	65	60	69	85	65	69	69
28	74	80	74	71	71	71	60	60	65	85	65	69	65
29	74	78	74	74	65	65	65	60	69	83	65	69	65
30	74	83	74	71		62	62	60	71	85	67	69	65
31		80	71	71		60	60	60	71	85	69	71	65

NOTE.—Mean discharge Jan. 23 to Feb. 3 estimated because of ice from observer's notes and weather records.

Monthly discharge, in second-feet, of Ohio Canal at Independence, Ohio, for the year ending Sept. 30, 1922

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October.....	89	54	73.4	May.....	71	60	65.6
November.....	85	69	77.8	June.....	92	69	85.9
December.....	74	71	73.5	July.....	87	65	76.1
January.....	87	-----	71.0	August.....	78	67	70.9
February.....	74	58	69.6	September.....	76	65	71.0
March.....	71	60	66.5				
April.....	65	58	60.3	The year.....	92	54	71.8

CONNEAUT CREEK AT AMBOY, OHIO

LOCATION.—At highway bridge half a mile east of Amboy, 3 miles southwest of Conneaut, Ashtabula County.

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

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

GAGE.—Chain gage on highway 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. Left bank high and clean; right bank fairly high and brushy. The flood of March, 1913, flowed over right bank and across the 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 period of record, 3.00 feet at 6 a. m., August 2 (discharge, 530 second-feet); minimum stage, 1.16 feet at 7 p. m. July 10 (discharge, 2.4 second-feet).

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve 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 Conneaut Creek at Amboy, Ohio, during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Dis-charge
July 5	Lee and Sherman.....	<i>Feet</i> 1.32	<i>Sec.-ft.</i> 5.32
25	E. E. R. Dornbach.....	1.41	11.0

Daily discharge, in second-feet, of Conneaut Creek at Amboy, Ohio, for the year ending Sept. 30, 1922

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1.....		33	18.9	11.....	28	10.6	22	21.....	38	6.8	12.6
2.....		400	41	12.....	13.7	32	30	22.....	33	3.5	8.2
3.....	25	142	38	13.....	11.6	38	30	23.....	27	4.8	6.2
4.....		79	8.2	14.....	24	5.7	14.9	24.....	18.9	6.2	6.2
5.....	5.2	47	6.2	15.....	32	10.6	22	25.....	16.2	8.9	5.2
6.....	24	11.6	35	16.....	24	27	35	26.....	28	30	5.2
7.....	12.6	32	8.9	17.....	10.6	8.2	10.6	27.....	9.7	11.6	5.7
8.....	30	27	7.4	18.....	41	7.4	7.4	28.....	25	6.2	4.5
9.....	17.5	17.5	6.2	19.....	35	4.8	10.6	29.....	6.2	14.9	4.8
10.....	2.9	35	5.2	20.....	60	4.8	13.7	30.....	8.9	10.6	6.2
								31.....	5.7	14.9	-----

NOTE.—Discharge, July 1-4, estimated by comparison with records of flow of near-by streams.

Monthly discharge of Conneaut Creek at Amboy, Ohio, for the year ending Sept. 30, 1922

[Drainage area, 178 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1922					
July.....	60	2.9	22.2	0.125	0.14
August.....	400	3.5	35.2	.198	.23
September.....	41	4.5	14.5	.081	.09

CATTARAUGUS CREEK AT VERSAILLES, N. Y.

LOCATION.—At three-span highway bridge in Versailles, Cattaraugus County, $2\frac{1}{4}$ miles above mouth of Clear Creek, 6 miles below Gowanda, and 8 miles above mouth of stream.

DRAINAGE AREA.—467 square miles (measured on post-route map).

RECORDS AVAILABLE.—September 23, 1910, to September 30, 1922.

GAGE.—Chain on upstream side of right span of bridge; read by Charles Wilson.

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

CHANNEL AND CONTROL.—Bed composed of rocks and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.00 feet at 5 p. m. March 7 (discharge, 7,680 second-feet); minimum discharge, 100 second-feet, several times October 2-7.

1910-1922: Maximum open-water stage recorded, 12.3 feet (mean of three high-water marks) during night of March 25, 1913 (discharge, about 30,000 second-feet); minimum stage, 4.35 feet several times in August, 1918 (discharge, about 49 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation not permanent; affected by ice during much of the period December to March. Gage read to half-tenths twice daily. Daily discharge throughout year ascertained by indirect method, applying mean daily effective gage-height to rating table; corrections for obtaining effective gage-heights determined from discharge measurements. Records poor.

Discharge measurements of Cattaraugus Creek at Versailles, N. Y., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Dis- charge	Date	Made by—	Gage height	Dis- charge
Jan. 4	B. F. Howe *	Feet 5.78	Sec.-ft. 374	June 13	Granger and Harrington	Feet 5.60	Sec.-ft. 766
24	do. "	5.58	242	Aug. 20	B. F. Howe.....	5.13	184

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Cattaraugus Creek at Versailles, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	140	500	1,000	200	280	700	3,000	440	220	1,000	170	200
2.....	110	2,800	900	190	700	800	1,500	440	220	850	320	220
3.....	110	1,600	1,200	220	800	700	1,300	400	440	800	750	200
4.....	110	1,800	900	340	700	650	1,300	550	340	800	700	200
5.....	120	1,800	800	5,200	600	700	1,200	500	300	600	360	180
6.....	100	1,100	750	2,600	600	700	1,000	440	260	500	260	170
7.....	110	850	750	1,000	500	3,600	900	750	220	500	420	170
8.....	300	750	750	700	420	2,200	900	600	200	550	2,000	170
9.....	340	700	750	750	440	1,200	900	500	200	480	700	160
10.....	320	1,300	700	550	480	1,300	900	440	340	420	420	140
11.....	380	950	700	480	700	3,800	1,100	420	2,000	380	320	160
12.....	1,000	900	800	280	750	2,200	1,600	380	1,700	340	320	480
13.....	480	750	750	340	440	1,700	1,400	320	800	500	280	280
14.....	300	800	700	440	260	2,200	1,200	300	550	320	260	260
15.....	220	1,100	700	440	220	1,900	2,400	320	480	260	220	280
16.....	180	950	550	360	190	1,300	1,300	280	440	240	200	220
17.....	170	3,400	800	340	190	1,000	1,000	300	1,700	240	200	190
18.....	170	3,800	3,000	480	260	900	1,200	280	900	750	210	180
19.....	220	2,400	1,200	800	300	850	1,000	340	650	500	210	190
20.....	180	2,400	850	750	900	850	1,000	340	500	320	180	190
21.....	320	1,200	750	600	2,000	900	1,000	360	440	240	160	160
22.....	240	1,000	750	420	3,800	800	950	360	950	220	160	160
23.....	190	900	650	220	6,500	800	850	280	700	300	160	150
24.....	170	1,800	650	200	3,000	1,000	750	280	500	600	500	150
25.....	170	1,700	600	190	1,400	1,300	700	1,000	440	380	500	150
26.....	140	1,100	550	190	1,000	1,200	650	850	340	280	950	190
27.....	140	2,000	440	190	1,000	1,600	600	500	320	200	460	130
28.....	140	3,400	360	190	800	2,400	550	360	600	180	260	140
29.....	140	1,600	400	190	-----	1,600	550	300	1,500	160	260	140
30.....	120	1,200	320	190	-----	1,800	480	280	750	140	260	150
31.....	120	-----	220	190	-----	3,000	-----	280	-----	150	220	-----

NOTE.—Discharge, Dec. 21 to Feb. 20, determined from gage heights corrected for ice effect from two discharge measurements, study of weather records and gage-height graph, and comparison with record of Allegheny River at Red House.

Monthly discharge of Cattaraugus Creek at Versailles, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 467 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,000	100	224	0.480	0.55
November.....	3,800	500	1,550	3.32	3.70
December.....	3,000	220	782	1.67	1.92
January.....	5,200	190	620	1.33	1.53
February.....	6,500	190	1,040	2.23	2.32
March.....	3,800	650	1,470	3.15	3.63
April.....	3,000	480	1,110	2.38	2.66
May.....	1,000	280	425	.910	1.05
June.....	2,000	200	633	1.36	1.52
July.....	1,000	140	426	.912	1.05
August.....	2,000	160	400	.857	.99
September.....	480	130	192	.411	.46
The year.....	6,500	100	736	1.58	21.38

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, 1922.

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 about 13 feet long, including the 2 feet of weir. At the time of the spring break-up the ice jammed at the bridge and caused the weir to bulge downstream slightly. This condition, which did not affect the rating, was remedied August 21 to September 1, when the weir was repaired.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 9.48 feet at 6 p. m. February 23 (discharge, 1,370 second-feet); minimum stage, 0.19 foot several times October 2-7 (discharge, 0.4 second-foot).

1912-1922: Maximum discharge, 2,500 second-feet, at 6 p. m. May 10, 1919 (gage-height, 9.0 feet); minimum discharge, 0.4 second-foot several times in September and October, 1921.

ICE.—Ice forms above weir, but control is kept free from ice by observer before reading gage.

ACCURACY.—Stage-discharge relation permanent, except August 22-30, when weir was being repaired. 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. Records good.

Discharge measurements of Little Tonawanda Creek at Linden, N. Y., during the year ending Sept. 30, 1922

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>
May 16	Shupe and Covert.....	0.78	5.34	Aug. 21	Howe and Granger.....	0.35	1.26
16	do.....	.78	5.17	24	Granger and Howe.....	.96	8.61
Aug. 21	Granger and Howe.....	.35	1.18	31	do.....	.42	1.45

Daily discharge, in second-feet, of Little Tonawanda Creek at Linden, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.5	1.2	22	7.2	6.0	19	211	9.6	3.3	11	1.7	1.5
2	.5	3.6	19	7.5	19	19	70	8.8	3.5	8.0	2.2	1.5
3	.4	3.3	21	6.8	14	18	66	8.8	4.8	7.5	1.9	1.5
4	.5	6.5	14	8.0	18	16	82	10	4.2	7.5	3.1	1.5
5	.5	8.0	12	274	17	18	50	8.8	3.6	5.5	3.8	1.4
6	.4	5.2	9.6	54	16	42	37	8.4	4.8	4.8	3.6	1.8
7	.5	4.2	10	31	15	235	37	17	3.6	4.2	6.2	1.5
8	.7	3.5	8.0	18	13	70	39	11	2.9	4.5	17	1.4
9	.7	3.5	8.0	19	12	58	35	8.4	2.6	4.5	8.8	1.2
10	.9	5.2	7.8	17	13	43	29	7.5	2.9	3.5	6	1.1
11	1.0	5.3	8.0	11	24	58	70	7.0	40	2.7	4.3	1.4
12	1.5	5.2	10	12	54	62	66	6.5	32	2.4	3.3	1.5
13	1.2	5.0	8.8	11	35	90	46	6.0	12	3.5	2.7	1.2
14	.9	5.2	7.5	9.6	23	134	32	5.5	7.5	2.7	2.2	1.4
15	.8	7.2	7.5	9.6	18	86	74	5.5	6.0	2.2	1.9	1.4
16	.7	9.2	8.0	9.6	14	46	43	5.2	4.8	2.0	1.7	1.3
17	.7	39	8.8	8.8	12	28	43	4.8	21	1.9	1.5	1.2
18	.7	25	58	8.8	10	25	70	5.5	11	9.6	1.5	1.1
19	.6	23	27	11	19	21	35	7.5	8.8	4.8	1.6	1.2
20	.8	25	16	14	199	27	40	6.2	7.2	3.3	1.4	1.3
21	.7	16	10	14	78	23	33	6.0	6.0	2.7	1.3	1.1
22	.7	12	8.8	8.8	199	17	29	5.5	9.6	2.2	1.3	1.1
23	.6	9.6	12	10	790	20	26	5.2	7.5	3.0	1.3	1.0
24	.7	35	9.6	8.0	135	28	23	4.5	5.5	5.3	8.8	1.0
25	.7	32	8.8	7.8	74	40	19	8.8	4.8	3.6	4.5	.9
26	.7	24	8.8	7.2	50	50	18	8.0	4.5	2.7	3.5	1.0
27	.7	35	8.0	7.0	32	74	16	6.0	4.5	2.3	2.6	1.0
28	.7	62	7.8	6.5	25	94	14	5.2	28	2.0	2.2	1.0
29	.7	32	7.8	6.2	-----	70	12	4.5	19	1.8	1.9	.9
30	.7	27	7.5	6.0	-----	36	11	4.2	9.6	1.7	1.8	.9
31	.7	-----	7.5	6.0	-----	164	-----	3.6	-----	1.5	1.7	-----

NOTE.—Discharge, Aug. 21-30, when weir was being repaired determined by indirect method on basis of two discharge measurements and study of levels on the crest of weir.

Monthly discharge of Little Tonawanda Creek at Linden, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 22 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1.5	0.4	0.713	0.032	0.04
November	62	1.2	15.9	.723	.81
December	58	7.5	12.5	.568	.65
January	274	6.0	20.5	.932	1.07
February	790	6.0	69.1	3.14	3.27
March	235	16	56.5	2.57	2.96
April	211	11	45.9	2.09	2.33
May	17	3.6	7.08	.322	.37
June	40	2.6	9.52	.433	.48
July	11	1.5	4.03	.183	.21
August	17	1.3	3.46	.157	.18
September	1.8	.9	1.24	.056	.06
The year	790	.4	20.2	.918	12.43

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, 1922.

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, practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.4 feet at 8 a. m. June 12 (discharge, 4,230 second-feet); minimum stage, 0.40 foot at 6.30 p. m. September 10 and 8 a. m. September 11 (backwater correction of 0.04 foot due to rubbish), (discharge, 33 second-feet).

1916–1922: Maximum stage recorded, 9.1 feet at noon May 22, 1919 (discharge, 10,600 second-feet); minimum discharge, 21 second-feet at 7 p. m. September 3 and 9.30 a. m. September 4, 1921.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice December to February and by rubbish July to September. Rating curve well defined between 20 and 2,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage-height, corrected for backwater when necessary, to rating table. Records good except for periods when stage-discharge relation was affected by ice or rubbish or when gage was not read, for which they are fair.

Discharge measurements of Genesee River at Scio, N. Y., during the year ending Sept. 30, 1922

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. 5	B. F. Howe.....	• 3.32	1,570	June 11	Granger and Harrington	2.75	1,180
26	.....do.....	• 2.11	109	Aug. 18	B. F. Howe.....	.60	61
Mar. 18	.....do.....	1.61	445	18	.....do.....	.67	77
June 10	Granger and Harrington	1.26	279				

• Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Genesee River at Scio, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	93	287	855	170		355	1,560		81	820	79	66
2	04	1,560	730	120	170	304	960		108	618	88	62
3	50	590	820	150		253	820		820	820	136	60
4	62	510	590	160		259	1,760	160	535	645	144	60
5	66	460	535	1,400	260	275	1,380		372	460	113	60
6	62	376	485	600	280	318	960		336	367	84	62
7	52	362	435	320	280	1,360	960	295	308	313	136	50
8	52	351	385	300	220	1,400	925		247	267	1,530	43
9	62	304	354	280	220	618	890		225	228	495	42
10	72	960	304	240	220	590	855		287	196	247	34
11	68	562	263	240	300	535	925	260	2,290	172	169	46
12	06	455	318	140	750	730	960		3,140	147	136	354
13	70	410	279	140	600	1,560	925		1,040	192	111	141
14	66	385	244	130	500	1,960	730	228	700	169	95	116
15	64	385	200	170	360	1,380	1,380	182	510	136	81	103
16	60	528	192	120	200	790	820	144	410	116	68	84
17	62	672	189	160	140	535	790	138	385	105	62	79
18	54	1,760	1,200	300	140	485	1,200	156	362	105	72	72
19	86	1,200	372	130	220	410	790	255	279	95	163	62
20	133	1,120	362	200	1,200	435	730	232	247	86	84	58
21	147	820		120	950	367	618	192	232	74	77	56
22	133	645		110	1,400	300	535	169	440	66	58	52
23	118	590	275	100	2,000	251	460	147	800	64	54	43
24	103	760		100	1,200	331	410	136	221	84	68	36
25	90	618		95	700	385	385	163	192	74	84	42
26	84	590	240	80	590	562	362	186	144	64	331	42
27	77	855	240	85	485	960	313	144	133	60	180	38
28	72	2,880	240	110	410	1,760	267	116	1,960	56	113	35
29	70	1,660	220	110		1,380	225	100	2,640	50	90	35
30	68	1,120	220	110		925	155	103	1,380	46	81	34
31	72		200	120		890		98		49	74	

NOTE.—Discharge for the following periods estimated from comparison with records of Genesee River at St. Helena: Oct. 9, 23, Nov. 16, Dec. 21-25, Mar. 1, 5, 8, Apr. 9, 30, May 1-6, 8-13, June 22 and 23. Discharge, Dec. 26 to Feb. 23, determined from gage heights corrected for ice effect from two discharge measurements, study of weather records and gage-height graph, and comparison with records of flow of Genesee River at St. Helena and Jones Bridge. Discharge, July 16 to Sept. 30, determined from gage heights corrected for backwater from rubbish, from two discharge measurements, and comparison with records for St. Helena.

Monthly discharge of Genesee River at Scio, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 288 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	147	50	77.4	0.269	0.31
November	2,880	287	795	2.75	3.07
December	1,200	189	383	1.33	1.53
January	1,400	80	213	1.740	.85
February	2,000		511	1.77	1.84
March	1,960	251	748	2.60	3.00
April	1,760		802	2.79	3.11
May	295	98	164	.639	.74
June	3,140	81	679	2.36	2.63
July	820	46	218	.757	.87
August	1,530	54	171	.694	.68
September	354	34	68.9	.239	.27
The year	3,140	34	401	1.39	18.90

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, 1922.

GAGE.—Stevens continuous water-stage recorder on left bank just below bridge, installed September 28, 1917, and a chain gage on upstream side of the bridge, installed August 14, 1908. Below stage of 3.3 feet readings of chain gage are used. Water-stage recorder inspected and chain gage read by Glenn Streeter.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.31 feet at 7.30 p. m. March 7 (discharge, 12,600 second-feet); minimum stage, 2.25 feet (chain gage reading) at 8 a. m. September 30 (discharge, 69 second-feet).

1908-1922: Maximum stage from water-stage recorder, 12.81 feet at 8 a. m. May 17, 1916 (discharge, 43,500 second-feet); minimum stage recorded, 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, December to February. Rating curve used for chain gage October 1 to spring break-up fairly well defined between 40 and 4,000 second-feet; curve used after spring break-up for chain gage well defined between 150 and 2,500 second-feet. Curve for automatic gage fairly well defined between 500 and 30,000 second-feet. Gage heights for stages above 3.3 feet taken from recorder graph when gage was operating satisfactorily; below 3.3 feet from chain gage. Daily discharge ascertained by applying to proper rating table mean daily gage height determined by averaging the twice daily chain gage readings, or from inspection of automatic record, except for days of considerable fluctuation, when the discharge is averaged for intervals of the day. Records fair.

Discharge measurements of Genesee River at St. Helena, N. Y., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
Jan. 6	B. F. Howe.....	<i>Feet</i> 5.18	<i>Sec.-ft.</i> 3,660	Mar. 17	B. F. Howe.....	<i>Feet</i> 4.27	<i>Sec.-ft.</i> 1,870
7	do.....	4.14	1,680	Aug. 27	H. I. Granger.....	3.39	858
27	do.....	^a 4.66	336				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Genesee River at St. Helena, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr	May	June	July	Aug.	Sept.
1	144	167	2,360	500	550	930	8,210	608	253	2,070	218	259
2	162	5,970	1,940	360	700	830	4,130	565	276	2,570	485	198
3	218	3,260	2,400	420	700	880	2,600	525	470	1,680	1,450	208
4	144	2,080	1,930	600	650	740	3,470	695	1,340	1,360	1,130	418
5	148	1,880	1,480	3,400	700	695	3,590	785	880	1,460	695	565
6	186	1,510	1,270	3,800	900	785	2,600	930	880	1,060	608	308
7	218	1,150	1,110	1,500	800	7,440	2,220	1,340	740	740	608	289
8	167	1,090	1,050	1,100	650	5,730	2,150	1,180	695	695	6,760	253
9	140	940	950	850	550	2,420	2,010	830	650	608	2,580	253
10	246	2,340	755	800	650	2,290	1,940	740	650	485	1,340	198
11	374	2,380	800	460	700	3,240	1,910	650	2,190	455	910	276
12	620	1,630	800	360	1,000	3,450	3,110	565	9,140	398	740	1,960
13	578	1,370	755	360	1,800	4,210	2,520	565	3,840	478	525	1,200
14	495	1,230	700	460	1,100	6,380	2,010	440	1,990	608	478	650
15	367	1,560	600	500	700	4,450	3,130	448	1,370	455	425	608
16	246	1,690	550	460	650	2,830	2,910	440	1,050	418	382	650
17	140	2,440	650	380	600	1,880	2,010	403	1,270	382	347	340
18	240	5,170	2,850	550	800	1,420	2,410	382	1,820	525	300	375
19	186	4,520	1,680	550	1,300	1,290	2,110	455	1,180	650	1,480	308
20	270	3,590	1,340	420	3,000	1,210	1,750	418	970	425	695	247
21	440	2,500	955	380	3,000	1,190	1,630	485	960	276	478	308
22	381	1,820	710	360	1,900	1,020	1,510	478	1,710	276	410	282
23	340	1,510	495	340	9,220	910	1,310	455	1,800	282	382	282
24	340	1,840	620	340	6,170	1,050	1,160	425	1,020	695	650	198
25	240	3,400	665	360	2,470	1,280	980	608	740	525	740	198
26	218	2,010	535	360	1,680	1,630	890	1,130	565	382	1,030	127
27	218	3,080	495	360	1,400	2,330	880	565	830	289	830	167
28	218	6,910	500	420	1,140	5,220	830	455	1,450	264	565	127
29	167	4,680	500	420	-----	4,660	785	382	2,320	224	396	127
30	186	3,020	440	440	-----	3,160	565	282	3,040	203	340	127
31	144	-----	440	440	-----	3,900	-----	289	-----	208	282	-----

NOTE.—Discharge, Dec. 14-17 and Dec. 28 to Feb. 22, determined from gage-heights corrected for ice effect, from three discharge measurements, study of weather records, and gage-height graph and comparison with records of Genesee River at Scio and Jones Bridge. Discharge for the following days, when chain gage readings were doubtful, determined from estimated gage-heights and by comparison with records for Scio and Jones Bridge: May 26, 27, July 14, 18, 20, 21, Aug. 24, 25, Sept. 14, 15, 18, 19, 20, and 21. Discharge for the following periods, when stage was below 3.3 feet or when recorder was not in operation, determined from chain gage readings: Oct. 1 to Nov. 1, Dec. 10 to Feb. 22, Mar. 1-6, Apr. 26 to June 10, June 25-28, July 7 to Aug. 7, Aug. 12-17, Aug. 19 to Sept. 11, and Sept. 14-30.

Monthly discharge of Genesee River at St. Helena, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 992 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	620	140	264	0.266	0.31
November	6,910	167	2,560	2.58	2.88
December	2,850	440	1,040	1.05	1.21
January	3,800	340	711	.717	.83
February	9,220	550	1,620	1.63	1.70
March	7,440	695	2,560	2.58	2.97
April	8,210	565	2,240	2.26	2.52
May	1,340	282	597	.602	.69
June	9,140	253	1,540	1.55	1.73
July	2,570	203	682	.688	.79
August	6,760	218	912	.919	1.06
September	1,960	127	384	.387	.43
The year	9,220	127	1,250	1.26	17.12

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

LOCATION.—At highway bridge known as Jones Bridge, $1\frac{1}{2}$ miles below Canaseraga Creek, $1\frac{3}{4}$ miles above mouth of Beards Creek, 5 miles below Mount Morris, Livingston County, and 6 miles by river 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, 1922.

GAGE.—Gurley seven-day water-stage recorder installed September 11, 1915, on right bank 60 feet downstream from bridge. Prior to 1915 a chain gage fastened to upstream side of highway bridge was used. Datum of water-stage recorder, 2.73 feet higher than that of chain gage (540.00 feet New York State Conservation Commission datum). Recorder inspected by Theron S. Trewer.

DISCHARGE MEASUREMENTS.—Made from footbridge erected on lower chord of upstream bridge truss.

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

EXTREMES OF DISCHARGE.—Maximum open-water stage during year from water-stage recorder, 18.06 feet at noon April 1 (discharge, 14,600 second-feet); minimum stage from water-stage recorder, 0.39 foot at 2 a. m. October 7 (discharge, 72 second-feet).

1903-1906, 1908-1913, and 1915-1922: Maximum stage recorded, 25.44 feet at noon May 17, 1916 (discharge, 55,100 second-feet); minimum stage recorded, 2.7 feet at 6 p. m. August 29, 1909 (discharge, about 18 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Some diurnal fluctuation due to operation of mills at Mount Morris is observable during extremely low water.

ACCURACY.—Stage-discharge relation changed presumably at time of spring break-up, March 8, and returned to previous rating probably at time of high water, September 12. Rating curve used before the spring break-up very well defined between 75 and 7,000 second-feet and fairly well defined between 7,000 and 60,000 second-feet; curve used after the break-up fairly well defined between 400 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 obtained by inspecting recorder graph, or for days of considerable fluctuation, by averaging discharge for intervals of the day. Records good, except for periods of ice effect and when gage did not operate, for which they are fair.

Discharge measurements of Genesee River at Jones Bridge, near Mount Morris, N. Y., during the year ending Sept. 30, 1922

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>
Jan. 8	B. F. Howe.....		* 1,580	July 18	C. C. Covert.....	1.82	507
30	do.....	* 6.97	483	19	do.....	2.41	860
Mar. 13	do.....	9.62	5,850	Sept. 2	Granger and Howe....	1.55	410
June 15	Granger and Harrington	3.73	1,600				

* Measurement made at Geneseo.

* 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 Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	219	309	2,960	1,400	650	1,900	13,400	790	411	2,490	304	438
2.....	181	7,180	2,410		800	1,300	8,020	735	385	2,990	429	390
3.....	207	4,580	2,680		850	1,200	4,250	680	616	1,750	1,010	345
4.....	229	2,540	2,410		800	1,200	5,080	845	1,370	1,630	1,180	906
5.....	219	2,150	1,780		950	1,000	5,420	1,010	1,150	1,400	900	
6.....	164	1,780	1,540	5,000	1,100	1,300	3,800	982	1,130	1,060	790	
7.....	154	1,300	1,300	2,400	1,000	6,000	3,070	1,510	872	900	708	
8.....	166	1,200	1,220	1,700	850	10,000	2,930	1,510	735	790	780	
9.....	168	1,080	1,110	1,500	750	4,950		1,180	625	762	4,520	
10.....	195	1,680	1,030	1,300	800	3,280		955	625	652	1,870	
							2,900					850
11.....	305	2,960	975	800	1,000	3,960		845	1,800	576	1,260	
12.....	497	1,960	1,000	800	1,900	5,500		762	11,900	510	928	
13.....	590	1,600	1,030	800	2,400	5,820	3,500	708	5,630	535	735	
14.....	448	1,360	920	650	1,700	9,620	2,650	625	2,440	735	625	
15.....	357	1,680	765	700	1,200	7,920	3,510	620	1,630	581	550	
16.....	295	2,000	690	650	1,000	4,700	4,210	581	1,260	447	490	
17.....	264	2,720	790	800	850	2,790	2,720	540	1,630	407	442	565
18.....	258	5,800	2,410		1,100	2,120	2,930	520	2,790	480	394	497
19.....	268	6,300	3,200		2,000	1,750	2,790	608	1,630	735	1,090	452
20.....	238	4,280	1,540	700	3,600	1,630	2,750	708	1,230	525	1,120	421
21.....	337	3,100	1,170		3,800	1,310	2,120	708	982	402	652	381
22.....	525	2,150	800		6,000	1,420	1,930	680	1,370	353	485	349
23.....	434	1,780	650		8,000	1,260	1,690	598	2,350	334	402	330
24.....	365	1,850	750	550	10,000	1,340	1,510	525	1,260	586	614	274
25.....	319	4,280		600	9,000	1,630	1,310	661	872	735	652	248
26.....	291	2,540		550	6,000	2,060	1,200	1,400	680	520	1,060	264
27.....	271	3,720		550	4,400	3,020	1,120	955	625	411	1,090	238
28.....	261	9,220	650	500	2,800	7,160	1,040		1,150	341	818	241
29.....	251	7,380		500		6,680	928	550	3,420	304	625	248
30.....	222	4,130		500		4,250	818		3,070	267	545	219
31.....	241			500		5,930				261	475	

NOTE—Discharge for the following periods estimated by comparison with records of Genesee River at St. Helena: Dec. 25-31, Jan. 1-5, 18-23, 28, 29, Apr. 9-12, May 28-31, and Sept. 5-16. Mean daily gage-heights Jan. 15, 16, 27, Feb. 14, 26, Mar. 4, June 29, and 30 partly estimated; water-stage recorder not operating satisfactorily. Discharge, Dec. 22 to Mar. 8, except for periods given above, determined from gage-heights corrected for ice effect from two discharge measurements, study of weather records and gage-height graph, and by comparison with records of flow at Scio and St. Helena. Braced figures show mean discharge for periods indicated.

Monthly discharge of Genesee River at Jones Bridge, near Mount Morris, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 1,400 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	590	154	288	0.206	0.24
November.....	9,220	309	3,160	2.26	2.52
December.....	3,200	650	1,280	.914	1.05
January.....	5,000	500	1,030	.736	.85
February.....	10,000	650	2,690	1.92	2.00
March.....	10,000	1,000	3,680	2.63	3.03
April.....	13,400	818	3,210	2.29	2.56
May.....	1,510	520	788	.563	.65
June.....	11,900	385	1,850	1.32	1.47
July.....	2,990	261	789	.564	.65
August.....	7,380	304	1,100	.786	.91
September.....	906	219	567	.405	.45
The year.....	13,400	154	1,690	1.21	16.38

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

LOCATION.—In station 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, 1922.

GAGE.—Gurley 7-day water-stage recorder installed in northwest corner of power house, December 14, 1919. Staff gage above Court Street dam was used March 17 to April 4, 1920, and a chain gage at site of water-stage recorder, April 5 to August 19, 1920, when recorder was out of commission. Recorder inspected by C. M. Hawkins, employee of the Rochester Gas & Electric Corporation.

DISCHARGE MEASUREMENTS.—Made from cable about 2,000 feet below gage.

CHANNEL AND CONTROL.—Coarse gravel and large broken rock; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 10.02 feet from 9 to 10 a. m. April 2 (discharge, 15,700 second-feet); minimum stage occurs nearly every day during low-water period when power plant shuts down.

1919-1922: 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.—The Barge Canal crosses the river near the southern line of the city of Rochester. It discharges water into Genesee River from Lake Erie and diverts water to the east for canal purposes.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve fairly well defined between 500 and 5,000 second-feet, and well defined between 5,000 and 15,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by discharge integration prior to March 4; subsequently, by averaging discharge for bi-hourly intervals of the day. Records fair.

Discharge measurements of Genesee River at Driving Park Avenue, Rochester, N. Y., during the year ending Sept. 30, 1922

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>
Dec. 3	Shupe and Davidson *	5.03	3,800	Mar. 10	Howe and Davidson *	6.37	6,270
3	do.....	4.58	3,140	11	do.....	5.89	5,320
Mar. 9	Howe and Davidson *	8.93	12,600	12	B. F. Howe.....	6.56	6,540
10	do.....	7.01	8,010	July 17	Covert and Davidson *	3.65	1,740
10	do.....	6.90	7,600	Aug. 29	Granger and Howe.....	3.93	2,450

* Engineer, Rochester Gas & Electric Corporation.

Daily discharge, in second-feet, of Genesee River at Driving Park Avenue, Rochester, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	940	940	4,700	1,060	450	3,000	12,700	1,550	1,220	4,300	1,100	1,080
2	680	2,100	3,800	1,200	490	2,300	15,100	1,080	1,120	4,200	1,040	1,040
3	860	7,300	3,400	1,850	700	1,800	10,200	1,600	1,120	3,900	1,200	940
4	840	4,400	3,800	1,300	1,250	1,750	6,400	1,550	1,300	2,800	1,650	980
5	800	3,200	3,100	1,220	1,350	1,700	7,400	1,650	2,050	2,600	1,750	1,500
6	960	2,900	2,500	2,900	1,450	1,950	6,400	1,800	1,850	1,850	1,600	1,650
7	800	2,400	2,250	5,300	1,240	4,500	4,900	2,150	1,750	1,800	1,700	1,300
8	780	1,900	1,850	3,700	1,220	12,400	4,300	2,600	1,600	1,650	2,000	1,140
9	780	1,800	1,950	2,350	1,080	12,900	4,100	2,450	1,400	1,500	7,500	1,160
10	920	2,000	1,850	1,800	940	7,800	3,600	2,050	1,500	1,650	8,400	960
11	820	3,400	1,650	1,450	980	5,300	3,300	1,700	2,400	1,450	2,250	1,040
12	840	3,500	1,700	820	2,250	6,900	5,500	1,600	7,000	1,300	1,850	1,200
13	1,140	2,700	1,650	940	3,000	7,700	5,700	1,500	10,600	1,350	1,350	3,200
14	1,140	2,350	1,600	760	2,800	9,500	3,400	1,400	5,600	1,550	2,200	2,200
15	1,040	2,300	1,350	720	2,350	11,400	4,800	1,600	3,300	1,450	1,300	1,500
16	880	2,600	1,140	720	1,700	8,600	6,500	1,200	2,300	1,140	1,200	1,550
17	940	2,800	1,180	820	1,350	5,600	5,800	1,250	2,600	1,200	1,180	1,350
18	900	4,300	1,800	800	1,040	3,700	4,800	1,160	3,100	1,080	1,140	1,220
19	820	7,300	4,000	740	800	2,900	5,000	1,240	3,200	1,400	1,100	1,060
20	980	5,900	3,400	560	2,300	2,500	4,700	1,300	2,350	1,500	1,750	1,120
21	880	4,900	2,350	760	5,100	2,600	3,700	1,400	1,500	1,250	1,650	1,060
22	840	3,600	1,140	780	6,100	2,450	3,500	1,500	1,650	1,160	1,200	1,020
23	1,020	2,900	1,350	980	8,700	2,250	3,300	1,350	2,800	1,080	1,220	1,080
24		2,700	1,350	920	12,000	2,050	2,900	1,300	3,000	1,240	1,120	920
25		4,000	1,240	740	13,300	2,150	2,700	1,250	2,200	1,250	1,300	1,020
26	880	5,200	1,400	560	11,100	2,600	2,200	1,450	1,800	1,400	1,350	740
27		3,200	1,400	520	6,800	3,300	2,300	1,950	1,600	1,250	1,650	860
28		6,400	1,350	540	4,200	5,500	2,100	1,600	1,600	1,080	1,750	800
29		9,600	1,200	420	-----	8,700	2,100	1,550	2,900	1,100	1,400	840
30	740	7,100	1,180	450	-----	7,400	1,650	1,250	4,600	920	1,220	880
31	940	-----	1,040	430	-----	6,200	-----	1,240	-----	1,100	1,160	-----

NOTE.—Discharge for the following periods when gage did not operate satisfactorily estimated on basis of records of generation at Station No. 5, automatic gage charts, and records of flow of Genesee River at Jones Bridge with allowance for Barge Canal inflow and diversion: Oct. 24–29, Dec. 15, 16, Aug. 8, 9, and 10.

Monthly discharge of Genesee River at Driving Park Avenue, Rochester, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 2,460 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,140	680	889	0.361	0.42
November	9,600	940	3,860	1.57	1.75
December	4,700	1,040	2,050	.833	.96
January	5,300	420	1,230	.500	.58
February	13,300	450	3,430	1.39	1.45
March	12,900	1,700	5,140	2.09	2.41
April	15,100	1,650	5,040	2.05	2.29
May	2,600	1,080	1,560	.634	.73
June	10,600	1,120	2,700	1.10	1.23
July	4,300	920	1,690	.687	.79
August	7,500	1,040	1,700	.691	.80
September	3,200	740	1,210	.492	.55
The year	15,100	420	2,530	1.03	13.96

NOTE.—The above figures 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, 2,200 feet below mouth of Mill Brook and 22 miles above mouth of creek.

DRAINAGE AREA.—158 square miles (measured by engineers of 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, 1922.

GAGE.—Gurley seven-day water-stage recorder installed October 19, 1920, on downstream side of left bridge abutment. During winter a vertical staff at the 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, 11.20 feet at 6 a. m. September 4 (discharge determined from logarithmic extension of rating curve, about 3,500 second-feet); minimum stage from water-stage recorder, 6.11 feet at 2 p. m. October 6 (discharge, 20 second-feet).

1910–1912, 1915–1917, and 1919–1922: 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, September 10, 1921.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation not permanent; affected by ice, December to February. Rating curve fairly well defined between 30 and 2,000 second-feet. Daily discharge ascertained by applying to rating table mean daily gage height as observed or as determined from inspection of recorder graph, or for days of considerable fluctuation, by averaging discharge for intervals of day; shifting-control method used March 15 to September 30. Records fair.

Discharge measurements of Canaseraga Creek near Dansville, N. Y., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
Jan. 9	B. F. Howe.....	<i>Feet</i> * 6.80	<i>Sec.-ft.</i> 132	June 16	Granger and Harrington.....	<i>Feet</i> 6.66	<i>Sec.-ft.</i> 65
28	do.....	* 7.05	58	July 19	C. C. Covert.....	6.59	50
Mar. 14	do.....	8.26	875	Aug. 25	H. I. Granger.....	6.73	71
June 16	Granger and Harrington.....	6.68	74				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Canaseraga Creek near Dansville, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1 st	34	338	268	90	90	136	900	80	46	240	55	55
2.....	28	706	236		190	158	460	70	55	150	70	56
3.....	28	323	247		240	174	460	75	170	110	55	48
4.....	26	232	195		140	128	700	110	100	95	50	950
5.....	25	188	164	950	140	114	440	110	75	75	60	280
6.....	23	131	145	340	150	310	320	95	70	65	50	150
7.....	24	117	122	220	110	1,530	320	150	60	60	140	110
8.....	28	102	112	180	95	563	300	130	48	65	300	90
9.....	28	112	107	140	90	341	260	100	48	60	140	80
10.....	34	262	100	110	95	310	240	90	65	50	90	70
11.....	44	195	100	85	200	563	280	80	440	46	70	150
12.....	70	171	107	80	420	653	300	70	320	44	60	340
13.....	69	139	102	75	280	1,000	240	65	150	55	55	180
14.....	46	139	88	70	260	1,060	200	65	110	48	48	150
15.....	39	213	97	55	190	600	300	60	80	42	46	130
16.....	34	181	100	50	140	380	240	60	65	40	44	110
17.....	32	372	92	70	120	260	200	55	420	40	40	110
18.....	32	585	252	65	120	220	200	60	320	48	46	90
19.....	37	398	142	100	130	180	170	95	200	48	70	85
20.....	43	329	109	150	700	170	170	80	150	40	44	85
21.....	52	232	95	110	247	150	150	75	130	38	40	75
22.....	42	184	80	70	490	130	150	65	190	34	36	70
23.....	35	155	112	65	1,000	130	140	60	140	60	42	65
24.....	36	274	100	65	580	160	130	55	95	75	140	60
25.....	29	287	95	65	355	180	110	150	80	50	130	60
26.....	31	239	102	60	268	260	110	190	70	44	150	55
27.....	28	510	90	60	202	400	100	100	90	40	110	55
28.....	29	969	90	60	168	550	95	80	150	36	90	55
29.....	28	462	85	60	-----	420	90	65	180	34	75	55
30.....	25	337		60	-----	280	80	55	110	34	70	50
31.....	32	-----		65	-----	500	-----	50	-----	55	60	-----

NOTE.—Mean discharge, Dec. 29 to Jan. 4, estimated by comparison with records of flow at other stations in the basin. Discharge, Dec. 27, 28, and Jan. 5 to Feb. 20, determined from gage heights corrected for ice effect from two discharge measurements, study of weather records and gage-height graph and comparison with records of other stations nearby. Staff gage readings used Jan. 5 to Mar. 13, when recorder did not operate. Mean gage height, Mar. 14, partly estimated.

Monthly discharge of Canaseraga Creek near Dansville, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 158 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	70	23	35.2	0.223	0.26
November.....	969	102	296	1.87	2.09
December.....	268	80	126	.797	.92
January.....	950	50	124	.785	.90
February.....	1,000	90	258	1.63	1.70
March.....	1,530	114	387	2.45	2.82
April.....	900	80	261	1.65	1.84
May.....	190	50	85.3	.540	.62
June.....	440	46	141	.892	1.00
July.....	240	34	62.0	.392	.45
August.....	300	36	79.9	.506	.58
September.....	950	48	131	.829	.92
The year.....	1,530	23	164	1.04	14.10

CANASERAGA CREEK AT SHAKERS CROSSING, N. Y.

LOCATION.—At highway bridge at Shakers Crossing, 1 mile above mouth and $1\frac{1}{4}$ miles northeast of Mount Morris, Livingston County.

DRAINAGE AREA.—335 square miles (measured by engineers of New York State Conservation Commission).

RECORDS AVAILABLE.—Occasional current-meter measurements 1904–1915. Continuous record of gage height and occasional current-meter measurements July 13, 1915, to September 30, 1922, when station was discontinued.

GAGE.—Gurley seven-day graph water-stage recorder on the left bank, just below bridge. Datum of gage same as that established on Genesee River at Jones Bridge near Mount Morris July 12, 1915 (540.00 feet, Conservation Commission datum). Recorder inspected by Mrs. William Russell.

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

CHANNEL AND CONTROL.—Firm gravel; not likely to shift; subject to backwater from Genesee River.

ICE.—Stage-discharge relation affected by ice.

EXTREMES OF STAGE.—Maximum stage during year from water-stage recorder, 25.31 feet at 6 a. m. February 24; minimum stage from water-stage recorder, 7.80 feet from 1 to 3 p. m. October 8.

1915–1922: Maximum stage from water-stage recorder, 28.92 feet at 1 p. m. May 17, 1916; minimum stage from water-stage recorder, 7.68 feet from 8 to 10 p. m. September 3, 1921.

Station maintained for purpose of obtaining record of water-surface elevations only.

Daily gage height, in feet, of Canaseraga Creek at Shakers Crossing, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.97	8.26	11.0	-----	11.42	11.25	21.48	8.98	8.38	9.9	8.24	8.37
2	7.97	14.96	10.75	-----	12.23	10.91	15.29	8.93	8.36	10.20	8.4	8.32
3	7.91	12.06	10.55	-----	13.73	10.62	12.40	8.89	8.80	9.06	9.0	8.27
4	7.90	10.23	10.06	-----	13.98	10.56	13.10	9.04	9.04	8.91	8.95	10.20
5	7.89	9.79	9.43	-----	13.28	10.41	13.12	9.26	8.63	8.66	8.5	9.96
6	7.87	9.27	9.15	21.78	13.10	11.15	11.56	9.24	8.89	8.49	8.33	9.06
7	7.84	8.85	8.87	18.35	13.03	16.36	11.20	9.25	8.66	8.40	8.45	8.81
8	7.84	8.73	8.82	15.92	12.55	19.77	11.14	9.50	8.48	8.38	14.65	8.67
9	7.85	8.62	8.73	15.49	12.22	12.94	10.86	9.31	8.40	8.40	11.42	8.57
10	7.89	10.10	8.67	15.00	12.19	11.80	10.61	9.16	8.43	8.30	9.10	8.51
11	7.95	10.46	8.65	13.85	12.4	12.45	10.41	8.92	9.97	8.23	8.73	8.50
12	8.09	9.51	8.68	12.52	-----	13.57	11.77	8.78	18.26	8.15	8.57	11.30
13	8.28	9.17	8.70	12.95	-----	14.10	11.17	8.74	12.58	8.19	8.47	9.94
14	8.1	9.01	8.59	12.95	-----	17.35	10.40	8.70	9.55	8.22	8.40	9.16
15	8.0	9.55	8.42	13.26	-----	15.40	11.37	8.68	8.85	8.17	8.33	9.11
16	7.96	9.66	8.6	13.24	12.46	12.61	11.58	8.67	8.6	8.28	8.31	8.94
17	7.90	10.99	8.54	12.7	11.55	10.96	10.48	8.64	9.32	8.21	8.29	8.85
18	7.90	13.72	10.62	-----	11.15	10.09	10.48	8.60	10.95	8.38	8.24	8.78
19	7.94	13.74	10.32	-----	11.73	9.84	10.45	8.68	9.66	8.64	8.65	8.61
20	7.96	12.08	8.90	-----	15.75	9.80	10.01	8.85	9.20	8.46	8.37	8.60
21	8.04	10.82	8.63	13.95	17.80	9.73	9.95	8.76	8.93	8.32	8.23	8.59
22	8.04	9.81	8.42	13.83	18.77	9.47	9.81	8.72	9.28	8.12	8.21	8.60
23	7.98	9.32	8.68	12.97	22.14	9.34	9.66	8.63	9.59	8.13	8.18	8.55
24	7.92	9.5	8.68	-----	24.68	9.58	9.50	8.56	8.77	8.74	9.04	8.41
25	7.94	12.0	8.58	-----	21.25	9.78	9.39	8.77	8.56	8.59	8.77	8.38
26	7.89	10.35	8.40	-----	17.73	10.23	9.31	9.66	8.47	8.40	9.50	8.34
27	7.90	11.90	8.56	-----	14.45	11.29	9.2	8.97	8.42	8.31	8.92	8.32
28	7.89	16.52	8.51	-----	12.60	14.72	9.1	8.65	9.07	8.26	8.81	8.30
29	7.88	14.85	8.35	11.35	-----	14.20	9.05	8.52	10.25	8.08	8.56	8.28
30	7.88	12.10	8.45	11.4	-----	11.95	9.03	8.46	10.20	8.01	8.50	8.28
31	7.86	-----	8.5	11.41	-----	13.64	-----	8.41	-----	7.99	8.42	-----

NOTE.—No record for periods for which no gage height is given. For following periods gage height was estimated for part of the day: Oct. 14, 15, Nov. 24–26, Dec. 1–3, 16, 24, 29–31, Jan. 13, 14, 17, 21, 29, 30, Feb. 11, 17, 18, 25–27, Mar. 10, 11, Apr. 27–29, June 14–16, July 1, Aug. 2–5, and Sept. 30.

KESHEQUA CREEK AT CRAIG COLONY, SONYEA, N. Y.

LOCATION.—About 200 feet downstream from private highway bridge on grounds of Craig Colony at Sonyea, Livingston County.

DRAINAGE AREA.—70 square miles (measured by New York State Conservation Commission).

RECORDS AVAILABLE.—October 31, 1917, to September 30, 1922, 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 gage in three sections on retaining wall on left bank just above the concrete dam for pumping plant of Craig Colony; read by A. J. Porter.

DISCHARGE MEASUREMENTS.—Made from the private 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, 3.10 feet at 4 p. m. March 7 (discharge, 1,840 second-feet); minimum stage recorded, 0.25 foot at 7 a. m. October 6 (discharge, 3.2 second-feet).

1917-1922: 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.

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

ACCURACY.—Stage-discharge relation changed presumably at time of high water in March; affected by ice for a short period in January. Rating curve used prior to October 1, 1921, was revised above 180 second-feet, on basis of recent discharge measurements and is fairly well defined between 5 and 1,500 second-feet; revised curve used from October 1 to March 6. Curve used after March 6 fairly well defined between 5 and 1,500 second-feet and is identical with the previous curve above 180 second-feet. Gage read to hundredths twice daily. Daily discharge determined by applying mean daily gage height to rating table. Records good.

Discharge measurements of Keshequa Creek at Craig Colony, Sonyea, N. Y., during the year ending Sept. 30, 1922

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>
Mar. 13	B. F. Howe.....	2.78	1,390	June 16	Harrington and Granger	0.60	19.4
14	do.....	1.84	402	July 19	C. C. Covert.....	.69	27.7
May 18	Shupe and Covert.....	.50	10.8	Aug. 25	H. I. Granger.....	.55	14.5
June 15	Granger and Harrington	.65	26.2	26	Howe and Granger....	.85	43.4

Daily discharge, in second-feet, of Keshequa Creek at Craig Colony, Sonyea, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4.0	14	74	14	14	22	460	18	7.6	81	5.7	6.2
2	3.8	112	60	11	102	30	146	18	8.1	46	65	7.2
3	3.4	60	95	14	87	20	112	18	31	29	15	7.2
4	4.7	53	52	16	44	29	195	43	18	27		8.1
5	7.5	41	41	430	30	33	121	28	12	19		12
6	3.2	26	34	107	33	268	83	22	81	14	12	10
7	3.4	20	20	44	39	890	79	95	29	12	25	8.0
8	5.0	16	27	16	24	169	72	41	17	13	135	6.7
9	6.1	17	24	36	25	86	63	29	13	13	43	6.2
10	5.0	46	22	29	25	79	54	24	29	9.6	27	5.9
11	10	44	25	10	365	169	80	20	348	7.2	18	7.2
12	11	42	28	13	141	258	100	18	123	6.7	12	38
13	12	34	19	29	60	460	70	17	50	17	11	17
14	6.1	29	18	27	30	410	58	17	34	11	14	12
15	5.8	61	13	39	31	191	126	14	24	72	8.1	14
16	6.8	47	8.0	36	19	110	68	13	18	6.2	6.2	11
17	4.4	179	29	40	28	60	61	11	25	6.2	5.7	14
18	4.7	273	153	44	24	43	56	14	95	36	7.2	10
19	8.0	127	42	50	54	41	42	23	54	29	5.7	9.1
20	4.0	114	25	56	378	47	50	17	41	11	5.9	9.1
21	6.1	58	27	38	97	48	43	14	30	7.6	5.7	8.1
22	5.4	40	15	24	635	35	44	14	54	7.2	4.6	7.2
23	6.8	35	14	14	590	29	38	12	39	11	4.1	8.1
24	3.7	125	16	11	166	50	32	11	24	38	38	5.9
25	5.8	120	16	10	58	53	30	12	19	14	18	5.4
26	4.0	82	16	8	48	79	29	44	15	11	51	5.2
27	4.7	194	28	9	48	176	27	23	14	7.2	18	5.2
28	3.7	365	22	11	50	240	24	17	41	6.2	16	5.2
29	6.1	153	25	12	156	20	14	37	37	4.6	11	4.6
30	4.7	109	13	13	83	20	12	24	24	5.7	7.6	4.9
31	3.7		17	14	468			9.6		5.7	7.2	

NOTE.—Discharge for following days when gage was not read interpolated or estimated by comparison with records for other stations: Oct. 8, Nov. 25, Jan. 17, Apr. 11, 28, May 10, 29, July 31, Sept. 6 and 7. Mean discharge, Aug. 3-5, estimated by comparison with records of flow of Canaseraga Creek at Dansville. Discharge, Jan. 21-28, determined from gage heights corrected for ice effect on basis of engineer's inspection and study of weather records.

Monthly discharge of Keshequa Creek at Craig Colony, Sonyea, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 70 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	12	3.2	5.60	0.080	0.09
November	365	14	87.9	1.26	1.41
December	153	8.0	32.8	.469	.54
January	430	8	39.5	.564	.65
February	635	14	116	1.66	1.73
March	890	20	156	2.23	2.57
April	460	20	80.1	1.14	1.27
May	95	9.6	22.0	.314	.36
June	348	7.6	45.2	.646	.72
July	81	5.7	16.8	.240	.28
August	135	4.1	20.4	.291	.34
September	38	4.6	9.29	.133	.15
The year	890	3.2	52.1	.744	10.11

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, 1922.

GAGE.—Vertical staff bolted to upstream side of right abutment of bridge; read by W. B. Milliman.

DISCHARGE MEASUREMENTS.—Made from highway bridge about a quarter of a mile downstream or by wading.

CHANNEL AND CONTROL.—A rectangular weir, 2.01 feet long and 0.67 foot high under upstream side of bridge. When the water overtops this weir it flows over a 2-inch plank 25.75 feet long, including the 2 feet of weir. The theoretical stage-discharge relation does not apply on account of leakage under the left abutment and around the right end of weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.24 feet at 10 a. m. April 1 and 8 a. m. April 2 (discharge, 178 second-feet); minimum discharge, about 2.5 second-feet, during periods in October and November.

1919-1922: Maximum and minimum stages recorded, same as given above.

ICE.—Creek frozen over in winter, but weir is usually kept free of ice.

DIVERSIONS.—No water is diverted from Conesus Lake above the station.

ACCURACY.—Stage-discharge relation permanent except as affected by leakage.

Rating curve used October 1 to March 31 fairly well defined between 4 and 150 second-feet. A new rating curve, defined by discharge measurements made during low-water period, indicating an increase in leakage, and fairly well defined between the same limits, as former curve, was used April 1 to September 30. Daily discharge ascertained by applying mean daily gage height to rating table. Records only fair.

Discharge measurements of Conesus Creek near Lakeville, N. Y., during the year ending Sept. 30, 1922

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>
May 15	Shupe and Covert.....	1.44	62	July 18	C. C. Covert.....	1.18	39.4
15	Covert and Shupe.....	1.44	61	Aug. 28	Howe and Granger.....	.97	24.2
June 17	Granger and Harrington.....	1.35	71	28	Granger and Howe.....	.98	24.0
				29	.....do.....	.97	23.8

Daily discharge, in second-feet, of Conesus Creek near Lakeville, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	3.2	2.5	2.7	5.2	12	121	172	94	43	50	26	21
2.....	2.8	3.4	2.8	5.2	27	114	172	94	42	51	26	21
3.....	2.6	2.8	2.8	5.2	18	108	172	88	41	50	25	21
4.....	2.6	2.6	2.8	6.9	25	108	172	88	41	50	25	21
5.....	2.6	2.6	3.0	12	28	108	172	88	40	50	25	22
6.....	2.5	2.5	3.0	8.9	32	121	164	88	41	48	25	20
7.....	2.5	2.5	3.0	9.2	34	150	164	88	40	49	28	20
8.....	2.5	2.5	3.0	8.9	36	135	157	82	39	52	30	20
9.....	2.5	2.5	3.0	9.6	32	135	157	82	37	48	31	21
10.....	2.6	2.6	3.2	9.6	34	135	150	75	48	43	28	21
11.....	2.6	2.6	3.5	10	75	142	142	75	48	41	26	20
12.....	2.6	2.6	6.1	14	56	157	157	74	54	41	26	24
13.....	2.6	2.5	7.1	17	64	164	150	70	56	41	26	23
14.....	2.5	2.5	7.1	19	67	150	142	69	56	39	25	23
15.....		2.6	4.3	20	70	157	142	68	54	37	25	23
16.....		2.6	3.6	21	68	157	142	65	54	36	25	22
17.....		2.6	6.9	21	68	150	142	63	56	37	25	20
18.....		2.6	3.8	21	68	150	142	61	54	37	24	20
19.....		2.8	4.3	21	67	142	135	62	52	36	24	20
20.....		2.6	8.2	24	75	142	128	60	50	34	24	19
21.....	•	2.8	10	22	75	142	128	56	49	32	23	19
22.....	2.5	2.8	6.3	22	121	135	121	55	50	32	22	20
23.....		2.7	6.3	24	128	128	121	53	50	32	22	19
24.....		2.7	6.5	24	128	128	114	48	49	35	23	18
25.....		2.7	6.7	17	121	128	114	52	44	33	24	17
26.....		2.7	5.9	13	128	128	108	50	43	32	24	17
27.....		2.8	5.5	13	128	121	108	48	43	31	24	16
28.....		3.7	5.5	13	121	121	101	48	45	29	24	15
29.....		3.5	5.5	12		121	101	45	45	29	23	15
30.....		3.2	5.5	12		121	94	44	48	28	23	15
31.....			5.7	12		157		44		26	21	

NOTE.—Water level below weir notch, Oct. 8 and Oct. 15 to Nov. 1; discharge estimated. Braced figure shows mean discharge for period included.

Monthly discharge of Conesus Creek near Lakeville, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 71 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	3.2	2.5	2.55	0.036	0.04
November.....	3.7	2.5	2.74	.039	.04
December.....	10	2.7	4.95	.070	.08
January.....	24	5.2	14.6	.206	.24
February.....	128	12	68.1	.959	1.00
March.....	157	108	135	1.90	2.19
April.....	172	94	139	1.96	2.19
May.....	94	44	67.0	.944	1.09
June.....	56	37	47.1	.663	.74
July.....	52	26	39.0	.549	.63
August.....	31	21	24.9	.351	.40
September.....	24	15	19.8	.279	.31
The year.....	172	2.5	46.8	.659	8.95

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, 1922.

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 the 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 the winter.

DIVERSIONS.—No water is diverted from Canadice Lake above the 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.

Monthly discharge of Canadice Lake outlet near Hemlock, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 12.6 square miles]

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.....	1.545	-1.092	May.....	0.315	2.708
November.....	2.312	-.585	June.....	31.758	3.100
December.....	3.492	+.474	July.....	2.648	2.790
January.....	3.736	.479	August.....	13.089	3.029
February.....	6.638	.661	September.....	12.485	2.457
March.....	19.502	1.881			
April.....	20.419	2.727	The year.....	9.828	1.552

NOTE.—Terminal water surface for the year was 2.54 feet higher than for the previous year, corresponding to a gain in storage of 73,048,325 cubic feet, or a discharge of 2.316 second-feet for the year. This correction applied to the above mean for the year gives 12.144 second-feet, equivalent to 0.964 second-foot per square mile, or a run-off of 13.027 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 $3\frac{1}{4}$ 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, 1922.

GAGE.—Gurley printing water-stage recorder on left bank until May 19, 1922, when a Gurley seven-day water-stage recorder was installed. Recorders inspected by Mrs. Charles H. Pearce.

DISCHARGE MEASUREMENTS.—Made from a cable directly opposite gage or by wading 100 feet below dam.

CHANNEL AND CONTROL.—A low concrete control has been constructed about 15 feet below gage. Crest of control is 1 foot wide and the slopes of both upstream and downstream faces are $\frac{1}{2}$:1. A small horizontal apron built on a level with the bed of the stream extends downstream $2\frac{1}{2}$ feet from toe of dam. Mean elevation of the left end of the dam for a distance of 50 feet is gage-height 1.28 feet; the remaining 50 feet of the crest of the dam is at a gage-height of 2.13 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.05 feet at 12.30 p. m. June 22 (discharge, 1,810 second-feet); minimum stage from water-stage recorder, 1.41 feet at 2.15 p. m. October 30 (discharge, 5.6 second-feet).

1912-1922: Maximum stage, 6.4 feet during period March 25-30, 1913, determined by leveling from flood marks (discharge, 2,750 second-feet); minimum stage from water-stage recorder, 1.38 feet (effective) at 7 p. m. August 21, 1920 (discharge, 3.8 second-feet).

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

DIVERSIONS.—An average flow of about 10 second-feet is pumped from Owasco Lake for the municipal water supply of the city of Auburn. Proportion returning to stream above the gaging station is not known.

REGULATION.—Large diurnal fluctuation in flow during low-water periods due to operation of mills in the city of Auburn; seasonal flow regulated at the State dam.

ACCURACY.—Stage-discharge relation permanent throughout year. Rating curve well defined between 1 and 1,700 second-feet. Operation of water-stage recorders satisfactory, except as indicated in footnote to daily-discharge table. Daily discharge ascertained by averaging the hourly discharge for the period when the printing water-stage recorder was in operation; and by applying to rating table mean daily gage-height determined by inspection of gage-height graph or for days of considerable fluctuation, by averaging discharge for intervals of the day, when the seven-day recorder was in operation. Records good, except for periods of estimate, which are fair.

The following discharge measurement was made by B. F. Howe:

September 4, 1922: Gage height, 2.66 feet; discharge, 381 second-feet.

Daily discharge, in second-feet, of Owasco Lake outlet near Auburn, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	65	82	179	166	203	640	929	368	161	1,100	158	610
2.....	33	84	169	196	197	607	923	307	174	1,100	163	594
3.....		69	161	210	197	575	926	205	194	1,090	155	516
4.....		64	163	190	199	557	926	166	168	1,060	175	347
5.....	55	75	181	192	195	578	935	180	183	995	171	321
6.....		13	168	183	197	692	943	199	187	953	173	232
7.....		65	186	170	196	717	925	270	192	890	180	249
8.....	100	61	215	190	197	729	906	451	190	830	177	244
9.....	25	81	217	182	193	739	880	444	193	772	164	235
10.....	65	82	205		183	741	858	385	199	727	173	132
11.....	65	74		170	188		859	290	542	629	172	239
12.....	62	68	170		239		792	287	1,050	627	174	337
13.....	74		182		288		733	288	1,300	373	158	330
14.....	64		171	181	291		731	269	1,260	206	186	330
15.....	50		157			750	717	277	1,170	193	183	325
16.....	19		172		280		727	223	1,080	161	182	320
17.....	58		136			724	718	179	1,030	175	188	295
18.....	72	85	190	220	287	710	791	170	942	158	188	282
19.....	73				193	682	837	159	885	164	187	224
20.....	79				364	687	772	166	840	168	175	214
21.....	67		170		525	680	719	150	840	160	199	192
22.....	67			192	678	671	685	162	1,130	149	181	180
23.....	22	152		194	710	660	671	166	1,400	148	202	178
24.....	58	162	262	223	746	588	629	163	1,470	166	272	160
25.....	67	166	271		824	544	558	160	1,380	159	672	186
26.....	64	120	262		781	534	472	162	1,320	142	798	186
27.....	60	59	278	200	754	560	442	166	1,240	154	790	228
28.....	62	186	223		729	589	377	164	1,150	162	771	190
29.....	68	164	173			669	376	179	1,150	169	754	181
30.....	9.8	152	183			723	360	163	1,120	144	718	188
31.....	61		170			812		154		159	659	

NOTE.—Discharge for the following periods when recorder did not operate satisfactorily estimated from study of lake levels of Owasco Lake, rainfall, evaporation, and run-off data: Oct. 3-7, Nov. 12-23, Dec. 16-24, Jan. 10-13, 15-22, 25-31, Feb. 15-17, Mar. 11-17, Apr. 6-9, and May 5. Braced figures show mean discharge for periods indicated.

Monthly discharge of Owasco Lake outlet near Auburn, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 206 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	100	9.8	57.6	0.280	0.32
November.....	186	13	94.3	.458	.51
December.....	278	136	189	.917	1.06
January.....	223	166	196	.951	1.10
February.....	824	183	371	1.80	1.87
March.....	812	534	674	3.27	3.77
April.....	943	360	737	3.58	3.99
May.....	451	150	228	1.11	1.28
June.....	1,470	161	805	3.91	4.36
July.....	1,100	142	454	2.20	2.54
August.....	798	155	364	1.77	2.04
September.....	610	132	275	1.93	1.48
The year.....	1,470	9.8	364	1.77	24.32

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, 1922.

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 open-water stage recorded during year, 9.90 feet at 5 p. m. April 12 (discharge, 5,380 second-feet); minimum stage recorded, 3.00 feet at 8 a. m. October 3 (discharge, 27 second-feet).

1911-1922: Maximum stage (determined by leveling from flood mark) about 12.5 feet during night of March 28, 1913 (discharge, about 10,000 second-feet); minimum stage, 2.4 feet at 5 p. m. August 26, 1918 (discharge, about 5 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION AND DIVERSION.—The State dam at Forestport, about 8 miles upstream, provides a reservoir with a capacity of 2 billion cubic feet. Water is diverted from this reservoir during the navigation season through the Forestport feeder, flowing west to a basin in Boonville. The Black River canal flows north from this basin entering 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, thus passing around it. The Black River canal also flows south from Boonville, passing out of the Black River drainage and entering the summit level of the Erie Canal (or 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." Discharge measurements are made for this station at a steel highway bridge in Hawkinsville. Occasional discharge measurements are made of the amount of diversion through this feeder during the winter and are included in the table of discharge measurements of the above-mentioned station. 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." Discharge measurements are made for this station at a steel and concrete highway bridge in Boonville. The difference in discharge between these two records doubtless represent 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. 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 periods when the stage-discharge relation was affected by ice, for which they are fair.

Discharge measurements of Black River near Boonville, N. Y., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Discharge
Jan. 14	E. B. Shupe.....	Feet	Sec.-ft.
Feb. 18	B. F. Howe.....	• 5.64	439
Aug. 2	H. I. Granger.....	• 4.92	263
		4.08	157

• Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Black River near Boonville, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	66	305	1,740	440	460	1,200	2,270	580	227	1,940	164	78
2.....	46	450	1,060	420	800	1,000	1,940	680	205	2,380	127	84
3.....	28	680	1,940	500	1,100	850	1,370	735	795	1,940	119	78
4.....	36	630	2,050	600	1,200	1,000	1,060	795	1,740	990	164	72
5.....	38	580	1,290	750	1,200	1,100	1,140	1,060	1,210	680	164	66
6.....	49	580	1,140	800	950	1,200	1,640	1,540	735	490	164	61
7.....	63	630	990	700	750	2,200	2,620	1,460	450	450	250	57
8.....	111	680	605	600	600	2,400	2,380	1,060	335	410	990	61
9.....	145	680	490	420	500	2,400	3,110	920	205	370	1,140	64
10.....	174	795	450	500	480	2,200	3,240	795	205	335	320	63
11.....	250	680	410	380	460	1,740	4,410	680	370	262	335	64
12.....	194	630	450	340	420	1,740	5,100	558	795	227	238	70
13.....	184	580	410	340	340	1,640	4,540	535	605	216	194	78
14.....	205	490	410	420	360	1,540	4,140	490	430	205	184	84
15.....	145	430	450	380	320	1,460	3,360	490	305	205	145	370
16.....	184	410	470	360	300	1,290	3,240	490	227	205	136	450
17.....	320	490	535	340	260	1,210	2,860	490	305	238	127	275
18.....	410	990	990	320	240	1,140	2,740	512	735	250	127	227
19.....	470	1,540	920	320	280	920	2,160	735	990	227	97	164
20.....	535	1,940	795	420	400	990	1,940	1,210	580	305	97	164
21.....	390	2,160	735	340	420	920	1,740	1,140	535	145	127	164
22.....	430	1,940	490	340	460	855	1,460	990	1,940	119	154	154
23.....	490	1,210	450	320	700	680	1,210	855	3,490	127	227	145
24.....	450	1,460	410	300	1,900	735	990	735	2,380	164	104	127
25.....	390	1,940	410	280	1,900	855	920	855	1,840	164	72	145
26.....	335	2,270	450	280	1,400	920	795	1,060	1,060	145	127	145
27.....	238	1,940	305	300	1,500	1,370	680	735	580	111	127	136
28.....	205	1,740	320	340	1,400	2,380	630	535	1,060	127	97	145
29.....	164	2,050	420	340	-----	3,110	535	450	1,370	111	84	145
30.....	154	2,050	420	380	-----	3,110	558	450	1,740	97	84	136
31.....	184	-----	440	420	-----	2,620	-----	450	-----	127	72	-----

NOTE.—Discharge, Dec. 28 to Mar. 10, determined from gage-heights corrected for ice effect from two discharge measurements, study of observer's notes, weather records, and gage-height graph, and by comparison with records of other stations in the basin.

Monthly discharge of Black River near Boonville, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 303 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	535	28	228	0.753	0.87
November.....	2,270	305	1,100	3.63	4.05
December.....	2,050	305	724	2.39	2.76
January.....	800	280	419	1.38	1.59
February.....	1,900	240	754	2.49	2.59
March.....	3,110	680	1,510	4.98	5.74
April.....	5,100	535	2,160	7.13	7.96
May.....	1,540	450	776	2.56	2.95
June.....	3,490	205	915	3.02	3.37
July.....	2,380	97	444	1.47	1.70
August.....	1,140	72	212	.700	.81
September.....	450	57	136	.449	.50
The year.....	5,100	28	778	2.57	34.89

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. 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, 1922.

GAGE.—Gurley seven-day water-stage recorder installed September 3, 1921, in concrete well and shelter on downstream side of right bridge abutment. Prior to that date, a vertical staff at same location and an inclined staff on right bank about 150 feet below, were used. Recorder inspected by employee of Black River Regulating District.

DISCHARGE MEASUREMENTS.—Made from cable about 150 feet below gage.

CHANNEL AND CONTROL.—Channel rocky and rough, control probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.45 feet (staff gage reading) at 6 p. m. April 13 (discharge, 26,200 second-feet); minimum stage from water-stage recorder, 0.64 foot at 1 a. m. September 5 (discharge, 357 second-feet).

1920–1922: Maximum stage recorded, that of April 13, 1922; minimum stage, 0.46 foot at 8.40 a. m. September 7, 1920 (discharge, 284 second-feet).

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

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. Some diurnal fluctuation at low stages due to mills and power plants above the station.

DIVERSIONS.—Water is diverted from Black River into the Forestport feeder at Forestport. A part of this water returns to the river through various spillways and 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) at 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; probably not affected by ice during year. Rating curve well defined between 400 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 recorder graph, or for days of considerable fluctuation, by averaging discharge for intervals of day. Records good except for periods of estimate, for which they are fair.

Discharge measurements of Black River at Watertown, N. Y., during the year ending Sept. 30, 1922

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. 15	Howe and Harrington...	2.58	2,940	May 13	Covert and Shupe.....	2.92	3,550
Dec. 16	A. W. Harrington.....	2.19	1,930	Aug. 13	A. W. Harrington.....	1.86	1,680
May 13	Covert and Shupe.....	3.02	3,740				

Daily discharge, in second-feet, of Black River at Watertown, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	890	1,540	6,000	1,660	1,730	5,250	14,800	4,100	2,300	9,880	1,130	1,240
2	768	1,910	5,500		2,050	4,430	12,900	3,880	1,890	10,200	1,280	1,170
3	1,130	3,770	5,500		2,140	3,880	11,200	3,350	2,140	10,200	1,300	760
4	1,030	3,880	6,130		2,390	3,350	10,200	3,150	3,970	9,880	1,470	661
5	1,140	3,560	6,930	3,600	2,660	2,950	9,560	3,460	5,250	9,250	1,640	1,270
6	1,240	3,350	6,660		2,950	3,050	9,880	4,100	5,010	7,770	1,560	1,060
7	1,300	3,150	5,500	3,250	3,050	4,180	10,200	4,320	4,100	6,130	1,630	1,220
8	1,140	2,860	4,320	3,050	2,950	8,340	10,900	5,130	3,050	4,890	3,710	1,240
9	1,160	2,480	3,560	2,860	2,480	8,640	12,200	6,000	2,570	3,880	5,010	1,200
10	1,130	2,480	3,050	2,760	2,390	8,940	14,800	6,000	2,220	3,460	5,010	878
11	1,260	3,350	3,050	2,570	2,390	8,940	16,800	5,250	2,050	2,950	3,880	710
12	1,760	3,460	3,150		2,390	8,640	20,800	4,430	2,300	2,570	2,660	1,100
13	1,970	2,950	3,050	2,400	2,390	8,340	25,000	3,880	2,950	2,220	2,010	
14	1,890	2,950	2,660		2,220	8,940	25,000	3,250	2,760	2,050	1,810	
15	1,660	2,950	2,390	1,850	2,140	9,880	20,800	3,050	2,390	1,760	4,850	1,500
16	1,310	2,950	2,220	2,140	2,050	10,200	19,200	3,150	2,050	1,510	1,670	
17	1,270	3,150	1,890	1,970	1,860	9,560	17,600	2,760	1,970	1,470	1,640	
18	1,550	5,370	3,770	1,970	1,830	8,940	16,400	2,570	2,840	1,510	1,520	1,730
19	1,380	6,660	5,870	1,890	1,580	8,050	16,400	2,390	5,010		1,290	1,500
20	1,620	7,770	6,130	2,050	1,860	6,930	16,400	3,560	5,250	1,500	1,100	1,660
21	2,570	8,940	6,000	2,050	2,140	6,630	14,800	4,660	4,780		1,150	1,540
22	4,210	9,250	5,130	1,840	2,480	6,130	12,900	4,890	6,360	1,600	1,080	1,320
23	4,210	8,640	4,210	2,140	2,900	6,000	11,200	4,100	10,900	1,260	1,200	1,580
24	3,460	7,210	3,250	2,050	5,870	5,620	9,560	3,250	13,200	1,120	1,330	1,180
25	2,660	6,130		1,970	6,390	5,500	8,340	2,860	15,600	1,510	1,160	910
26	2,220	5,740		1,970	6,130	5,370	6,660	3,150	13,200	1,300	1,080	1,180
27	1,890	5,130		1,890	5,870	6,390	5,870	3,990	10,500	1,500	1,030	1,340
28	1,750	5,250		1,890	5,620	7,770	6,000	3,770	8,640	1,370	1,170	1,200
29	1,500	5,870		1,440			5,250	3,150	8,640	1,440	1,150	1,160
30	1,100	6,130		1,500			12,900	4,540	9,560	1,040	1,290	1,070
31	1,440			1,620			15,200		2,390		1,160	

NOTE.—Discharge for the following periods when water-stage recorder did not operate satisfactorily, estimated from hydrograph and comparison with sum of records of Black River at Boonville, Moose River at Moose River, and Beaver River at State Dam: Dec. 25-31, Jan. 2-6, 12-14, July 19-21, and Sept. 13-17. Mean daily gage height estimated Apr. 9, July 6, 7, 8, 14, Sept. 2, 3, and 8. Discharge, Apr. 12-29, determined from recorder graph corrected on basis of twice-daily readings of staff gage, because of partial obstruction of intake to gage well.

Monthly discharge of Black River at Watertown, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 1,890 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	4,210	768	1,730	0.915	1.05
November.....	9,250	1,540	4,630	2.45	2.73
December.....	6,930	1,890	4,160	2.20	2.54
January.....		1,440	2,370	1.25	1.44
February.....	6,390	1,580	2,960	1.57	1.64
March.....	15,200	2,950	7,390	3.91	4.51
April.....	25,000	4,540	13,200	6.98	7.79
May.....	6,000	2,390	3,770	1.99	2.29
June.....	15,600	1,890	5,450	2.88	3.21
July.....	10,200	1,040	3,530	1.87	2.16
August.....	5,010	1,030	1,810	.958	1.10
September.....	1,730	661	1,250	.661	.74
The year.....	25,000	661	4,350	2.30	31.20

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, 1922.

GAGES.—Two Gurley seven-day graph water-stage recorders, with natural scale for gage height. Gage No. 1 is at downstream end of left abutment of steel highway bridge in village of Hawkinsville; gage No. 2 is on left bank, just below a farm bridge about a mile above the basin at Boonville; they are 2.53 miles apart. 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 the steel highway bridge at gage No. 1 in Hawkinsville.

DETERMINATION OF DISCHARGE.—Daily discharge determined by use of Chezy formula. The coefficient, "C," computed from each current-meter measurement is plotted with reference to date of measurement. A smooth curve drawn through the plotted points shows the variations of "C" through the season, and coefficients for intervening days are taken off the curve. The other factors in the Chezy formula are obtained from gage-height records and cross-section of the canal.

DIVERSIONS.—One spillway takes water from 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 the 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 the 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.

REGULATION.—Flow in the feeder is regulated at the outlet of Forestport reservoir.

ICE.—There is usually little flow in the canal during the winter season. Water was observed in the canal several times during the winter of 1917-1918 and each succeeding winter, and occasional current-meter measurements of the discharge were made.

ACCURACY.—Operation of water-stage recorders satisfactory except as indicated in footnote to daily-discharge table. Records good except when either recorder was out of commission, when estimates for missing gage heights were made from comparison with other recorder or from a study of the slope relation. Records for such periods, fair.

Discharge measurements of Forestport feeder near Boonville, N. Y., during the year ending Sept. 30, 1922

Date	Made by—	Gage height (feet)		Dis-charge (sec.-ft.)	Date	Made by—	Gage height (feet)		Dis-charge (sec.-ft.)
		Gage No. 1	Gage No. 2				Gage No. 1	Gage No. 2	
Oct. 15	B. F. Howe	2.805	1.475	212	June 18	Granger and Harrington	2.835	1.530	231
Nov. 10	Howe and Harrington	3.040	1.750	231	29	C. C. Covert	2.580	1.590	173
16	Harrington and Howe	2.740	1.698	192	July 16	Shupe and Covert	1.975	1.115	115
Feb. 19	B. F. Howe	2.350	1.200	68	Aug. 2	H. I. Granger	2.665	1.410	188
June 5	C. C. Covert	2.855	1.725	225	12	Granger and Harrington	2.875	1.640	194
18	A. W. Harrington				Sept. 6	B. F. Howe	2.845	1.510	188

Daily discharge, in second-feet, of Forestport feeder near Boonville, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	June	July	Aug.	Sept.	Day	Oct.	Nov.	June	July	Aug.	Sept.
1	201	188		181	194	196	16	250		208	120	182	158
2	196	221		212	185	196	17	213		210	125	180	178
3	198	181		175	187	195	18	209		220	135	178	186
4	225	195		168	192	194	19	217		228	130	194	192
5	245	205	158	177	182	192	20	218		218	151	214	181
6	205	194	214	177	171	192	21	190		218	200	217	177
7	202	216	234	167	185	182	22	197		177	209	215	179
8	205	207	191	135	174	186	23	195		180	202	212	178
9	204	200	179	165	184	178	24	201		206	208	214	176
10	212	229	191	188	197	175	25	209		178	205	208	178
11	201	214	208	184	196	176	26	230		194	205	211	178
12	181	201	215	181	192	188	27	229		206	202	209	186
13	176	200	230	178	188	193	28	249		177	202	209	189
14	175	196	223	159	188	196	29	201		174	208	208	178
15	214	196	214	127	184	205	30	177		173	199	199	175
							31	173			197	202	

NOTE.—Discharge for the following days when only one water-stage recorder was operating satisfactorily, determined from gage height estimated from comparison with graph from other recorder or from study of the slope relation: Nov. 8, 9, 10, June 5-24, Aug. 13-18, and Sept. 15.

Monthly discharge, in second-feet, of Forestport feeder near Boonville, N. Y., for the year ending Sept. 30, 1922

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	250	173	206	July	212	120	177
November 1-15	229	181	203	August	217	171	195
June 5-30	234	158	201	September	205	158	184

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, 1922.

GAGES.—Two Gurley seven-day graph water-stage recorders, 1.81 miles apart, with natural scale for gage heights. 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 the same datum. Recorders inspected by Fred Kesauer.

DISCHARGE MEASUREMENTS.—Made from the steel and concrete highway bridge in the village of Boonville, a short distance below gage No. 1.

DETERMINATION OF DISCHARGE.—Daily discharge determined by use of Chezy formula. The coefficient "C" computed from each current-meter measurement is plotted with reference to date of measurement. A smooth curve drawn through the plotted points shows the variation of "C" through the season, and the coefficients for intervening days are taken off the curve. The other factors in the Chezy formula are obtained from gage-height records and cross section of canal.

DIVERSIONS.—No diversion between gage No. 1 and gage No. 2. Records obtained at this station indicate the quantity of water diverted for the canal from the Black River basin into the Mohawk River basin.

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.

ICE.—No flow in canal during winter season.

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 gage-height graph from other recorder or from a study of the slope relation. Records for such periods, fair.

Discharge measurements of Black River canal (flowing south) near Boonville, N. Y., during the year ending Sept. 30, 1922

Date	Made by—	Gage height (feet)		Dis- charge (sec.- ft.)	Date	Made by—	Gage height (feet)		Dis- charge (sec.- ft.)
		Gage No. 2	Gage No. 2				Gage No. 1	Gage No. 2	
Oct. 15	B. F. Howe.....	1.110	0.680	154	June 18	Granger and Har- rington.....	1.273	1.003	149
15	do.....	1.500	1.240	179	29	C. C. Covert.....	1.418	1.226	132
16	do.....	1.665	1.280	191	July 16	Shupe and Covert.....	.992	.890	84
Nov. 10	Howe and Har- rington.....	1.466	1.226	152	Aug. 3	H. I. Granger.....	1.088	.757	128
16	A. W. Harrington.....	1.490	1.230	151	12	Granger and Har- rington.....	1.362	1.015	135
June 4	C. C. Covert.....	1.545	1.370	178	Sept. 5	B. F. Howe.....	1.230	.662	142
5	do.....	1.147	.910	144					

Daily discharge, in second-feet, of Black River canal (flowing south) near Boonville, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	June	July	Aug.	Sept.	Day	Oct.	Nov.	June	July	Aug.	Sept.
1-----	156	137	-----	130	130	146	16-----	169	-----	133	81	131	143
2-----	164	149	-----	133	132	146	17-----	165	-----	135	79	133	150
3-----	164	151	-----	137	131	144	18-----	158	-----	140	81	123	140
4-----	163	149	142	138	128	142	19-----	158	-----	136	86	167	145
5-----	164	139	147	133	115	144	20-----	160	-----	151	87	160	145
6-----	161	151	143	117	132	144	21-----	154	-----	137	144	160	146
7-----	161	156	145	128	131	144	22-----	149	-----	132	150	164	148
8-----	153	156	150	121	125	148	23-----	153	-----	128	145	162	146
9-----	155	138	143	121	130	147	24-----	154	-----	114	144	163	146
10-----	156	137	137	121	133	147	25-----	156	-----	104	144	162	146
11-----	156	146	137	126	131	148	26-----	159	-----	109	148	160	145
12-----	150	134	138	123	134	139	27-----	153	-----	139	144	160	133
13-----	162	140	139	132	135	156	28-----	157	-----	139	142	160	120
14-----	154	142	138	124	131	149	29-----	143	-----	140	130	155	137
15-----	157	138	132	77	134	137	30-----	143	-----	139	125	143	142
							31-----	141	-----		131	144	-----

NOTE.—Discharge for the following days, when one water-stage recorder did not operate satisfactorily, determined from gage heights estimated by comparison with gage-height graph from other recorder or from a study of the slope relation: Oct. 26-29, June 5-9, 22, 23, 26-29, and Sept. 18.

Monthly discharge, in second-feet, of Black River canal (flowing south) near Boonville, N. Y., for the year ending Sept. 30, 1922

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October-----	169	141	156	July-----	150	77	123
November 1-15.	156	134	144	August-----	167	115	142
June 4-30-----	150	104	136	September-----	156	120	144

MOOSE RIVER AT MCKEEVER, N. Y.

LOCATION.—Half a mile west of village of 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 to September 30, 1922.

GAGE.—Vertical staff on left bank just above Moose Head Inn and half a mile below dam of Iroquois Pulp & Paper Co.; read by R. D. Nash.

DISCHARGE MEASUREMENT.—May be made from highway bridge a quarter of a mile above gage or by wading.

CHANNEL AND CONTROL.—Coarse gravel and boulders, with some ledge outcrop; probably permanent. Section at gage very smooth and uniform.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of records, 12.9 feet about 10 p. m. June 22 (discharge, about 10,000 second-feet); minimum stage, 1.50 feet at 8 a. m. July 15 (discharge, 85 second-feet).

ICE.—Stage-discharge relation probably 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 on Middle Branch of Moose River at Old Forge.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 100 and 5,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

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

Daily discharge, in second-feet, of Moose River at McKeever, N. Y., for the year ending Sept. 30, 1922

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1.....		620	2,470	253	235	16.....		554	309	387	400
2.....		532	2,470	290	290	17.....		575	387	217	328
3.....		710	2,150	253	272	18.....		1,400	155	253	532
4.....		2,310	1,750	328	272	19.....		1,470	328	290	490
5.....		1,280	1,610	348	290	20.....		1,160	367	272	164
6.....		1,100	1,240	367	290	21.....		1,100	328	328	469
7.....		800	1,160	900	290	22.....		5,200	290	348	309
8.....		755	1,050	1,750	210	23.....		6,820	272	197	171
9.....		665	900	1,280	253	24.....		3,300	290	113	428
10.....		665	950	950	448	25.....		2,740	348	100	511
11.....		448	800	710	511	26.....		2,280	348	283	203
12.....		755	710	554	272	27.....		1,830	309	290	144
13.....		665	554	532	134	28.....	850	2,280	290	348	309
14.....		665	448	511	328	29.....	800	2,020	235	348	253
15.....		532	235	467	532	30.....	755	3,400	217	328	177
						31.....	755		214	190	-----

Monthly discharge of Moose River at McKeever, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 366 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
June.....	6,820	448	1,650	4.51	5.03
July.....	2,470	155	751	2.05	2.36
August.....	1,750	100	442	1.21	1.40
September.....	532	134	320	.874	.98

NOTE.—See "Regulation" in station description.

MOOSE RIVER AT MOOSE RIVER, N. Y.

LOCATION.—In hamlet of Moose River, Lewis County, 3 miles downstream from McKeever, 5 miles below mouth of South Branch of Moose River, and 13 miles above junction of Black and Moose rivers at Lyons Falls.

DRAINAGE AREA.—370 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 5, 1900, to September 30, 1922.

GAGE.—Staff in two sections on left bank a short distance above the cable; read by W. D. Rinkle. Gage datum was lowered 0.17 foot February 23, 1903, and again 5.00 feet on January 1, 1913.

DISCHARGE MEASUREMENTS.—Made from a cable a short distance below gage.

CHANNEL AND CONTROL.—Cobblestones and boulders; fairly permanent. Current smooth; depth comparatively uniform. Ice and logs occasionally jam above the station on a small island.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, about 15.0 feet during evening of June 22 (discharge, 11,600 second-feet); minimum stage, 5.29 feet at 8.45 a. m. September 28 (discharge, 101 second-feet).

1900–1922: Maximum stage recorded, 16.3 feet during the afternoon of March 27, 1913, determined by leveling from flood marks (discharge, about 16,500 second-feet); minimum stage, 4.94 feet July 21, 23, 25, 26, and 27, 1913 (discharge, about 42 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—A timber dam at McKeever, 3 miles upstream, is used for power and for the regulation of flow during log driving. Seasonal distribution of flow affected by operation of the State dam at Old Forge. This regulation is indicated by the record for station on Middle Branch of Moose River at Old Forge.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice, December to March, and by logs, April to September. Rating curve well defined between 100 and 5,500 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying to rating table mean daily gage height corrected, when necessary, for ice and log effect, as determined by discharge measurements. Records fair, except for period of ice effect and for low stages when one daily reading of gage may not indicate the correct mean daily gage height, owing to fluctuations in stage.

Discharge measurements of Moose River at Moose River, N. Y., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Dis-charge	Date	Made by—	Gage height	Dis-charge
Feb. 20	B. F. Howe.....	<i>Feet</i> 7.74	<i>Sec.-ft.</i> 410	May 10	Covert and Shupe.....	<i>Feet</i> 8.20	<i>Sec.-ft.</i> 1,270
Apr. 6	Howe and Harrington..	8.39	1,320	Aug. 13	H. I. Granger.....	6.68	495

* Stage-discharge relation affected by ice.

° Stage-discharge relation affected by logs.

Daily discharge, in second-feet, of Moose River at Moose River, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	441	422	1,200	1,300	340	700	1,700	1,000	550	2,400	289	202
2.....	202	500	860	700	340	800	1,600	950	500	2,400	304	304
3.....	460	1,200	1,080	950	420	700	1,500	950	700	2,200	274	274
4.....	404	860	2,460	950	550	650	1,600	900	2,000	1,900	304	274
5.....	441	715	1,320	800	650	380	1,400	1,200	1,500	1,600	336	259
6.....	422	244	1,320	600	750	900	1,400	1,500	1,000	1,400	336	244
7.....	404	540	1,080	700	550	700	1,400	1,400	850	1,200	600	274
8.....	422	715	810	240	650	1,300	1,700	1,600	850	1,100	1,100	304
9.....	202	580	670	700	420	1,900	3,740	1,600	700	1,100	1,600	244
10.....	460	760	700	650	600	1,800	4,100	1,200	650	1,000	900	274
11.....	460	860	700	600	550	1,600	6,130	950	180	800	700	500
12.....	910	750	715	600	200	1,100	9,700	950	800	700	650	460
13.....	670	230	760	600	600	1,400	6,680	900	700	550	480	120
14.....	670	670	760	500	500	1,400	5,170	380	650	404	600	150
15.....	460	580	580	200	380	1,600	3,170	850	480	336	440	500
16.....	244	500	580	500	380	1,800	3,390	750	550	189	441	460
17.....	422	500	625	500	300	1,800	3,620	600	600	304	202	260
18.....	336	860	369	460	320	1,590	4,890	550	1,500	244	244	550
19.....	320	2,660	1,520	440	300	715	4,890	700	1,600	336	304	500
20.....	580	3,280	1,200	400	400	1,450	3,060	1,400	1,300	369	274	420
21.....	1,450	2,360	860	400	400	1,260	2,600	1,100	1,100	369	404	420
22.....	1,450	1,910	810	200	380	1,260	2,400	850	5,960	289	369	440
23.....	760	1,450	760	500	440	1,260	1,800	850	7,060	289	336	120
24.....	670	1,140	760	440	700	1,260	1,400	800	2,860	274	136	160
25.....	670	1,200	500	440	1,200	1,020	1,500	750	2,460	304	202	500
26.....	580	1,200	1,300	440	1,100	441	1,500	1,400	2,270	352	244	386
27.....	580	352	800	200	1,000	1,260	1,400	1,200	1,910	304	274	369
28.....	500	1,320	950	360	1,100	1,670	1,500	900	2,000	289	304	101
29.....	441	1,450	1,000	170	-----	3,620	1,400	900	2,460	274	336	386
30.....	216	1,200	1,100	650	-----	3,860	800	850	3,500	216	369	124
31.....	336	-----	1,400	500	-----	2,760	-----	750	-----	274	244	-----

NOTE.—Discharge for the following days estimated from hydrograph: Nov. 12, Dec. 10, 11, Feb. 19, Apr. 2, May 30, June 17, July 4, 12, Sept. 7, and 21; no gage-height record. Discharge, Dec. 26 to Mar. 17, determined from gage heights corrected for ice effect from one discharge measurement, study of weather records and gage-height graph and comparison with records for the other stations in the basin. Discharge, Apr. 1-8, Apr. 21 to June 21, July 1-13, Aug. 7-15, and Sept. 11-25, determined from gage heights corrected for log effect from three discharge measurements.

Monthly discharge of Moose River at Moose River, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 370 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,450	202	535	1.45	1.67
November.....	3,280	230	1,030	2.78	3.10
December.....	2,460	369	953	2.58	2.97
January.....	1,300	170	538	1.45	1.67
February.....	1,200	200	554	1.50	1.66
March.....	3,860	380	1,420	3.84	4.43
April.....	9,700	800	2,900	7.84	8.75
May.....	1,600	380	990	2.68	3.09
June.....	7,060	180	1,640	4.43	4.94
July.....	2,400	189	767	2.07	2.39
August.....	1,600	136	439	1.19	1.37
September.....	550	101	319	.862	.96
The year.....	9,700	101	1,010	2.73	36.90

• 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, 1922.

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 about 200 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum discharge, about 500 second-feet at 5 p. m. June 23 and 8 a. m. June 24; minimum discharge, 26 second-feet at 5 p. m. November 16.

1911-1922: 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 controlled by gates at dam.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by backwater during high stages in North Branch of Moose River or by debris on control. Rating curve revised on basis of recent measurements and is well defined between 20 and 300 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height corrected for backwater effect from discharge measurements and from records of discharge through gates and over spillway of Old Forge dam. Records fair.

Discharge measurements of Middle Branch of Moose River at Old Forge, N. Y., during the year ending Sept. 30, 1922

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. 11	Howe and Harrington	2.06	124	Aug. 13	H. I. Granger	2.20	168
Apr. 6	do	2.51	210	14	do	1.78	102
May 9	Shupe and Covert	1.24	34.7				

Daily discharge, in second-feet, of Middle Branch of Moose River at Old Forge, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	150	28	36	140	140	80	220	122	110	440	30	140
2	150	28	36	140	140	80	240	98	54	400	30	140
3	150	60	36	140	130	80	244	48	55	400	30	140
4	150	100	36	140	130	80	225	34	56	360	30	140
5	150	110	38	80	130	80	207	34	59	340	30	140
6	150	110	40	80	130	80	207	34	76	300	30	140
7	150	110	44	80	130	80	225	34	98	307	32	140
8	150	110	48	80	130	80	244	34	92	285	71	140
9	140	110	65	80	130	80	264	34	92	244	174	140
10	140	120	80	80	130	80	264	34	92	225	174	140
11	140	120	80	80	100	80	285	34	92	207	174	130
12	140	100	80	80	80	80	460	34	90	150	166	120
13	120	110	80	80	80	85	460	34	90	68	158	120
14	75	90	80	80	80	85	440	34	90	32	95	130
15	75	48	80	80	80	85	460	36	90	31	75	140
16	75	28	80	80	80	85	440	38	90	31	75	140
17	75	28	80	80	80	80	405	48	100	30	75	140
18	75	30	85	80	80	80	405	60	180	30	75	140
19	70	38	90	80	80	85	432	68	190	30	70	140
20	75	120	100	80	80	85	432	122	190	30	70	140
21	70	120	140	80	80	85	379	143	190	30	70	140
22	55	65	160	80	80	120	354	143	360	30	70	140
23	32	55	150	80	80	120	307	143	480	30	70	140
24	30	44	150	80	80	110	285	136	480	30	65	140
25	30	36	140	80	80	110	307	143	480	30	65	140
26	30	32	140	80	80	110	285	143	440	30	65	140
27	30	32	140	80	80	110	264	143	400	30	65	140
28	30	34	140	100	80	100	264	143	440	30	100	140
29	30	34	140	140	-----	120	207	143	400	30	140	140
30	28	34	140	140	-----	140	166	143	420	30	140	140
31	28	-----	140	140	-----	160	-----	136	-----	30	140	-----

NOTE.—Discharge, Oct. 1 to Apr. 2, Apr. 12-16, May 3-18, June 12 to July 6, and Aug. 14 to Sept. 30, determined from gage heights corrected for backwater effect from six discharge measurements and study of records of discharge through gates and over spillway of Old Forge dam.

Monthly discharge of Middle Branch of Moose River at Old Forge, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 51.5 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean.	Per square mile	
October.....	150	28	90.1	1.75	2.02
November.....	120	28	69.5	1.35	1.61
December.....	160	36	92.7	1.80	2.08
January.....	140	80	94.2	1.83	2.11
February.....	140	80	99.3	1.93	2.01
March.....	160	80	94.0	1.83	2.11
April.....	460	166	313	6.08	6.78
May.....	143	34	83.0	1.61	1.86
June.....	480	54	203	3.94	4.40
July.....	440	30	138	2.68	3.09
August.....	174	30	85.6	1.66	1.91
September.....	140	120	138	2.68	2.99
The year.....	480	28	125	2.43	32.87

NOTE.—The above figures do not necessarily represent the natural flow from the basin, because of storage in Fulton Chain of Lakes.

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 September 30, 1922.

GAGES.—Elevation of water surface in the reservoir is determined by a staff gage in two sections, on the west corner of the gate house; read by James 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.—Current-meter measurements made from a temporary footbridge at mouth of outlet tunnel, below the gates. Discharge over the spillway has not been measured.

DETERMINATION OF DISCHARGE.—Records include the 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 experiments¹ have been used to compute ratings for the spillway and logway.

REGULATION.—At ordinary stages the discharge of Beaver River is completely regulated by the operation of the sluice gates.

EXTREMES OF STAGE.—Maximum elevation of water surface in reservoir recorded during year, 19.85 feet at 3.15 p. m. June 23; minimum elevation recorded, 3.8 feet at 10.05 a. m., October 9.

1908–1922: Maximum elevation of water surface in reservoir, that of current year; minimum elevation, 2.9 feet September 29 and October 1, 1913.

EXTREMES OF DISCHARGE.—Maximum daily discharge during year, 3,380 second-feet April 12; minimum discharge, 24 second-feet July 1–4.

1908–1922: Maximum discharge, that of current year; minimum discharge, zero, during periods when gates were closed and there was no flow over spillway.

¹ U. S. Geol. Survey Water-Supply Paper 200.

ACCURACY.—Stage-discharge relation permanent; probably not affected by ice. Rating curves for sluice gates well defined. Lake gage read to half-tenths once daily. The accuracy of computations depends to a large extent on the care with which the gates were set to the recorded openings. Records fair.

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

Monthly discharge of Beaver River at State dam, near Beaver River, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 176 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	174	31	115	0.653	0.75
November.....	238	70	185	1.05	1.17
December.....	413	141	295	1.68	1.94
January.....	348	280	295	1.68	1.94
February.....	343	152	277	1.57	1.64
March.....	1,400	302	470	2.67	3.08
April.....	3,380	95	1,370	7.78	8.68
May.....	523	97	313	1.78	2.05
June.....	1,080	184	485	2.76	3.08
July.....	982	24	300	1.70	1.96
August.....	317	245	275	1.56	1.80
September.....	297	146	250	1.42	1.58
The year.....	3,380	24	385	2.19	29.67

NOTE.—The above figures do not necessarily represent the natural flow of the river on account of regulation at the dam.

BEAVER RIVER AT EAGLE FALLS, NEAR NUMBER FOUR, N. Y.

LOCATION.—Just below Eagle Falls plant of Beaver River Power Corporation, $2\frac{1}{2}$ miles from Beaver Lake, 4 miles north of Number Four, Lewis County, 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, 1922.

GAGE.—Gurley seven-day graph water-stage recorder installed October 10, 1921, in a concrete shelter on left bank 500 feet below power house; prior to October 10, temporary vertical staff gage at same location. Staff gage read and recorder inspected by employee of Beaver River Power Corporation.

DISCHARGE MEASUREMENTS.—Made from a cable over tailrace and river channel, about 300 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed of channel consists of boulders and large broken rock. Control is at the head of rapids about 50 feet below gage and is probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.30 feet at 3.30 p. m. April 13 (discharge, 4,980 second-feet); minimum stage, 0.60 foot (staff gage reading) at 8 a. m. October 9 (discharge, 16 second-feet).

1921-1922: Maximum and minimum stages recorded, same as given above.

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

REGULATION.—Seasonal flow is regulated by storage in Beaver River Flow 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 probably permanent; not affected by ice during year. Rating curve fairly well defined between 10 and 3,500 second-feet. Staff gage read to half-tenths twice daily. 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 from two readings a day from staff gage or by inspection of recorder graph, or for days of considerable fluctuation, by averaging discharge for intervals of the day. Records good, except for period when staff gage was used and for estimated periods for which they are fair.

Discharge measurements of Beaver River at Eagle Falls, near Number Four, N. Y., during the year ending Sept. 30, 1922

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	Howe and Harrington..	0.67	20.0	Apr. 9	Harrington and Howe..	4.93	2,290
11	B. F. Howe.....	2.16	297	9	Howe and Harrington..	4.98	2,340
13	do.....	2.02	285	10	Harrington and Howe..	5.45	2,770
Nov. 13	Howe and Harrington..	2.74	463	10	Howe and Harrington..	5.61	2,990
14	do.....	2.97	592	Aug. 22	A. W. Harrington.....	2.27	346

Daily discharge, in second-feet, of Beaver River at Eagle Falls, near Number Four, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	235	186	354	315		482	1,840	749	265	1,390	306	310
2.....	210	320	321			436	1,440	334	260	1,390	315	290
3.....	285	496	375			408	1,160	245	360	1,390	303	260
4.....	272	454	518			393	990	260	433	1,260	294	351
5.....	235	306	685			375	835	330	450	1,260	272	300
6.....	188	203	685		390	402	1,060	402	458	1,160	268	282
7.....	235	309	635			462	1,400	543		666	396	288
8.....	210	288	558			660	1,780	1,080		357	426	285
9.....	34	309	500			660	2,320	1,160	340	206	375	276
10.....	210	266	480			635	2,870	990		283	330	228
11.....	285	210	436			600	3,200	835	253	268	300	321
12.....	272	340	447		288	503	3,900	740	340	268	296	288
13.....	270	478	426		260	510	3,900	635	300	262	255	272
14.....	275	570	396		218	518	3,200	546	265	255	324	272
15.....	248	526			225	612	2,760	562	272	233	291	285
16.....	212	422	360	360	228	835	2,650	468	278	186	291	266
17.....	282	412			612	2,700	458	306	272	275	275	224
18.....	242	574	333		204	590	2,700	454	682	262	270	300
19.....	242	1,160	660		315	586	2,700	478	1,080	248	262	262
20.....	299	1,160	612		381	612	2,480	506	910	238	273	250
21.....	570	873	566		366	685	2,040	461	685	208	333	245
22.....	516	530				740	1,400	348	2,020		333	242
23.....	268	405			420	635	1,210	261	2,980		318	223
24.....	232	375				558	985	252	2,480		312	184
25.....	182	393			510	534	826	260	1,740		315	278
26.....	175	366	350		496	542	701	405	1,540		326	262
27.....	173	282			492	712	764	430	1,210		291	260
28.....	171	375			475	1,030	700	378	1,120		369	270
29.....	165	378				1,980	600	400	1,300		310	222
30.....	44	393				2,430	312	318	1,540	268	330	178
31.....	175					2,100		306		342	320	

NOTE.—Discharge for the following periods when gage did not operate satisfactorily estimated by comparison with records of West Branch of Oswegatchie River near Harrisville and Beaver River at Beaver River, with allowance for storage: Dec. 9, 10, 15-17, 22-31, Jan. 2-31, Feb. 1-11, 22-25, Mar. 11, Apr. 22, 28, 29, June 7-10, 22, July 22-29, Aug. 29, 30, 31, Sept. 1, and 2; mean daily gage height Nov. 27, Mar. 10, Apr. 23, May 3, 4, 31, June 1, 16, 28, 29, and Sept. 3, estimated. Braiced figures show mean discharge for periods indicated.

Monthly discharge of Beaver River at Eagle Falls, near Number Four, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 230 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	570	34	239	1.04	1.20
November.....	1,160	186	445	1.93	2.15
December.....	685	321	438	1.91	2.20
January.....			359	1.56	1.80
February.....	510	204	365	1.59	1.66
March.....	2,430	375	730	3.17	3.66
April.....	3,900	312	1,850	8.04	8.97
May.....	1,160	245	503	2.19	2.52
June.....	2,980	253	830	3.61	4.03
July.....	1,390	186	458	1.99	2.29
August.....	426	262	312	1.36	1.57
September.....	351	178	266	1.16	1.29
The year.....	3,900	34	565	2.46	33.34

NOTE.—The above figures do not necessarily represent the natural flow from the basin because of artificial storage, mainly in Stillwater reservoir and Beaver Lake.

STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

EAST BRANCH OF OSWEGATCHIE RIVER AT NEWTON FALLS, N. Y.

LOCATION.—600 feet below lower dam of Newton Falls Paper Co., in Newton Falls, St. Lawrence County, 4 miles above mouth of Little River and 10 miles below outlet of Cranberry Lake.

DRAINAGE AREA.—166 square miles (measured by engineers of New York State Conservation Commission).

RECORDS AVAILABLE.—October 6, 1912, to September 30, 1922.

GAGE.—Vertical staff on left bank, read by Henry Van Waldick. Datum lowered 1.0 foot on July 28, 1920.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Small boulders and rock; covered with waste from pulp mill; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.68 feet at 6.20 p. m. April 18 (discharge, 1,920 second-feet); minimum stage reached nearly every Sunday in low-water period when paper mills shut down.

1912-1922: Maximum stage recorded, 6.1 feet (old datum) at 5.15 p. m. March 28, 1913 (discharge, 2,200 second-feet).

ICE.—Stage-discharge relation affected by ice only for a short time during extremely cold weather.

REGULATION.—Some diurnal fluctuation in flow caused by operation of paper mills. Seasonal flow largely controlled by storage at Cranberry Lake.

ACCURACY.—Stage-discharge relation changed presumably at time of high water in April; not affected by ice during year. Rating curve used before the change well defined between 20 and 1,200 second-feet; curve used after the change well defined between 40 and 1,000 second-feet. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for days of great fluctuation due to closing down of power plant, when discharge is averaged for intervals of day, taking into account the discharge during periods when power plant was shut down. Records only fair as mean daily gage heights are obtained from only two readings and may be considerably in error on account of artificial regulation.

Discharge measurements of East Branch of Oswegatchie River at Newton Falls, N. Y., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Dis-charge
		<i>Feet</i>	<i>Sec.-ft.</i>
July 15	Covert and Shupe	3.13	374
Aug. 15	Shupe and Covert	3.02	320
Aug. 21	A. W. Harrington	3.08	354

Daily discharge, in second-feet, of East Branch of Oswegatchie River at Newton Falls, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	214	188	171	99	223	252	376	439	274	357	159	309
2	140	242	205	112	262	188	402	469	263	997	150	263
3	304	242	205	140	242	252	402	439	241	1,140	178	198
4	272	214	120	148	272	252	430	439	219	1,190	241	309
5	252	232	223	180	205	223	490	411	309	1,140	263	411
6	242	180	205	188	155	293	490	383	321	1,040	208	333
7	232	223	214	196	180	326	554	357	286	1,190	263	309
8	282	188	223	148	155	402	894	411	252	1,090	263	286
9	262	120	180	196	214	460	1,070	198	274	785	263	263
10	282	205	196	155	223	402	1,220	263	263	633	263	263
11	242	155	110	171	155	326	1,330	333	198	383	241	309
12	232	180	171	205	155	196	1,620	298	230	298	263	298
13	326	110	110	196	376	272	1,560	383	263	321	309	309
14	326	232	232	188	326	282	1,560	230	263	263	286	298
15	326	140	130	140	242	262	1,560	309	274	274	357	274
16	304	148	188	171	205	252	1,740	309	286	198	263	298
17	272	171	110	196	282	205	1,740	298	263	159	298	274
18	376	242	119	205	282	188	1,860	178	101	208	286	383
19	402	205	205	205	119	196	1,880	274	321	263	321	309
20	326	155	196	196	282	282	1,320	298	274	263	208	263
21	326	490	130	205	326	326	1,570	170	274	208	286	309
22	326	148	205	140	262	223	1,290	298	309	252	333	357
23	110	293	242	252	293	242	1,190	274	333	208	298	263
24	242	293	120	155	252	223	1,190	241	241	263	309	309
25	205	242	75	223	282	242	825	198	208	263	309	263
26	223	272	140	205	262	171	707	321	252	252	298	309
27	223	190	205	180	350	282	633	357	286	159	263	309
28	196	133	282	282	282	304	439	150	286	168	309	263
29	171	100	188	130	-----	402	383	159	286	168	263	309
30	163	223	171	163	-----	460	411	252	499	168	309	286
31	180	-----	110	148	-----	376	-----	252	-----	168	263	-----

NOTE.—Discharge for the following days estimated because shut-down of power plant caused great fluctuation in stage: Oct. 23, Nov. 9, 13, 15, 27, 29, Dec. 4, 11, 13, 15, 17, 21, 24, 25, 31, Jan. 29, May 21, and 28.

Monthly discharge of East Branch of Oswegatchie River at Newton Falls, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 166 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	402	110	257	1.55	1.79
November	490	100	205	1.23	1.37
December	282	75	174	1.05	1.21
January	282	99	178	1.07	1.23
February	376	119	245	1.48	1.54
March	460	171	283	1.70	1.96
April	1,880	376	1,050	6.33	7.06
May	469	150	303	1.83	2.11
June	499	101	272	1.64	1.83
July	1,190	159	467	2.81	3.24
August	357	150	268	1.61	1.86
September	411	198	298	1.80	2.01
The year	1,880	75	333	2.01	27.21

NOTE.—Table shows run-off as regulated at Cranberry Lake and by paper mills at Newton Falls

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.—961 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 23, 1916, to September 30, 1922.

GAGE.—Gurley seven-day graph water-stage recorder on the right bank, installed September 16, 1916. Prior to this date gage-height was determined by measuring the distance from a reference point to the water surface. Recorder inspected by G. B. Todd.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Solid rock.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.67 feet at 9 p. m. April 14 (discharge, 9,390 second-feet); minimum stage from water-stage recorder, 0.85 foot from 2 to 8 a. m. October 5 (discharge, 292 second-feet).

1916-1922: Maximum stage from water-stage recorder, 7.6 feet from 9 to 12 a. m. March 30, 1917 (discharge, 11,700 second-feet); minimum stage from water-stage recorder, 0.81 foot, 2 to 4 a. m. September 30, 1921 (discharge, 274 second-feet).

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

REGULATION.—Some diurnal fluctuation due to operation of mills at Rensselaer Falls and above. Seasonal flow regulated by storage in Cranberry Lake.

ACCURACY.—Stage-discharge relation permanent except as affected by ice from December to March. Rating curve well defined between 400 and 15,000 second-feet. Operation of water-stage recorder satisfactory during the year, except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph, or for days of considerable fluctuation, by averaging discharge for intervals of the day. Records good except for periods of ice effect and when gage did not operate for which they are fair.

Discharge measurements of Oswegatchie River near Heuvelton, N. Y., during the year ending Sept. 30, 1922

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>
Dec. 17	A. W. Harrington.....	1.42	695	May 11	Covert and Shupe.....	2.44	1,730
Jan. 13	E. B. Shupe.....	1.70	842	Aug. 20	A. W. Harrington.....	1.19	460
Feb. 17	B. F. Howe.....	1.68	810				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Oswegatchie River near Hewelton, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	325	670	1,640	650	550	2,600	5,480	1,750	520	3,960	478	485
2.....	310	686	1,590	600	600	2,200	4,920	1,570	548	4,120	452	446
3.....	320	662	2,250	550	1,100	2,000	4,300	1,450	608	4,300	485	420
4.....	310	890	2,390	550	1,300	1,700	3,780	1,400	646	4,650	548	420
5.....	315	1,260	2,180	550	1,200	1,500	3,960	1,340	890	4,560	534	414
6.....	360	1,360	1,980	800	1,200	1,500	5,100	1,330	1,190	4,120	555	409
7.....	382	1,330	1,640	1,000	1,200	3,200	5,860	1,360	1,220	3,620	842	387
8.....	409	1,280	1,300	1,000	1,100	6,500	5,960	1,410	1,010	2,980	1,080	376
9.....		1,150	1,170	1,000	1,000	7,000	5,860	1,520	800	2,250	1,220	382
10.....		1,120	1,110	1,000	900	7,680	5,860	1,780	737	1,690	1,520	394
11.....	600	1,030	1,080	950	900	6,850	6,450	1,740	670	1,200	1,360	420
12.....		985	1,060	900	900	6,250	7,680	1,650	622	1,120	1,170	420
13.....		947	1,050	850	950	5,670	8,990	1,510	630	1,200	985	426
14.....	928	918	918	800	950	5,670	9,220	1,360	630	956	800	426
15.....	918	947	854	750	900	5,860	9,220	1,260	615	863	694	433
16.....	909	938	670	650	850	5,860	8,720	1,070	592	800	600	440
17.....	836	1,210	670	600	800	5,670	8,320	928	600	746	630	472
18.....	800	1,780	1,420	650	800	5,100	8,100	990	694	670	615	520
19.....	800	2,900	2,820	650	750	4,210	7,890	909	836	578	520	534
20.....	845	3,530	2,820	700	1,100	3,450	7,470	909	1,020	520	478	506
21.....	1,190	4,040	2,700	700	1,700	2,980	6,850	966	1,140	466	485	485
22.....	1,840	4,300	2,400	700	1,600	2,750	6,050	1,080	1,680	499	492	478
23.....	1,980	4,210	1,780	650	1,400	2,680	5,290	1,020	3,860	548	466	485
24.....	1,910	3,620	1,370	600	1,800	2,320	4,380	881	5,480	578	440	485
25.....	1,640	2,820	1,280	550	3,200	2,250	3,700	854	6,250	592	420	459
26.....	1,400	2,180	1,020	550	3,200	2,180	3,130	782	6,050	562	414	459
27.....	1,220	1,980	938	550	3,000	2,250	2,530	710	5,100	662	426	452
28.....	1,040	2,820	872	500	2,800	2,900	2,250	755	3,960	662	426	387
29.....	890	2,570	654	500	4,210	2,110	728	3,370	562	472	376	
30.....	782	1,740	622	550	5,100	1,910	694	3,620	499	466	387	
31.....	702		670	550	5,480		608		485	506		

NOTE.—Mean discharge, Oct. 9-13, when gage did not operate estimated at 600 second-feet by comparison with records of East Branch of Oswegatchie River at Newton Falls and West Branch of Oswegatchie River near Harrisville. Mean daily gage-height estimated Nov. 13, 14, Dec. 25, Jan. 8, May 7, Sept. 10, 14, 15, 21, 22, and 23. Discharge Dec. 8, 21, 22, and Jan. 1 to Mar. 9 determined from gage-heights corrected for ice effect from three discharge measurements, study of weather records and gage-height graph, and comparison with records of the East and West branches of Oswegatchie River.

Monthly discharge of Oswegatchie River near Hewelton, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 961 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,980	310	850	0.885	1.02
November.....	4,300	662	1,860	1.94	2.16
December.....	2,820	622	1,450	1.51	1.74
January.....	1,000	500	697	.725	.84
February.....	3,200	550	1,350	1.40	1.46
March.....	7,680	1,500	4,050	4.21	4.85
April.....	9,220	1,910	5,710	5.94	6.63
May.....	1,780	608	1,170	1.22	1.41
June.....	6,250	520	1,850	1.93	2.15
July.....	4,650	466	1,650	1.72	1.98
August.....	1,520	414	664	.691	.80
September.....	534	376	439	.457	.51
The year.....	9,220	310	1,810	1.88	25.55

WEST BRANCH OF OSWEGATCHIE RIVER NEAR HARRISVILLE, N. Y.

LOCATION.—At highway bridge near Geers Corners, $2\frac{1}{2}$ miles downstream from Harrisville, Lewis County.

DRAINAGE AREA.—245 square miles (measured on topographic maps and map of New York issued by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—July 1, 1916, to September 30, 1922.

GAGE.—Vertical staff in three sections on the 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. Read by Frank Osborne.

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

CHANNEL AND CONTROL.—Rocky and rough; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.6 feet at 6 p. m. June 23 (discharge, about 4,220 second-feet); minimum stage recorded, 1.1 feet several times, September 6–9 and 25–30 (discharge, 40 second-feet).

1916–1922: 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 recorded, 0.90 foot at 7 a. m. September 18, 20–24, 1921 (discharge, about 33 second-feet).

ICE.—Stage-discharge relation only slightly affected by ice during extremely cold periods.

REGULATION.—Operation of pulp mill at Harrisville causes some diurnal fluctuation.

ACCURACY.—Stage-discharge relation changed slightly at low-water end, presumably at time of high water in April; not affected by ice during year. Rating curve used before the change well defined between 50 and 4,000 second-feet; curve used after the change fairly well defined between the same limits. 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 effect of diurnal fluctuation.

Discharge measurements of West Branch of Oswegatchie River near Harrisville, N. Y., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Dis-charge
May 11	Covert and Shupe.....	<i>Feet</i> 3.62	<i>Sec.-ft.</i> 749
Aug. 21	A. W. Harrington.....	1.61	102

Daily discharge, in second-feet, of West Branch of Oswegatchie River near Harrisville, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	51	170	560	182	124	970	1,800	460	177	1,490	101	80
2.....	74	275	520	195	208	750	1,420	405	201	2,040	117	80
3.....	68	480	560	182	275	700	1,150	405	225	1,960	155	80
4.....	60	560	750	170	200	560	1,030	405	560	1,490	189	71
5.....	68	560	700	260	365	460	1,090	440	480	1,090	201	71
6.....	77	560	650	352	305	440	1,210	440	422	850	213	61
7.....	85	520	560	352	275	650	1,350	560	370	650	290	67
8.....	77	440	440	370	245	1,490	1,640	750	275	440	480	80
9.....	77	370	352	335	275	2,130	1,960	800	225	370	650	61
10.....	106	335	335	305	275	2,130	2,690	850	225	305	460	80
11.....	220	320	370	305	245	1,800	2,790	700	290	225	335	61
12.....	305	305	305	275	275	1,490	3,300	560	189	201	250	71
13.....	370	275	290	232	290	1,350	3,740	460	166	225	201	71
14.....	370	232	275	208	260	1,350	3,090	405	177	213	135	94
15.....	335	275	275	245	245	1,490	2,490	370	189	201	135	101
16.....	275	290	245	275	245	1,640	2,310	335	155	201	117	166
17.....	245	335	245	245	245	1,490	2,310	305	155	177	101	177
18.....	195	560	480	220	245	1,420	2,130	250	250	155	94	177
19.....	170	1,090	910	195	245	1,060	1,960	260	520	155	87	109
20.....	220	1,960	1,030	232	275	850	1,800	352	480	145	84	87
21.....	560	2,400	970	208	305	750	1,490	405	1,030	135	73	76
22.....	850	2,220	800	245	290	750	1,210	370	2,130	117	80	73
23.....	850	1,350	520	260	370	650	1,090	352	3,740	117	73	73
24.....	650	1,090	440	208	700	600	970	335	3,740	117	73	71
25.....	560	750	370	182	850	650	850	335	2,690	126	73	61
26.....	440	650	352	170	1,090	650	750	320	1,800	117	71	59
27.....	370	650	275	146	1,090	750	650	275	1,150	135	101	63
28.....	275	600	275	170	970	1,030	600	250	800	135	87	61
29.....	220	560	232	146	-----	1,960	560	250	800	117	94	59
30.....	170	560	245	124	-----	2,890	560	201	1,150	117	101	49
31.....	146	-----	195	158	-----	2,310	-----	189	-----	109	84	-----

Monthly discharge of West Branch of Oswegatchie River near Harrisville, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 245 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	850	51	275	1.12	1.29
November.....	2,400	170	691	2.82	3.15
December.....	1,030	195	469	1.91	2.20
January.....	370	124	231	.943	1.09
February.....	1,090	124	386	1.58	1.64
March.....	2,890	440	1,200	4.90	5.65
April.....	3,740	560	1,670	6.82	7.61
May.....	850	189	412	1.68	1.94
June.....	3,740	155	825	3.37	3.76
July.....	2,040	109	449	1.83	2.11
August.....	650	71	171	.698	.80
September.....	177	49	83.0	.339	.38
The year.....	3,740	49	570	2.33	31.62

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 (all but 16 square miles measured on topographic maps).

RECORDS AVAILABLE.—August 20, 1908, to September 30, 1922.

GAGE.—Stevens water-stage recorder installed October 22, 1912, on left bank. Recorder inspected by employee of International Paper Co.

DISCHARGE MEASUREMENTS.—Made from a cable three-quarters of a mile below gage just above Black Rapids.

CHANNEL AND CONTROL.—Channel opposite gage is a deep pond with no perceptible velocity. Control is at head of Black Rapids.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 11.82 feet from 6 to 8 p. m. April 17 (discharge, 7,580 second-feet); minimum stage from water-stage recorder, 2.00 feet at 4 p. m. September 4 (discharge, 73 second-feet).

1908-1922: Maximum stage from water-stage recorder, that of April 17, 1922; minimum stage from water-stage recorder, 0.85 foot at 11 a. m. September 2, 1913 (discharge, about 10 second-feet).

ICE.—Rapids that form control rarely freeze, measurements made when the pond was covered with ice indicate that the stage-discharge relation was not affected.

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 permanent except as affected by logs on control from October 1 to March 18. Rating curve well defined between 50 and 7,000 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 the day. Mean daily discharge, October 1 to March 18, estimated on account of backwater from logs. Records good except for period of log effect for which they are fair.

COOPERATION.—Water-stage recorder inspected by an employee of the International Paper Co.

Discharge measurements of Raquette River at Piercefield, N. Y., during the year ending Sept. 30, 1922

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>
Jan. 7	E. B. Shupe.....	• 5.24	858	Apr. 5	B. F. Howe.....	7.52	2,470
15	Covert and Shupe.....	2.85	203	6	do.....	7.92	2,900
16	do.....	• 5.92	1,220	Aug. 14	H. I. Granger.....	4.46	614

• Stage-discharge relation affected by logs.

Daily discharge, in second-feet, of Raquette River at Piercefield, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1-----	280	440	1,700	500	650	900	3,350	3,950	1,590	2,880	750	470
2-----	280	480	1,700	750	650	1,000	3,030	3,730	1,520	2,960	730	455
3-----	280	500	1,600	1,000	500	950	2,880	3,510	1,520	3,290	730	290
4-----	280	500	1,100	950	480	950	2,930	3,290	803	3,510	690	95
5-----	280	550	1,700	1,000	300	360	2,870	3,180	1,420	3,730	690	335
6-----	280	320	1,800	950	500	900	2,930	3,080	1,360	3,730	339	455
7-----	380	500	1,800	800	700	1,100	3,080	2,940	1,270	3,730	531	425
8-----	280	650	1,800	440	650	1,100	3,290		1,300	3,510	710	440
9-----	240	700	1,700	700	650	1,100	3,520		1,490	3,160	670	425
10-----	280	800	1,700	900	650	1,300	4,170		1,390	3,180	690	213
11-----	360	800	1,100	900	550	1,400	4,770	3,200	791	2,980	690	324
12-----	440	850	1,700	900	300	800	5,610		1,390	2,880	608	455
13-----	280	460	1,800	850	500	1,400	6,120		1,520	2,590	313	440
14-----	280	650	1,600	900	700	1,600	6,640	2,890	1,370	2,410	494	455
15-----	280	850	1,500	650	650	1,600	7,160	2,940	1,300	2,240	650	440
16-----	240	850	1,500	700	650	1,700	7,290	2,980	1,330	1,830	650	296
17-----	280	850	1,400	800	650	1,900	7,550	2,780	1,210	2,030	632	135
18-----	280	800	800	800	550	1,900	7,420	2,680	566	1,830	615	322
19-----	400	800	1,300	750	280	1,190	7,420	2,590	1,550	1,760	564	455
20-----	420	1,400	1,500	650	480	2,020	7,420	2,410	1,390	1,660	272	472
21-----	440	1,700	1,500		650	2,180	7,290	2,210	1,390	1,590	492	443
22-----	280	1,500	1,200		650	2,070	7,030	2,410	1,490	1,390	632	441
23-----	280	1,600	1,200		650	2,130	6,770	2,150	1,660	640	587	373
24-----	380	1,700	950		700	2,150	6,510	2,090	1,870	1,080	515	127
25-----	550	1,800		600	550	2,070	6,120	1,940	1,740	935	515	304
26-----	500	1,500			320	1,480	5,730	1,870	2,070	730	380	455
27-----	500	1,300			650	2,140	5,250	1,760	2,070	730	238	455
28-----	550	1,700	1,000		850	2,240	4,890	1,450	2,240	750	410	332
29-----	500	1,800		360		2,590	4,530	1,640	2,410	730	530	251
30-----	280	1,800		500		2,980	4,060	1,660	2,680	430	515	348
31-----	420			650		3,180		1,620		588	455	

NOTE.—Discharge for the following periods when gage did not operate estimated from comparison with records of Oswegatchie River near Heuvelton: Dec. 25–31, Jan. 21–28, and May 8–13. Discharge, Oct. 1 to Mar. 18, determined from recorder graph corrected for backwater from logs on control, on basis of three discharge measurements and comparison with records of flow of streams in adjacent drainage areas.

Monthly discharge of Raquette River at Piercefield, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 723 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October-----	550	240	348	0.481	0.55
November-----	1,800	320	1,000	1.35	1.54
December-----	1,800	800	1,380	1.91	2.30
January-----	1,000	360	707	.978	1.13
February-----	850	280	574	.794	.83
March-----	3,180	360	1,630	2.25	2.59
April-----	7,550	2,870	5,250	7.26	8.10
May-----	3,950	1,450	2,680	3.71	4.28
June-----	2,680	566	1,520	2.10	2.34
July-----	3,730	430	2,110	2.92	3.37
August-----	750	238	558	.772	.89
September-----	472	95	362	.501	.56
The year-----	7,550	95	1,510	2.09	28.38

ST. REGIS RIVER AT BRASHER CENTER, N. Y.

LOCATION.—Near steel highway bridge in Brasher Center, St. Lawrence County, 5 miles downstream from Brasher Falls, $6\frac{1}{2}$ miles below junction of East and West branches of St. Regis River, and 12 miles above mouth.

DRAINAGE AREA.—621 square miles (measured on post-route map).

RECORDS AVAILABLE.—August 22, 1910, to November 10, 1917, and January 1, 1919, to September 30, 1922.

GAGES.—Gurley seven-day graph water-stage recorder installed August 14, 1920, on left bank 600 feet above bridge. Datum same as that of staff gage with inclined and vertical sections used June 24, 1916, to August 14, 1920. A chain gage on downstream side of bridge, at independent datum, was used August 22, 1910, to June 23, 1916. Recorder inspected by Alfred Berry.

DISCHARGE MEASUREMENTS.—Made from a cable at the staff gage.

CHANNEL AND CONTROL.—Bed at cable composed of small boulders and coarse gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, about 10.2 feet (partially estimated) during afternoon of April 12 (discharge, 7,530 second-feet); minimum stage from water-stage recorder 5.78 feet at 3 a. m. October 3 (discharge, 162 second-feet).

1910-1922: Maximum stage recorded, 9.1 feet 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 practically permanent, except as affected by ice. Rating curve 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 the day. Records good except for periods of ice effect and when gage did not operate for which they are fair.

Discharge measurements of St. Regis River at Brasher Center, N. Y., during the year ending Sept. 30, 1922

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. 12	E. B. Shupe.....	7.10	467	Mar. 31	B. F. Howe.....	8.14	3,130
Feb. 17	B. F. Howe.....	7.44	341	Aug. 20	A. W. Harrington.....	6.12	328
Mar. 30	do.....	8.52	3,890				

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of St. Regis River at Brasher Center, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	192	529	894	320	260		3,000	1,440	420	4,120	284	242
2	192	538	870	260	280		2,420		284	3,440	284	232
3	179	635	1,590	220	400		2,260		420	2,740	270	210
4	206	675	1,440	220	440		2,340	1,500	735	2,500	319	197
5	215	882	1,200	300	440		2,340		894	2,180	372	197
6	226	735	1,100	550	420	1,500	2,900	1,670	822	1,590	364	188
7		665	1,000	550	420		3,000	1,850	685	1,230	981	197
8		695	800	550	380		3,260	2,260	620	1,080	2,420	188
9		605	700	550	360		4,020	2,500	492	954	1,920	202
10	320	538	700	550	340		5,180	1,660	492	846	1,350	206
11		596	700	480	340	2,340	5,740	1,590	501	735	906	197
12		586	725	480	360	2,260	7,280	1,410	615	675	685	192
13		645	596		400	2,260	7,030	1,520	576	725	456	248
14	586	567	474		380	3,260	5,510	1,140	501	675	429	254
15	558	655	404		380	3,620	4,440	918	438	501	388	242
16		538	625	388	380	3,000	4,220	930	340	429	348	242
17		404	605	483	340	2,400	3,920	882	544	412	340	232
18		333	1,130	1,340	320		3,820	846	2,660	412	404	237
19		270	2,260	1,380	300		3,720	705	2,660	380	420	242
20		419	2,580	1,120	440		3,350	942	2,100	364	364	226
21		1,570	2,740	1,090	650	1,900	2,920	930	1,510	348	340	215
22		1,630	2,340	700	650		2,580	706	4,140	340	312	206
23		1,550	2,030	600	480	600	2,030	745	6,080	348	291	210
24		1,190	1,720	650	340	700	2,030	715	5,640	412	270	206
25		1,150	1,730	420	240		1,510	1,850	665	2,740	429	197
26		966	2,180	280	240	1,200	1,460	1,510	645	1,820	412	264
27		745	4,020	240	240		2,030	1,380	596	1,390	364	264
28		625	4,400	280	240		2,660	1,490	529	1,510	340	254
29		695	2,800	220	240		4,220	1,460	465	2,780	326	291
30		501	1,520	280	260		4,220	1,390	501	4,860	312	270
31		447		240	260		3,260		501		277	250

NOTE.—Discharge for the following periods when gage did not operate estimated from a study of the recorder graph and comparison with record of Oswegatchie River near Heuvelton: Oct. 7–13, Jan. 13–22, Feb. 25–28, Mar. 1–10, 18–24, Apr. 6, 7, and May 2–5; mean daily gage height estimated, Mar. 25, 29, 30, Apr. 5, 12, 13, May 10, 11, and 12. Discharge, Nov. 28, 29, Dec. 5–11, Dec. 22 to Mar. 10, Mar. 16 and 17, determined from gage-heights corrected for ice effect from two discharge measurements, study of weather records and gage-height graph, and by comparison with records of flow of streams in adjacent drainage areas.

Monthly discharge of St. Regis River at Brasher Center, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 621 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,630	179	569	0.916	1.06
November	4,400	529	1,410	2.27	2.53
December	1,590	220	739	1.19	1.37
January	550	220	360	.580	.67
February		260	528	.850	.89
March	4,220		2,150	3.46	3.99
April	7,280	1,380	3,280	5.28	5.89
May	2,500	465	1,140	1.84	2.12
June	6,080	284	1,600	2.58	2.88
July	4,120	277	964	1.55	1.79
August	2,420	254	527	.849	.98
September	254	179	211	.340	.38
The year	7,280	179	1,120	1.80	24.55

RICHELIEU RIVER AT FORT MONTGOMERY, ROUSES POINT, N. Y.

LOCATION.—Inside the fort, three-eighths of a mile south of international boundary, half a mile above head of Richelieu River (outlet of Lake Champlain), and 1 mile northeast of Rouses Point, Clinton County.

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, 1922.

GAGE.—Staff, inside of fort; read by Thomas Bourke. Elevation of gage zero, 92.50 feet above mean sea level.

EXTREMES OF STAGE.—Maximum elevation recorded during year, 100.73 feet at 10 a. m. April 17; minimum elevation recorded, 92.54 feet at 10 a. m. October 8.

1869–1922: Maximum elevation recorded, 103.28 feet April, 1869;² 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.

Daily gage height, in feet, of Richelieu River at Fort Montgomery, Rouses Point, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	0.25	0.25	1.32	1.68	1.28	1.47	5.25	6.87	4.40	5.05	3.10	1.90
2.....	.14	.14	1.50	1.65	1.30	1.50	5.25	6.78	4.28	5.10	3.02	1.92
3.....	.23	.20	1.40	1.65	1.30	1.52	5.20	6.45	4.20	5.15	3.00	1.90
4.....	.17	.22	1.42	1.64	1.30	1.53	5.15	6.38	4.17	5.15	2.95	1.80
5.....	.10	.07	1.45	1.62	1.30	1.55	5.18	6.22	4.20	5.05	2.90	1.75
6.....	.08	.20	1.45	1.64	1.30	1.57	5.20	6.20	4.03	5.00	2.87	1.75
7.....	.09	.25	1.43	1.59	1.30	1.62	5.30	6.15	3.90	5.20	2.82	1.70
8.....	.04	.18	1.48	1.62	1.28	1.75	5.67	6.05	3.85	5.00	2.80	1.70
9.....	.14	.20	1.45	1.60	1.27	2.40	5.82	6.13	3.50	4.85	2.78	1.80
10.....	.25	.25	1.50	1.58	1.29	2.60	6.15	6.00	3.38	5.00	2.75	1.78
11.....	.25	.35	1.55	1.55	1.28	2.80	6.35	5.78	3.80	4.98	2.75	1.75
12.....	.23	.23	1.62	1.57	1.28	2.85	6.95	5.80	3.60	4.67	2.73	1.62
13.....	.30	.27	1.62	1.55	1.28	2.92	7.50	5.75	3.62	4.60	2.70	1.55
14.....	.35	.25	1.60	1.57	1.28	3.12	7.65	5.67	3.50	4.42	2.65	1.57
15.....	.30	.30	1.62	1.57	1.27	3.35	7.70	5.50	3.50	4.35	2.62	1.60
16.....	.05	.37	1.63	1.56	1.26	3.53	7.83	5.42	3.50	4.28	2.60	1.55
17.....	.35	.42	1.65	1.55	1.27	3.68	8.23	5.52	4.25	4.30	2.55	1.50
18.....	.40	.55	1.68	1.57	1.28	3.72	7.95	5.20	3.95	4.05	2.80	1.47
19.....	.26	.65	1.65	1.58	1.27	3.78	8.12	5.13	4.15	4.00	2.42	1.55
20.....	.10	.72	1.65	1.55	1.30	3.82	7.90	5.00	4.25	3.92	2.30	1.50
21.....	.22	1.16	1.68	1.52	1.35	3.88	7.78	4.97	4.30	3.88	2.28	1.45
22.....	.40	1.10	1.70	1.47	1.35	3.90	7.65	4.85	4.55	3.80	2.40	1.53
23.....	.10	1.12	1.72	1.45	1.38	3.90	7.45	4.85	5.75	3.85	2.42	1.40
24.....	.32	1.13	1.70	1.42	1.37	3.92	7.35	4.80	4.85	3.65	2.30	1.35
25.....	.12	1.15	1.70	1.40	1.40	3.90	7.23	4.72	4.75	3.52	2.48	1.27
26.....	.30	1.17	1.70	1.38	1.43	3.87	7.20	4.65	4.70	3.48	2.20	1.20
27.....	.35	1.20	1.70	1.35	1.45	3.95	6.90	4.60	4.60	3.62	2.12	1.15
28.....	.15	1.23	1.70	1.33	1.45	4.10	6.82	4.52	4.55	3.38	2.05	1.17
29.....	.18	1.27	1.69	1.32	-----	4.35	6.98	4.50	4.65	3.30	2.03	1.40
30.....	.15	1.30	1.68	1.30	-----	4.75	6.90	4.45	4.85	3.27	1.98	1.25
31.....	.25	-----	1.70	1.30	-----	5.00	-----	4.52	-----	3.18	1.95	-----

¹ Hoyt, J. C., U. S. Geol. Survey Water-Supply Paper 97, p. 340, 1904.

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, 1922.

GAGES.—Gage showing elevation of water surface above intake to power plant is a Gurley seven-day graph water-stage recorder installed November 12, 1919, in a shelter attached to retaining wall at power house on right side of river. Before that date the crest gage was a vertical staff on the angle of the wing wall at the end of the racks. Datum raised 0.76 foot August 20, 1906. 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. Inclined staff gage at cable station, a quarter of a mile below dam. 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.

DISCHARGE RATING.—Records include flow over concrete spillway 171.25 feet in crest length, a rating for which has been prepared by use of coefficients³ derived from experiments made in the hydraulic laboratory of Cornell University on a model section of the dam; the discharge through two power units equipped with 300 kilowatt generators which have been rated by current-meter measurements; and the discharge through two 5-foot waste gates when open. Occasional observations are made on the inclined staff gage at the cable as a check on the ratings of the spillway and turbines.

EXTREMES OF DISCHARGE.—Maximum daily discharge during year, 5,900 second-feet, April 11; minimum daily discharge, 122 second-feet, September 10. 1908–1922: Maximum daily discharge recorded, 6,410 second-feet, April 20, 1914; minimum daily discharge, 90 second-feet, September 28, 1914.

SPECIAL STUDY.—A portable water-stage recorder was operated at the cable for a short period in July, 1914. Mean daily discharge computed from its record agreed very closely with mean daily discharge derived from power-plant ratings.

ICE.—The crest of the spillway is kept free from ice so that the 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.—Discharge over the spillway ascertained by applying to rating table mean gage height for six-hour periods, as observed, or taken from water-stage recorder chart. Discharge through the turbines ascertained by applying to their ratings the mean kilowatt output and head for periods of run. Records fair.

COOPERATION.—Gage-height records and watt meter readings furnished by Plattsburg Gas & Electric Co., Herbert A. Stutchbury, superintendent.

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

³ Horton, R. E., Weir experiments, coefficients, and formulas: U. S. Geol. Survey Water-Supply Paper 200, pp. 98–100, 1907.

Daily discharge, in second-feet, of Saranac River near Plattsburg, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	370	225	370	440	390	720	1,900	1,300	640	1,650	400	560
2.....	235	360	410	410	420	680	1,650	820	600	1,600	420	420
3.....	360	390	620	400	470	660	1,800	1,200	720	1,600	410	380
4.....	250	360	660	420	400	660	1,600	1,120	800	1,550	540	520
5.....	240	370	590	370	380	620	1,850	1,800	700	1,300	620	430
6.....	310	350	520	280	490	640	2,200	2,350	840	1,140	500	470
7.....	260	350	460	500	280	900	3,100	2,050	700	1,000	600	480
8.....	310	230	460	420	430	1,800	4,000	2,200	600	940	800	480
9.....	245	235	460	430	370	1,500	4,000	1,750	600	680	640	400
10.....	280	225	520	290	350	1,550	5,100	1,650	580	740	560	122
11.....	375	220	500	330	360	1,550	5,900	1,550	450	780	680	450
12.....	250	240	540	370	370	1,450	4,500	1,400	640	700	440	460
13.....	300	155	420	470	300	1,450	3,700	1,200	720	620	500	470
14.....	300	270	440	430	340	2,050	3,400	1,350	740	470	460	500
15.....	320	245	380	380	360	2,700	3,300	1,240	600	560	430	310
16.....	270	240	330	460	320	2,100	3,200	1,180	600	450	400	380
17.....	340	200	440	360	330	1,700	2,700	1,120	580	420	410	270
18.....	310	225	390	400	310	1,500	2,900	1,060	1,120	480	520	490
19.....	300	420	350	390	400	1,450	2,800	1,120	1,200	500	340	370
20.....	310	760	500	410	420	1,400	2,500	1,160	1,200	500	230	390
21.....	430	920	290	380	460	1,350	2,300	1,060	1,120	520	250	440
22.....	370	480	410	300	400	1,250	2,050	940	1,350	400	200	400
23.....	235	440	410	430	360	1,220	1,950	1,000	1,800	380	460	420
24.....	320	290	430	245	620	1,240	1,950	940	1,550	600	640	370
25.....	250	290	610	430	560	1,300	1,800	780	1,300	580	440	480
26.....	300	390	550	250	680	1,700	1,650	800	1,080	540	430	380
27.....	260	340	380	360	700	2,600	1,650	660	1,100	520	370	
28.....	230	540	440	410	740	4,100	1,450	700	1,100	460	500	
29.....	215	460	400	380	-----	2,700	1,400	640	1,500	460	380	
30.....	185	430	410	520	-----	2,200	1,350	620	2,450	320	430	
31.....	270	-----	370	490	-----	2,050	-----	620	-----	450	340	

NOTE.—Mean discharge, Sept. 26-30, estimated by comparison with records of Ausable River at Ausable Forks; power-plant records incomplete.

Monthly discharge of Saranac River near Plattsburg, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 607 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	430	185	290	0.478	0.55
November.....	920	155	355	.585	.65
December.....	660	290	454	.748	.86
January.....	520	245	392	.646	.74
February.....	740	280	430	.708	.74
March.....	4,100	620	1,570	2.59	2.90
April.....	5,900	1,350	2,650	4.37	4.88
May.....	2,350	620	1,210	1.99	2.29
June.....	2,450	450	966	1.59	1.77
July.....	1,650	320	739	1.22	1.41
August.....	800	200	460	.758	.87
September.....	560	122	412	.679	.76
The year.....	5,900	122	828	1.36	18.51

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, 1922.

GAGE.—Staff, in two sections, on the right bank; lower section, inclined, graduated from 1.0 to 6.5 feet; upper section, vertical, graduated from 6.55 to 10.1 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, 8.22 feet at 7 a. m. April 12 (discharge, about 6,300 second-feet); minimum stage, 2.34 feet several times during August and September (discharge, 31 second-feet).

1916-17 and 1919-1922: Maximum open-water stage recorded, that of April 12, 1922; minimum stage, 1.60 feet at 7.30 p. m., September 13, 1920, caused by closing gates in dam (discharge, practically zero).

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

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice. Rating curve fairly well defined between 30 and 1,000 second-feet; extended beyond these limits. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. 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 dams upstream.

Discharge measurements of West Branch of Ausable River near Newman, N. Y., during the year ending Sept. 30, 1922

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>
Dec. 20	A. W. Harrington.....	2.99	122	July 13	Covert and Shupe.....	2.62	73
Jan. 9	E. B. Shupe.....	+2.70	55	15	do.....	2.78	98
Feb. 14	B. F. Howe.....	+2.75	49	Aug. 15	H. I. Granger.....	2.46	38.8
Apr. 4	do.....	3.39	234	15	do.....	2.44	43.4

* 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 Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	100	73	130	44	120	130	353	194	62	417	54	35
2.....	61	194	90	48	200	140	313	194	70	510	54	35
3.....	56	130	1,230	48	140	110	258	275	462	353	48	35
4.....	120	105	395	48	100	90	240	417	439	275	61	37
5.....	87	109	275	70	100	95	224	330	333	240	58	46
6.....	76	90	153	100	90	80	258	732	166	194	51	41
7.....	66	76	109	70	75	170	313	670	153	166	113	37
8.....	56	87	130	55	85	1,740	1,320	938	122	142	333	35
9.....	70	36	100	55	70	732	1,220	586	96	117	153	33
10.....	58	13	100	70	75	510	2,470	439	142	83	78	33
11.....	275	58	100	60	75	395	2,470	374	179	46	78	47
12.....	208	586	100	55	70	313	4,550	333	194	64	54	51
13.....	153	109	130	55	55	258	1,320	275	153	37	64	39
14.....	113	52	90	55	48	353	732	240	87	61	46	61
15.....	100	73	58	34	55	510	614	208	88	58	48	87
16.....	87	73	46	44	55	353	614	208	67	68	54	51
17.....	66	66	73	44	48	224	670	194	78	48	39	61
18.....	52	732	130	48	55	194	1,850	194	865	72	37	68
19.....	56	1,420	258	70	60	130	865	580	560	72	41	61
20.....	73	938	120	44	60	208	614	796	374	48	43	51
21.....	374	395	109	44	55	224	417	275	294	43	37	43
22.....	166	258	58	44	55	194	333	240	1,420	46	39	43
23.....	130	208	55	44	160	194	275	179	830	54	35	41
24.....	120	153	55	55	850	194	258	275	510	61	33	37
25.....	113	142	55	55	440	179	240	224	374	48	48	37
26.....	100	109	55	55	380	179	275	166	275	35	58	33
27.....	66	73	55	55	360	417	275	166	275	41	58	33
28.....	52	109	55	55	220	1,060	240	224	395	58	58	35
29.....	61	153	70	75	-----	1,970	194	115	510	46	61	37
30.....	82	130	44	85	-----	796	166	87	700	51	41	37
31.....	70	-----	48	85	-----	462	-----	87	-----	78	41	-----

NOTE.—Discharge, Dec. 23 to Mar. 7, determined from gage heights corrected for ice effect from three discharge measurements, study of observer's notes, weather records, and gage-height graph, and by comparison with records of flow of Ausable River at Ausable Forks.

Monthly discharge of West Branch of Ausable River near Newman, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 116 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	374	52	105	0.905	1.04
November.....	1,420	13	225	1.94	2.16
December.....	1,230	44	144	1.24	1.43
January.....	100	34	57.1	.492	.57
February.....	850	48	148	1.28	1.33
March.....	1,970	80	407	3.51	4.05
April.....	4,550	166	798	6.88	7.68
May.....	938	87	345	2.97	3.42
June.....	1,420	62	342	2.95	3.29
July.....	510	35	117	1.01	1.16
August.....	333	33	65.0	.560	.65
September.....	87	33	44.0	.379	.42
The year.....	4,550	13	233	2.01	27.20

AUSABLE RIVER AT AUSABLE FORKS, N. Y.

LOCATION.—In village of Ausable Forks, Clinton County, immediately below junction of East and West branches and 15 miles above mouth of river.

DRAINAGE AREA.—444 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 17, 1910, to September 30, 1922.

GAGE.—Chain on left bank 1,000 feet below junction of East and West branches; read by A. S. Baker.

DISCHARGE MEASUREMENTS.—Made from a cable $1\frac{1}{2}$ miles below gage or by wading either near the cable or a short distance above gage.

CHANNEL AND CONTROL.—Stone and gravel; occasionally shifting. Channel divided by an island opposite the gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.00 feet at 7 a. m. April 12 (discharge, 11,400 second-feet); minimum discharge, 85 second-feet, December 30.

1910-1922: 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 slightly affected by ice.

ACCURACY.—Stage-discharge relation changed at time of high water in March; also affected by ice. Rating curve used before the change fairly well defined between 175 and 3,000 second-feet; curve used after the change fairly well defined between 100 and 2,000 second-feet. 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 and estimate, for which they are fair.

Discharge measurements of Ausable River at Ausable Forks, N. Y., during the year ending Sept. 30, 1922

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>
Dec. 21	A. W. Harrington.....	3.86	378	July 14	Covert and Shupe.....	3.65	304
Apr. 1	B. F. Howe.....	4.33	1,050	Aug. 16	H. I. Granger.....	3.47	167
July 13	Shupe and Covert.....	3.71	372				

Daily discharge, in second-feet, of Ausable River at Ausable Forks, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	121	183	280	140	170	354	1,120	653	291	1,220	142	152
2.....	170	336	319	120	214	371	951	745	289	1,240	142	147
3.....	170	379	1,730	120	234	354	1,080	897	332	1,190	164	147
4.....	148	354	1,440	180	208	345	722	1,320	1,220	1,200	208	142
5.....	142	336	1,040	280	208	234	858	2,340	1,190	897	243	142
6.....	148	371	825	300	234	407	1,700	2,930	609	619	258	142
7.....	202	287	588	240	227	998	2,570	2,460	503	423	453	136
8.....	196	294	505	200	221	3,690	4,060	2,930	405	405	1,040	147
9.....	177	264	417	160	202	3,440	3,800	2,010	359	368	544	142
10.....	214	257	319	140	202	2,270	6,000	1,800	405	368	405	147
11.....	702	287	319	130	202	1,830	6,000	1,410	483	324	299	152
12.....	578	371	287	120	234	1,440	9,200	978	473	316	236	164
13.....	446	426	214	160	214	764	3,800	795	493	280		180
14.....	264	436	177	180	208	1,200	2,340	745	405	236		169
15.....	221	379	157	170	214	1,440	2,120	699	350	229	200	194
16.....	202	302	142	160	202	1,070	2,340	653	299	215		236
17.....	214	214	189	150	196	955	2,690	609	473	222	164	236
18.....	202	1,350	280	160	183	903	4,860	566	3,420	236	147	174
19.....	177	2,840	257	140	170	578	4,320	544	2,010	215	136	164
20.....	177	3,190	550	140	234	546	3,800	1,160	1,500	194	136	164
21.....	536	1,350	380	140	280	526	1,900	1,410	1,280	158	147	158
22.....	515	1,230	220	120	234	465	1,050	1,300	4,320	147	158	152
23.....	417	851	140	100	264	465	845	1,220	3,180	147	155	147
24.....	319	505	140	100	1,160	446	978	1,060	1,060	169	152	142
25.....	242	417	140	95	955	446	951	770	1,140	158	158	158
26.....	287	336	110	95	702	465	951	566	745	147	201	147
27.....	294	345	140	95	567	1,030	910	463	664	147	215	147
28.....	272	319	140	100	407	3,070	745	378	1,160	147	222	136
29.....	183	294	160	110	-----	5,890	664	350	1,700	147	208	142
30.....	177	287	85	120	-----	2,570	676	324	1,900	147	194	116
31.....	157	-----	130	140	-----	1,500	-----	283	-----	136	180	-----

NOTE.—Discharge for the following periods when gage was not read estimated by comparison with records of West Branch of Ausable River near Newman: Dec. 20, July 13, and Aug. 13–16 and 23. Discharge, Dec. 21 to Feb. 1, determined from gage heights corrected for ice effect from one discharge measurement, study of observer's notes, weather records, and gage-height graph by and comparison with records of flow of West Branch.

Monthly discharge of Ausable River at Ausable Forks, N. Y., for the year ending Sept. 30, 1922

[Drainage area, 444 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	702	121	267	0.601	0.69
November.....	3,190	183	626	1.41	1.57
December.....	1,730	85	381	.858	.99
January.....	300	95	149	.336	.39
February.....	1,160	170	312	.703	.73
March.....	5,890	294	1,290	2.91	3.36
April.....	9,200	664	2,470	5.56	6.20
May.....	2,930	283	1,110	2.50	2.88
June.....	4,320	291	1,110	2.50	2.79
July.....	1,240	136	389	.876	1.01
August.....	1,040	136	242	.545	.63
September.....	236	116	157	.354	.40
The year.....	9,200	85	707	1.59	21.64

LAKE GEORGE AT ROGERS ROCK, N. Y.

LOCATION.—At boathouse in a small bay on north side of steamboat landing at Rogers Rock, Essex County.

RECORDS AVAILABLE.—July 10, 1913, to September 30, 1922.

GAGE.—Vertical staff gage fastened to a pile in the back end of the boathouse.

Datum 3.15 feet below crest of dam at outlet of lake. During the winter a temporary vertical staff gage located at Hoopers dock is used. 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 above that of the gage at Glen Island.

EXTREMES OF STAGE.—Maximum stage recorded during year, 5.07 feet April 18; minimum stage, 2.10 feet on March 3.

1913-1922: Maximum stage recorded, that of April 18, 1922; minimum stage, 1.2 feet on November 21 and December 22, 1916.

REGULATION.—The elevation of lake surface is regulated by the operation of gates and wheels at the dam at the outlet of the lake at Ticonderoga.

COOPERATION.—Gage-height record furnished by the International Paper Co.

Daily gage height, in feet, of Lake George at Rogers Rock, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.78	2.28	2.58	2.58	2.34	2.14	3.75	4.30	3.85	4.55	3.50	3.09
2	2.75	2.24	2.60	2.58	2.36	2.12	3.85	4.35	3.80	4.50	3.45	3.10
3	2.76	2.32	2.64	2.56	2.36	2.10	3.90	4.30	3.85	4.48	3.42	3.00
4	2.76	2.38	2.70	2.52	2.36	2.12	3.95	4.25	3.90	4.45	3.40	3.00
5	2.70	2.34	2.74	2.56	2.34	2.12	3.95	4.30	3.90	4.40	3.42	2.99
6	2.76	2.36	2.80	2.58	2.34	2.14	3.95	4.35	3.92	4.40	3.45	2.98
7	2.70	2.36	2.78	2.56	2.32	2.20	4.10	4.35	3.88	4.45	3.50	2.96
8	2.68	2.38	2.76	2.52	2.30	2.40	4.05	4.30	3.90	4.40	3.55	2.98
9	2.65	2.34	2.76	2.52	2.30	2.48	4.20	4.25	3.88	4.35	3.50	2.96
10	2.66	2.36	2.78	2.52	2.30	2.48	4.30	4.20	3.85	4.30	3.50	2.94
11	2.62	2.38	2.76	2.56	2.30	2.50	4.40	4.10	3.90	4.20	3.45	2.98
12	2.64	2.36	2.76	2.62	2.28	2.54	4.60	4.05	3.88	4.10	3.45	2.94
13	2.62	2.34	2.78	2.62	2.28	2.58	5.00	4.00	3.78	4.05	3.42	2.92
14	2.60	2.36	2.76	2.60	2.26	2.60	4.90	4.00	3.75	4.00	3.40	2.90
15	2.58	2.30	2.74	2.58	2.24	2.62	5.00	4.05	3.70	3.95	3.38	2.88
16	2.54	2.28	2.70	2.56	2.22	2.64	5.05	4.02	3.70	3.92	3.35	2.86
17	2.52	2.30	2.82	2.54	2.22	2.68	4.90	4.00	3.75	3.90	3.35	2.82
18	2.52	2.32	2.78	2.54	2.20	2.70	5.07	4.10	3.78	3.88	3.38	2.88
19	2.50	2.34	2.76	2.54	2.20	2.72	5.00	4.20	3.80	3.85	3.30	2.86
20	2.52	2.36	2.74	2.52	2.20	2.74	5.05	4.20	3.88	3.80	3.25	2.82
21	2.60	2.38	2.74	2.52	2.20	2.76	5.00	4.15	4.00	3.78	3.22	2.80
22	2.60	2.36	2.72	2.52	2.20	2.80	4.80	4.10	4.10	3.75	3.26	2.78
23	2.54	2.38	2.72	2.54	2.20	2.82	4.75	4.00	4.25	3.72	3.24	2.76
24	2.52	2.38	2.82	2.54	2.15	2.84	4.70	3.95	4.30	3.70	3.22	2.72
25	2.48	2.40	2.72	2.54	2.18	2.88	4.70	4.05	4.25	3.72	3.20	2.64
26	2.44	2.42	2.76	2.48	2.18	2.92	4.65	4.00	4.20	3.70	3.22	2.66
27	2.40	2.46	2.72	2.44	2.18	2.98	4.60	4.00	4.25	3.65	3.15	2.60
28	2.38	2.50	2.72	2.38	2.16	3.00	4.60	3.98	4.30	3.60	3.12	2.58
29	2.36	2.52	2.68	2.36	-----	3.45	4.40	3.95	4.45	3.55	3.10	2.56
30	2.34	2.54	2.68	2.34	-----	3.55	4.45	3.90	4.50	3.52	3.10	2.50
31	2.34	-----	2.58	2.34	-----	3.65	-----	3.88	-----	3.50	3.08	-----

LAKE GEORGE AT GLEN ISLAND, NEAR BOLTON LANDING, N. Y.

LOCATION.—On dock on northeast side of Glen Island, 2 miles northeast of Bolton Landing. Reached by boat from Bolton Landing.

RECORDS AVAILABLE.—September 4, 1919, to September 30, 1922.

GAGE.—Vertical cast iron staff gage, reading from 6.0 to 10.0 feet fastened to 2 by 8 inch oak plank. During winter periods, a temporary vertical staff gage attached to the 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, 9.88 feet, April 15-18; minimum stage, 7.08 feet morning and afternoon, March 4 to 7.

1919-1922: Maximum stage recorded, that of April 15-18, 1922; minimum stage, 6.45 feet March 1-6, 1920.

REGULATION.—The elevation of lake surface is regulated by the operation of gates and wheels at the dam at the outlet of the lake at Ticonderoga.

COOPERATION.—Gage-height record furnished by State of New York Conservation Commission.

Daily gage height, in feet, of Lake George at Glen Island, near Bolton Landing, N. Y., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.7	7.3	7.5	7.5	7.3	7.15	8.75	-----	8.8	9.35	8.5	8.05
2	7.7	7.3	7.55	7.5	7.3	7.1	8.85	-----	8.8	9.35	8.45	8.05
3	7.7	7.3	7.6	7.5	7.3	7.1	8.85	9.05	8.8	9.35	8.45	8.0
4	7.65	7.3	7.65	7.5	7.3	7.1	8.85	9.1	8.85	9.3	8.45	8.0
5	7.65	7.25	7.75	7.5	7.3	7.1	8.9	9.1	8.85	9.3	8.45	8.0
6	7.6	7.25	7.75	7.5	7.3	7.1	9.0	9.15	8.85	9.25	8.45	7.95
7	7.6	7.25	7.75	7.5	7.25	7.1	9.05	9.15	8.85	9.25	8.45	7.95
8	7.6	7.25	7.75	7.5	7.25	7.3	9.1	9.15	8.8	9.2	8.45	7.9
9	7.6	7.25	7.75	7.5	7.25	7.35	9.15	9.15	8.8	9.2	8.5	7.9
10	7.6	7.25	7.75	7.5	7.2	7.35	9.3	9.05	8.8	9.15	8.5	7.8
11	7.6	7.25	7.7	7.5	7.2	7.4	9.45	9.05	8.8	9.15	8.35	7.8
12	7.6	7.25	7.7	7.55	7.2	7.45	9.65	8.95	8.8	9.1	8.35	7.85
13	7.55	7.25	7.7	7.55	7.2	7.5	9.75	8.95	8.75	9.0	8.35	7.85
14	7.55	7.25	7.65	7.55	7.15	7.5	9.8	8.9	8.75	8.95	8.3	7.85
15	7.55	7.25	7.65	7.5	7.15	7.55	9.9	8.9	8.7	8.9	8.3	7.85
16	7.5	7.25	7.65	7.5	7.15	7.6	9.9	8.85	8.7	8.85	8.25	7.8
17	7.45	7.25	7.65	7.5	7.15	7.65	9.9	8.9	8.7	8.8	8.25	7.85
18	7.4	7.25	7.65	7.5	7.15	7.65	9.9	8.9	8.8	8.8	8.2	7.85
19	7.45	7.25	7.65	7.5	7.15	7.65	9.85	9.0	8.8	8.8	8.2	7.8
20	7.45	7.25	7.65	7.45	7.1	7.65	-----	9.05	8.8	8.75	8.15	7.75
21	7.45	7.25	7.6	7.45	7.1	7.75	-----	9.05	8.85	8.75	8.1	7.7
22	7.45	7.3	7.6	7.45	7.1	7.75	-----	9.05	9.05	8.75	8.1	7.7
23	7.4	7.3	7.6	7.45	7.15	7.8	-----	9.0	9.2	8.7	8.05	7.65
24	7.4	7.3	7.6	7.45	7.15	7.8	-----	9.0	9.25	8.7	8.0	7.6
25	7.4	7.35	7.6	7.45	7.15	7.85	-----	9.0	9.2	8.7	8.0	7.6
26	7.35	7.35	7.6	7.4	7.15	7.9	-----	8.95	9.2	8.65	8.1	7.6
27	7.35	7.4	7.6	7.4	7.15	7.95	-----	8.95	9.25	8.6	8.1	7.55
28	7.3	7.4	7.55	7.35	7.15	8.05	-----	8.95	9.25	8.6	8.05	7.55
29	7.3	7.45	7.55	7.35	-----	8.4	-----	8.9	9.3	8.55	8.05	7.5
30	7.3	7.5	7.5	7.3	-----	8.55	-----	8.85	9.3	8.5	8.05	7.5
31	7.3	-----	7.5	7.3	-----	8.65	-----	8.8	-----	8.5	8.05	-----

NOTE.—A temporary staff gage at Bolton Landing was read Oct. 21 to Apr. 19. No gage readings Apr. 20 to May 2.

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, 1922.

GAGE.—Staff. Comparisons of gage readings indicate that zero of gage at Burlington is at practically the 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 DISCHARGE.—Maximum stage recorded during year, 8.22 feet on April 19, minimum stage, 0.18 foot, October 10.

1907-1922: Maximum stage recorded, 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 and subject to inaccuracies due to wave action.

COOPERATION.—Gage heights furnished through the courtesy of 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 Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.26		1.54				5.44	6.98		5.30	3.30	
2		0.54			1.54			6.85	4.38	5.43	3.26	
3	.30	.50		1.80	1.52		5.50	6.75	4.35	5.44	3.22	
4	.28				1.56		5.50	6.55	4.25	5.44		2.16
5			1.86				5.50	6.50		5.40	3.14	
6	.22			1.84	1.57	1.84	5.57	6.50				2.12
7	.22	.50	1.92			1.84	5.62		4.25			
8			1.94			2.20	5.78	6.43	4.18	5.18		2.04
9		.54	1.96	1.76					4.12		3.16	
10	.18	.56			1.60	2.87	6.24	6.37	4.10	5.03	3.16	
11	.30					3.07	6.57	6.25		4.88	3.10	
12	.32	.61	1.92				7.05			4.83	3.02	1.94
13	.30		1.92	1.84	1.54	3.30	7.64	6.12	3.88		2.94	
14						3.40	7.80			4.70		1.92
15	.28	.64	1.89			3.62	7.95	5.86	3.86	4.60	2.86	1.90
16		.64	1.88			3.92	8.10	5.80	3.86			
17	.26	.66		1.73		3.95	8.18		3.72	4.40	2.78	1.90
18	.20	.60				4.10	8.20	5.52				
19	.20	.70	1.96	1.75			8.22	5.48	4.12	4.22		1.82
20	.30		2.06		1.54	4.17		5.44	4.36	4.18	2.68	
21		1.26			1.54	4.17	8.10		4.44	4.10		1.74
22	.30	1.32	2.06				8.03	5.34	4.65	3.98		1.70
23		1.38		1.64		4.26		5.28	4.82			1.68
24	.40		2.05		1.60	4.24	7.90	5.13		3.86		
25	.48	1.48		1.64		4.24	7.72		5.02	3.84	2.40	
26		1.56					7.60		4.98			1.58
27	.48				1.82	4.27	7.50	4.88	4.92		2.38	1.52
28		1.56	1.98	1.62		4.38	7.40		4.94	3.56		1.50
29	.46	1.56				4.72	7.25	4.66	4.96	3.52		1.45
30		1.56	1.94	1.58		5.10			5.18			1.43
31	.46					5.30		4.45		3.36		

WINOOSKI RIVER AT MONTPELIER, VT.

LOCATION.—1 mile downstream from Central Vermont Railway station in Montpelier, Washington County, three-eighths mile above mouth of Dog River, and $1\frac{1}{4}$ miles below mouth of North Branch.

DRAINAGE AREA.—420 square miles.

RECORDS AVAILABLE.—May 19, 1909, to September 30, 1922.

GAGE.—Gurley seven-day water-stage recorder on right bank, installed July 4, 1914; gage height referred to datum by means of a hook gage inside the well; an outside staff gage is used for auxiliary readings. Recorder inspected by L. D. Smith.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Channel deep and fairly uniform in section at the gage.

Control is formed by sharply defined rock outcrop about 500 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 14.77 feet at 6 a. m. April 12 (discharge, from extension of rating curve, 15,400 second-feet); minimum stage during year from water-stage recorder, 2.63 feet at 7 a. m. October 5 (discharge, from extension of rating curve, 9 second-feet).

1909-1922: Maximum stage determined by leveling from flood marks preserved on building near present gage, 17.31 feet, April 7, 1912 (discharge, 20,200 second-feet); minimum stage from water-stage recorder, 2.58 feet September 30, 1921 (discharge, from extension of rating curve, 6 second-feet).

ICE.—Stage-discharge relation affected by ice. Discharge ascertained by means of gage heights, current-meter measurements, observer's notes, and climatic records.

REGULATION.—Operation of power plants on main stream and tributaries above station cause diurnal fluctuations in stage.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined between 30 and 7,500 second-feet. Operation of water-stage recorder satisfactory except for short periods indicated by footnote to daily-discharge table. Daily discharge December 23 to April 30 determined by applying to rating table mean daily gage height corrected for effect of ice during winter; daily discharge during remainder of year ascertained by use of discharge integrator. Records good.

Discharge measurements of Winooski River at Montpelier, Vt., during the year ending Sept. 30, 1922

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>
Dec. 11	J. L. Lamson	4.14	429	Mar. 18	J. L. Lamson	7.26	1,060
Jan. 13	—do.....	* 4.66	345	June 12	J. S. S. Jones.....	4.88	836

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	70	132	310	290	200	170	1,420	602	200	1,440	155	156
2	160	275	320	300	200	170	1,340	590	400	1,550	237	123
3	86	310	1,360	290	230	165	1,220	590	650	1,140	233	96
4	100	230	1,180	290	210	160	1,220	590	930	1,290	174	133
5	53	200	740	310	210	210	1,300	1,540	455	979	177	156
6	72	192	590	320	200	280	1,640	1,910	350	727	167	131
7	72	190	500	300	200	400	1,880	1,310	740	596	602	126
8	64	166	475	300	190	3,500	5,230	1,720	510	470	1,010	135
9	86	158	395	290	190	2,300	6,210	1,110	312	518	362	110
10	144	168	385	300	185	1,850	8,100	874	300	420	235	61
11	184	200	390	290	185	1,500	9,010	706	500	330	220	125
12	445	220	405	280	170	1,400	11,800	608	675	304	156	125
13	400	280	345	290	180	1,200	4,970	524	500	304	135	206
14	220	225	385	290	175	1,400	3,110	524	350	276	157	162
15	180	220	280	280	180	1,550	3,110	410	345	186	141	455
16	118	210	245	290	180	1,750	2,990	350	330	201	128	905
17	141	270	270	240	175	1,400	2,750	325	560	225	135	318
18	106	850	1,220	230	175	1,100	3,470	320	2,120	198	167	227
19	116	1,720	1,200	230	185	1,000	2,530	1,250	1,890	210	176	187
20	160	2,500	700	240	210	860	2,030	750	1,040	190	132	158
21	480	1,180	530	230	230	1,050	1,680	500	1,700	168	155	146
22	255	650	295	240	220	930	1,340	440	2,600	139	121	129
23	196	480	300	220	220	811	1,220	375	2,700	142	134	120
24	168	290	320	230	200	832	1,100	330	1,420	190	112	95
25	182	330	320	230	200	937	1,040	310	986	181	81	160
26	168	335	310	220	185	1,550	1,040	375	734	160	573	138
27	160	310	310	220	175	2,330	1,040	290	590	133	380	108
28	150	290	300	210	185	4,070	990	231	1,140	136	251	119
29	140	330	290	210	-----	6,910	755	225	1,930	136	216	128
30	106	330	300	210	-----	3,230	692	205	2,680	98	182	110
31	136	-----	290	200	-----	2,030	-----	175	-----	122	183	-----

NOTE.—Stage-discharge relation affected by ice Dec. 23 to Mar. 21; discharge based on gage heights corrected for effect of ice by means of discharge measurements, observer's notes, and weather records.

Operation of water-stage recorder unsatisfactory Oct. 26–29, Nov. 21–23, 28–30, and May 15 to June 15; discharge during these periods estimated from observer's readings and by comparison with records on tributary streams.

Monthly discharge of Winooski River at Montpelier, Vt., for the year ending Sept. 30, 1922

[Drainage area, 420 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	480	53	162	0.386	0.44
November	2,500	132	440	1.05	1.17
December	1,360	245	492	1.17	1.35
January	320	200	260	.619	.71
February	230	170	194	.462	.48
March	6,910	160	1,520	3.62	4.17
April	11,800	692	2,870	6.83	7.62
May	1,910	175	647	1.54	1.78
June	2,700	200	988	2.35	2.62
July	1,550	98	424	1.01	1.16
August	1,010	81	235	.560	.65
September	905	61	178	.424	.47
The year	11,800	53	701	1.67	22.62

MOLLYS BROOK NEAR MARSHFIELD, VT.

LOCATION.—At head of Mollys Falls, one-fourth mile above confluence with Winooski River and 1 mile from Marshfield village, Washington County.

DRAINAGE AREA.—24 square miles (from surveys by engineers of Montpelier & Barre Light & Power Co.).

RECORDS AVAILABLE.—August 11, 1920, to September 30, 1922.

GAGE.—Inclined staff on right bank; vertical high-water section on left bank; read by Carroll George.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed covered with gravel and alluvial deposits. Control is well defined at head of Mollys Falls; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.15 feet at 8 a. m. April 12 (discharge, by extension of rating curve, 680 second-feet); minimum stage, 1.16 feet at 6.30 p. m. October 2 and 7.45 a. m. October 3 (discharge, by extension of rating curve, 2.6 second-feet).

1920-1922: Maximum stage recorded, that of April 12, 1922; minimum stage, 1.12 feet at 7.15 a. m. September 15, 1921 (discharge, by extension of rating curve, 2.2 second-feet).

ICE.—Ice forms at gage, and on rocks at the control; discharge relation somewhat affected.

REGULATION.—Storage in Peacham Pond has some effect on the distribution of flow.

ACCURACY.—Stage-discharge relation probably permanent except when affected by ice. Rating curve well defined between 5 and 250 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table with corrections for effect of ice during winter. Records excellent.

Discharge measurements of Mollys Brook near Marshfield, Vt., during the year ending Sept. 30, 1922

Date	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 13	J. L. Lamson.....	* 1.64	12.4
June 13	J. S. S. Jones.....	1.87	28.0

* Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Mollys Brook near Marshfield, Vt., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7.4	8.0	17	12	11	8	76	61	11	113	8.0	10
2	3.3	25	22	12	12	8	92	57	34	121	8	20
3	2.7	16	45	12	13	8	78	55	62	87	10	24
4	4.2	16	63	13	11	8	69	55	69	112	10	21
5	2.9	12	46	14	11	11	74	112	27	81	11	18
6	3.9	11	29	16	11	22	88	112	28	65	10	17
7	2.9	8.3	25	12	10	50	94	112	53	56	36	14
8	5.6	7.4	18	13	10	184	261	135	26	49	47	11
9	16	6.8	21	12	10	155	314	85	19	45	18	9.2
10	12	9.6	25	13	10	141	510	64	22	38	15	8.6
11	9.6	11	22	12	9	66	516	59	32	34	12	6.8
12	67	13	20	12	8	62	594	50	51	32	11	24
13	24	14	20	11	8	45	330	49	32	29	10	27
14	15	12	19	11	8	56	245	45	23	27	8.9	24
15	10	12	10	11	8	66	224	41	23	24	8.3	61
16	7.4	12	14	11	8	63	218	36	22	21	11	53
17	6.8	14	20	11	7	47	220	24	53	20	28	22
18	5.9	29	74	10	7	35	251	24	113	24	29	17
19	6.3	94	49	10	7	35	218	65	105	23	25	14
20	21	145	33	10	8	32	188	41	60	19	18	14
21	30	82	30	10	9	41	145	29	72	17	13	12
22	7.4	35	15	10	8	34	123	27	155	15	9.6	10
23	11	18	14	10	8	30	112	22	162	15	10	8.3
24	8.3	5.6	12	10	9	36	94	19	87	20	12	8.6
25	13	5.9	12	10	10	45	92	19	68	15	27	24
26	12	18	12	10	10	67	92	24	53	14	83	24
27	8.3	8.9	12	10	10	107	92	19	44	13	38	20
28	6.8	12	12	10	8	197	85	16	103	12	14	19
29	6.8	20	12	9	-----	355	74	15	178	11	13	19
30	6.8	20	12	9	-----	209	66	14	240	9.6	9.6	17
31	7.1	-----	11	11	-----	122	-----	10	-----	8.6	7.4	-----

NOTE.—Stage-discharge relation affected by ice Dec. 18, 19, and Dec. 23 to Mar. 7; discharge based on gage heights corrected for effect of ice.

Monthly discharge of Mollys Brook near Marshfield, Vt., for the year ending Sept. 30, 1922

[Drainage area, 24 square miles]

Month.	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	67	2.9	11.3	0.471	0.54
November	145	5.6	23.4	.975	1.09
December	74	10	24.1	1.00	1.15
January	16	9	11.2	.467	.54
February	13	7	9.25	.385	.40
March	355	8	75.6	3.15	3.63
April	594	66	188	7.83	8.74
May	135	10	48.3	2.01	2.32
June	240	11	67.6	2.82	3.15
July	121	8.6	37.7	1.57	1.81
August	83	7.4	18.4	.767	.88
September	61	6.8	19.2	.800	.89
The year	594	2.9	44.5	1.85	25.14

JAIL BROOK AT EAST BARRE, VT.

LOCATION.—At ruins of old dam one-fourth mile above highway bridge in village of East Barre, Washington County.

DRAINAGE AREA.—38 square miles (approximate) including 13 square miles tributary to Orange Brook reservoir (see Diversions).

RECORDS AVAILABLE.—August 14, 1920, to September 30, 1922.

GAGE.—Inclined staff on left bank; read by George J. Dobbs.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed covered with rocks and boulders. Control formed by rocks near gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 8.38 feet at 6 p. m. April 10 (discharge, by extension of rating curve, 1,350 second-feet); minimum stage, 2.65 feet at 4 p. m. August 23 and 4 p. m. September 11 (discharge, 2.1 second-feet).

1920-1922: Maximum stage recorded, that of April 10, 1922; minimum stage, 2.45 feet September 11, 1921 (discharge, by extension of rating curve, 0.5 second-foot).

ICE.—Ice forms at gage, and on rocks at the control; discharge relation somewhat affected.

DIVERSIONS.—Water is diverted from about 13 square miles tributary to Orange Brook reservoir, and used for municipal supply of Barre. No records available as to quantity diverted or amount wasted back into Jail Brook.

ACCURACY.—Stage-discharge relation probably permanent except when affected by ice. Rating curve well defined between 1 and 60 second-feet, and by measurements at 859 and 873 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table with corrections for effect of ice during winter. Records good.

Discharge measurements of Jail Brook at East Barre, Vt., during the year ending Sept. 30, 1922

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. 21	J. L. Lamson.....	3.56	57	Jan. 12	J. L. Lamson.....	3.09	15.7
21	do.....	3.50	43.2	June 13	J. S. S. Jones.....	3.26	27.4

Daily discharge, in second-feet, of Jail Brook at East Barre, Vt., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.6	13	41	14	8	9	175	73	10	60	2.8	7.4
2	4.6	41	60	13	10	9	132	77	11	123	41	5.6
3	3.0	28	635	13	12	10	123	75	47	92	10	4.2
4	4.6	20	127	11	14	10	132	103	74	185	11	3.0
5	4.6	21	98	15	13	11	170	286	25	87	9.8	2.8
6	3.0	13	86	12	10	47	190	325	25	50	6.2	6.5
7	3.0	13	80	11	11	280	220	185	45	30	190	6.2
8	4.0	12	78	11	11	590	882	187	18	33	157	5.6
9	8.6	23	80	11	10	475	647	104	13	50	26	3.2
10	7.4	14	98	11	10	237	433	77	17	25	14	2.7
11	12	21	80	12	10	162	930	68	41	19	11	2.3
12	67	18	66	14	10	127	1,140	60	55	16	8.6	9.5
13	33	20	54	13	10	127	551	50	20	18	8.0	23
14	18	23	41	13	9	237	412	46	12	13	6.8	9.5
15	9.5	20	35	11	8	310	433	41	13	15	6.2	54
16	5.6	20	41	11	8	225	376	34	13	9.2	5.3	89
17	5.0	26	106	13	8	200	466	30	19	12	6.2	20
18	5.0	200	605	11	8	150	545	71	47	9.8	5.3	14
19	4.0	460	138	12	8	98	358	187	99	7.4	5.0	11
20	16	430	74	13	8	67	286	83	46	5.6	4.8	8.6
21	60	106	60	13	10	63	230	47	75	6.2	4.6	6.8
22	14	60	54	13	10	50	175	37	346	5.9	5.0	5.3
23	9.5	54	47	11	10	60	145	34	212	6.2	2.7	5.0
24	10	54	41	11	10	92	138	28	63	8.6	3.4	7.7
25	12	106	35	11	13	119	123	20	37	5.6	11	11
26	15	74	29	11	11	256	132	26	22	4.8	268	9.2
27	13	74	24	10	10	442	141	21	15	5.6	21	5.9
28	14	89	21	8	10	671	103	19	81	3.4	14	5.0
29	11	81	19	8	-----	954	80	15	256	3.2	12	4.2
30	10	50	17	8	-----	406	74	14	162	2.8	10	3.8
31	7.4	-----	15	8	-----	205	-----	12	-----	3.0	8.0	-----

NOTE.—Stage-discharge relation affected by ice Dec. 7-13, 15, 21-31, Jan. 1-3, and Feb. 2 to Mar. 7; discharge based on gage heights corrected for effect of ice.

Monthly discharge, in second-feet, of Jail Brook at East Barre, Vt., for the year ending Sept. 30, 1922

Month	Maximum	Minimum	Mean	Month	Maximum	Minimum	Mean
October	67	3.0	13.0	May	325	12	78.5
November	460	12	72.8	June	346	10	64.0
December	635	15	96.3	July	185	2.8	29.5
January	15	8	11.5	August	268	2.7	28.8
February	14	8	10.0	September	89	2.3	11.7
March	954	9	216				
April	1,150	74	355	The year	1,150	2.3	82.4

LAMOILLE RIVER AT CADYS FALLS, VT.

LOCATION.—One-fourth mile below power plant of Morrisville Electric Light & Power Co., at what was formerly known as Cadys Falls, 2 miles downstream from village of Morrisville, Lamoille County.

DRAINAGE AREA.—280 square miles.

RECORDS AVAILABLE.—September 4, 1913, to September 30, 1922.

GAGES.—Friez water-stage recorder in gage house on right bank, one-fourth mile below highway bridge at Cadys Falls; recorder inspected by N. E. Cobleigh.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of smooth gravel; well defined gravel control 500 feet downstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 10.65 feet at 4.30 a. m. April 12 (discharge, from extension of rating curve, 7,360 second-feet); discharge practically nil at various times in February when water was held back by dam.

1913-1922: Maximum stage recorded, 11.63 feet October 1, 1920 (discharge from extension of rating curve, 8,730 second-feet); discharge practically nil at various times in February, 1922 (water held back by dam).

ICE.—River freezes over at gage during extremely cold weather, but control usually remains partly open.

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

Discharge measurements of Lamoille River at Cadys Falls, Vt., during the year ending Sept. 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
Dec. 9	J. L. Lamson	<i>Feet</i> 2.58	<i>Sec.-ft.</i> 258	Mar. 22	J. L. Lamson	<i>Feet</i> 3.22	<i>Sec.-ft.</i> 524
9	do	2.62	288	June 14	J. S. S. Jones	2.52	385
Jan. 16	do	2.58	235				

• Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Lamoille River at Cadys Falls, Vt., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	80	186	240	125	140	130	950	500	98	1,020	104	102
2	50	198	240	170	115	125	820	350	160	520	130	97
3	104	250	970	170	64	145	710	350	265	630	130	60
4	100	220	840	145	78	140	740	345	485	640	112	82
5	120	180	540	155	16	66	790	500	320	510	114	93
6	118	176	430	145	83	120	1,060	820	335	410	72	96
7	122	180	325	165	91	150	1,200	640	495	340	210	85
8	124	160	285	125	92	3,200	2,950	1,380	270	340	420	85
9	24	158	255	160	53	3,000	3,700	860	200	330	255	94
10	76	150	245	180	95	1,800	4,800	570	184	260	170	41
11	62	134	275	170	96	1,300	5,600	430	305	215	138	85
12	73	168	285	170	56	990	6,400	365	980	200	130	80
13	166	164	270	180	125	780	3,400	320	820	190	74	90
14	158	190	250	155	130	980	2,050	290	355	180	102	95
15	160	186	250	125	145	1,560	2,000	280	300	160	88	112
16	94	182	240	160	140	1,240	2,150	255	275	128	90	245
17	150	190	220	165	145	820	2,050	300	435	142	83	136
18	140	480	620	165	140	680	2,750	215	2,450	132	95	156
19	140	1,260	860	145	60	570	2,000	235	1,880	124	164	150
20	124	2,350	500	125	125	500	1,460	450	920	124	106	134
21	215	1,100	300	125	130	485	1,180	71	960	122	122	136
22	225	630	270	105	125	435	890	116	2,600	98	108	134
23	152	420	235	140	130	400	760	126	2,350	71	67	134
24	172	290	190	125	155	390	690	140	1,220	124	100	85
25	156	300	205	130	180	465	640	126	495	122	114	138
26	150	290	230	125	82	730	590	198	435	106	340	114
27	184	225	215	135	135	1,280	740	160	420	117	200	78
28	176	280	205	135	140	2,300	610	140	580	97	172	100
29	156	275	200	98	-----	3,600	495	120	1,240	104	138	111
30	106	275	220	140	-----	1,980	430	100	1,550	69	118	114
31	164	-----	194	140	-----	1,340	-----	98	-----	82	104	-----

NOTE.—Stage-discharge relation affected by ice Jan. 2 to Feb. 4 and Feb. 11 to Mar. 7; discharge based on gage heights corrected for effect of ice. Operation of water-stage recorder unsatisfactory May 1-5 and May 27 to June 2; discharge estimated.

Monthly discharge of Lamoille River at Cadys Falls, Vt., for the year ending Sept. 30, 1922

[Drainage area, 280 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	225	24	130	0.464	0.53
November.....	2,350	134	375	1.34	1.50
December.....	970	190	342	1.22	1.41
January.....	180	98	145	.518	.60
February.....	180	16	110	.393	.41
March.....	3,600	66	1,020	3.64	4.20
April.....	6,400	430	1,820	6.50	7.25
May.....	1,380	71	350	1.25	1.44
June.....	2,600	98	779	2.78	3.10
July.....	1,020	69	249	.889	1.02
August.....	420	67	141	.504	.58
September.....	245	41	109	.389	.43
The year.....	6,400	16	464	1.66	22.47

MISSISQUOI RIVER NEAR RICHFORD, VT.

LOCATION.—3 miles downstream from Richford, Franklin County, 3 miles below mouth of North Branch, and 2 miles above mouth of Trout River.

DRAINAGE AREA.—445 square miles.

RECORDS AVAILABLE.—May 22, 1909, to December 3, 1910, and June 26, 1911, to September 30, 1922.

GAGE.—Gurley water-stage recorder on left bank, one-fourth mile above highway bridge; inspected by Harry Jenne. Chain gage on highway bridge used from June 26, 1911, to July 31, 1915. From May 22, 1909, to December 3, 1910, gage was just below plant of the Sweat-Comings Co. in Richford.

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

CHANNEL AND CONTROL.—Channel deep, banks not subject to overflow; stream bed composed of gravel, boulders and ledge rock. Control is sharply defined by rock outcrop about 100 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 12.16 feet at 2 a. m., April 12 (discharge, from extension of rating curve, 9,510 second-feet); minimum stage, from water-stage recorder, 1.96 feet at 4 p. m. October 1 (discharge, 22 second-feet, water held back by dams).

1911-1922: Maximum discharge about 10,200 second-feet on March 26, 1913; minimum discharge about 8 second-feet on July 14, 1911 (water held back by dams).

ICE.—Stage-discharge relation usually affected by ice, from December to March; discharge determined from gage heights corrected for effect of ice by means of current-meter measurements, observer's notes, and weather records.

REGULATION.—Considerable daily fluctuation at low stages caused by operation of power plants at Richford.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined below 6,000 second-feet. Operation of water-stage recorder generally satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder sheets, with corrections for effect of ice during the winter, or for days having large variation in stage, by averaging discharge of twelve two-hour periods. Records good for open-water periods, and fair for the winter.

Discharge measurements of Missisquoi River near Richford, Vt., during the year ending Sept. 30, 1922

[Made by J. L. Lamson]

Date	Gage height	Discharge
Jan. 17.....	Feet • 4.05	Sec.-ft. 217
Mar. 23.....	• 7.72	937

* Storage-discharge relation affected by ice.

Daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for the year ending Sept. 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1.....	68	237	428	320	200	200	2,150	710	179	2,840	95	173
2.....	77	407	455	300	200	185	1,560	625	197	1,920	100	188
3.....	100	575	1,200	280	220	170	1,520	595	970	1,580	132	162
4.....	86	478	1,440	260	220	170	1,560	580	1,740	1,360	130	155
5.....	80	469	1,140	260	220	170	1,720	710	890	1,100	162	179
6.....	102	500	740	300	220	200	2,020	1,170	550	830	185	191
7.....	79	442	560	280	200	860	2,340	1,140	460	650	594	165
8.....	95	335	560	260	185	3,900	3,500	1,760	399	527	1,200	145
9.....	115	328	560	260	170	3,100	5,040	1,720	328	469	536	132
10.....	150	293	580	250	155	2,600	6,360	1,060	296	428	310	112
11.....	224	328	600	230	155	1,950	7,740	830	300	339	227	110
12.....	375	324	580	230	155	1,500	8,170	710	668	807	218	142
13.....	532	335	560	230	155	1,400	7,480	686	1,360	300	203	185
14.....	437	343	520	220	155	1,700	4,490	575	890	296	179	203
15.....	300	328	500	220	155	2,700	3,280	478	590	254	170	209
16.....	221	343	480	220	145	1,950	3,390	451	545	215	157	162
17.....	182	371	500	200	145	1,550	2,950	424	650	212	142	120
18.....	165	1,440	1,250	195	145	1,300	4,270	379	6,000	200	1,030	140
19.....	135	3,390	1,000	190	145	1,150	3,940	335	8,000	176	2,200	122
20.....	176	5,040	780	200	145	1,100	2,540	375	4,930	167	890	115
21.....	1,030	3,720	620	200	170	1,050	1,880	395	2,060	162	437	127
22.....	995	1,800	560	195	170	960	1,480	451	4,700	165	324	112
23.....	800	1,140	480	185	200	860	1,240	395	6,600	155	282	95
24.....	692	710	460	200	340	820	1,240	331	4,820	224	233	102
25.....	523	469	440	170	400	920	1,170	300	2,290	240	212	84
26.....	437	698	420	170	340	1,100	1,100	321	1,320	209	808	82
27.....	391	692	400	170	260	1,400	1,320	331	1,030	152	545	75
28.....	347	580	380	185	230	2,500	1,320	303	2,760	160	355	102
29.....	317	565	380	185	-----	6,200	1,030	240	4,080	152	282	82
30.....	265	500	360	185	-----	5,800	830	203	4,270	135	265	71
31.....	237	-----	340	185	-----	3,700	-----	197	-----	142	224	-----

NOTE.—Stage-discharge relation affected by ice Dec. 8 to Mar. 29; discharge based on gage heights corrected for effect of ice.

Monthly discharge of Missisquoi River near Richford, Vt., for the year ending Sept. 30, 1922

[Drainage area, 445 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	1,030	68	314	0.706	0.81
November.....	5,040	237	906	2.04	2.28
December.....	1,440	340	622	1.40	1.61
January.....	320	170	224	.503	.58
February.....	400	145	200	.450	.47
March.....	6,200	170	1,720	3.87	4.46
April.....	8,170	830	2,950	6.63	7.40
May.....	1,760	197	606	1.36	1.57
June.....	8,000	179	2,130	4.79	5.34
July.....	2,840	135	518	1.16	1.34
August.....	2,200	95	414	.930	1.07
September.....	209	71	135	.303	.34
The year.....	8,170	68	893	2.01	27.27

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, 1922.

GAGES.—Water-stage recorder on right bank; referenced to gage datum by a hook gage inside the 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, 4.62 feet at 8 p. m. April 13 (discharge, from extension of rating curve, 2,350 second-feet); minimum discharge practically nil at various times when water was held back by dams.

1909-1922: 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 nil at various times when water was held back by dams.

ICE.—River usually remains open at the 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 mean daily gage height to rating table. 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, 1922

[Made by J. L. Lamson]

Date	Gage height	Dis-charge
Mar. 24.....	Feet 2.54	Sec.-ft. 256
24.....	2.53	250

Daily discharge, in second-feet, of Clyde River at West Derby (Newport), Vt., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
1.....	38	91	175	123	71	81	760	730	164	532	97
2.....	42	88	175	120	69	79	680	670	146	565	85
3.....	46	85	218	117	71	79	603	603	164	548	89
4.....	47	81	248	114	81	91	548	548	173	574	85
5.....	48	91	259	113	58	64	523	515	160	540	100
6.....	46	62	264	119	79	99	532	507	173	507	110
7.....	48	91	264	113	74	91	565	482	182	467	125
8.....	53	91	243	93	71	131	710	474	164	415	140
9.....	48	107	213	113	71	218	860	482	146	394	120
10.....	56	99	204	110	71	380	1,100	490	133	316	100
11.....	57	99	191	107	76	422	1,390	498	133	275	54
12.....	58	99	178	113	58	415	1,970	367	125	248	93
13.....	59	81	171	113	79	407	2,270	212	137	222	44
14.....	59	113	167	107	81	422	2,210	101	178	202	82
15.....	58	85	160	85	81	460	1,970	322	212	182	76
16.....	51	96	134	113	81	474	1,740	353	217	173	-----
17.....	59	99	167	105	81	452	1,500	328	264	160	-----
18.....	61	116	218	107	79	460	1,420	304	452	151	-----
19.....	76	182	227	102	56	452	1,470	292	460	117	-----
20.....	110	334	243	107	79	394	1,560	286	474	113	-----
21.....	128	387	259	102	67	360	1,470	292	490	110	-----
22.....	145	467	243	85	71	328	1,320	264	612	112	-----
23.....	149	482	218	116	71	298	1,210	259	650	120	-----
24.....	138	452	191	107	81	259	1,040	243	622	160	-----
25.....	113	380	191	107	85	243	910	243	603	170	-----
26.....	138	286	167	107	71	269	820	227	540	150	-----
27.....	171	264	164	113	91	316	780	212	507	140	-----
28.....	138	222	145	91	81	437	740	217	507	133	-----
29.....	123	204	141	71	-----	641	710	187	507	120	-----
30.....	64	196	128	96	-----	720	740	164	532	54	-----
31.....	88	-----	126	83	-----	760	-----	169	-----	105	-----

NOTE.—Water-stage recorder not in operation Oct. 2, 3; Jan. 1-4; Apr. 16; July 21-27, 29; and Aug. 5-10; discharge estimated. No record Aug. 16 to Sept. 30.

Monthly discharge of Clyde River at West Derby (Newport), Vt., for the year ending September 30, 1922

[Drainage area, 150 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October.....	171	38	81.1	0.541	0.62
November.....	482	62	134	1.23	1.37
December.....	264	126	197	1.31	1.51
January.....	123	71	106	.707	.82
February.....	91	56	74.5	.497	.52
March.....	760	64	332	2.21	2.55
April.....	2,270	523	1,140	7.60	8.48
May.....	730	101	356	2.37	2.73
June.....	650	125	328	2.19	2.44
July.....	574	54	260	1.73	1.99
August 1-15.....	140	44	93.3	.622	.85

. MISCELLANEOUS MEASUREMENTS

Miscellaneous discharge measurements in St. Lawrence River drainage basin during the year ending September 30, 1922

Date	Stream	Tributary to—	Locality	Discharge
Mar. 13	Ottawa River	Auglaize River	Kalida, Ohio	<i>Sec.-ft.</i> 466
17	do	do	do	434
May 1	do	do	do	81.6
6	do	do	do	321
29	do	do	do	363
June 3	do	do	do	127
July 10	do	do	do	284
15	do	do	do	565
Aug. 22	do	do	do	65.8
July 27	West Branch of Black River	Black River	Elyria, Ohio	14.8
	Ashtabula River	Lake Erie	1 mile southeast of Ashtabula, Ohio.	.5

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