DEPARTMENT OF THE INTERIOR
HUBERT WORK, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 524

SURFACE WATER SUPPLY OF THE UNITED STATES

1921

PART IV. ST. LAWRENCE RIVER BASIN

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SURFACE WATER SUPPLY OF ST. LAWRENCE RIVER BASIN, 1921.

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, 1921.

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, 1895–1922.

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	180,000.00
1922	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 5,200 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1921, 1,350 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.

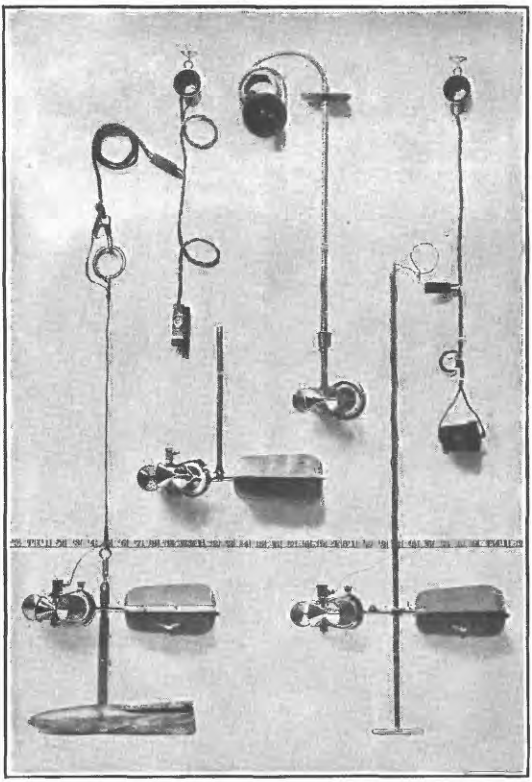
"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

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.

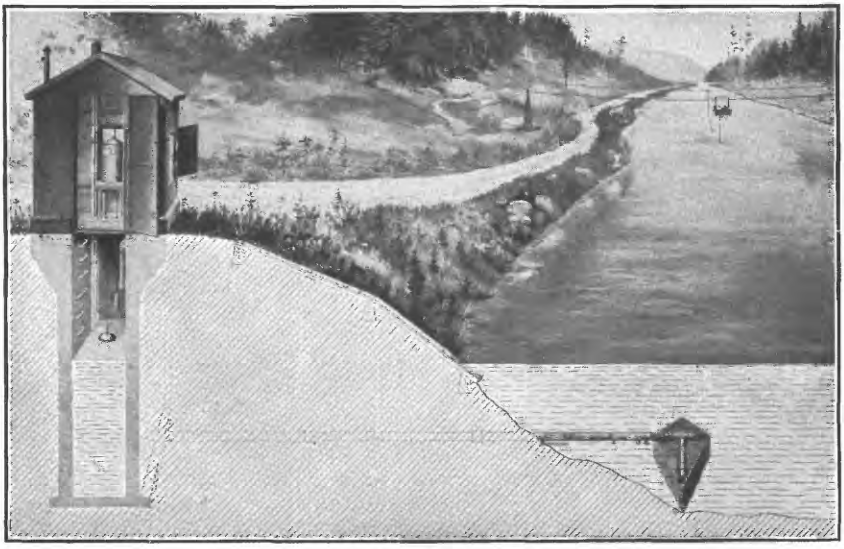
The following terms not in common use are here defined:

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

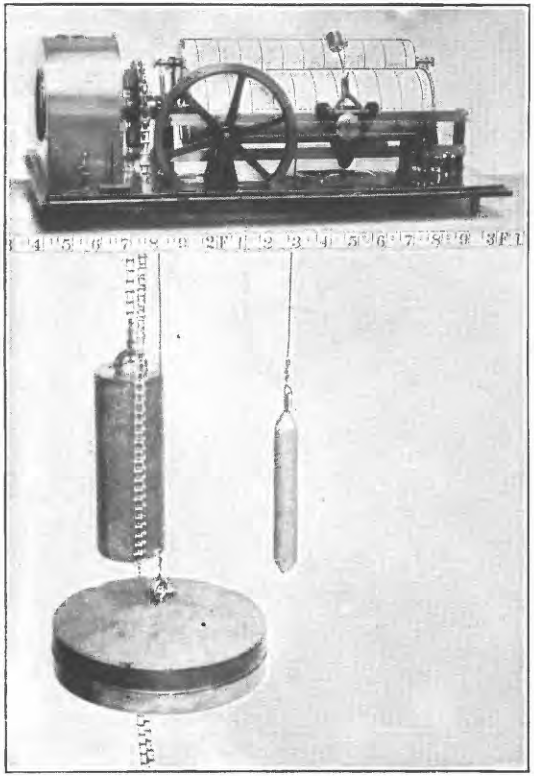
"Control," a term used to designate the section or sections of the stream channel below the gage which determine the stage-discharge



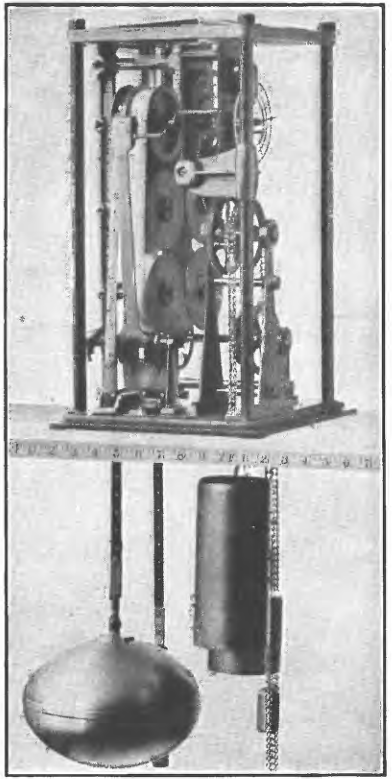
A. PRICE CURRENT METERS.



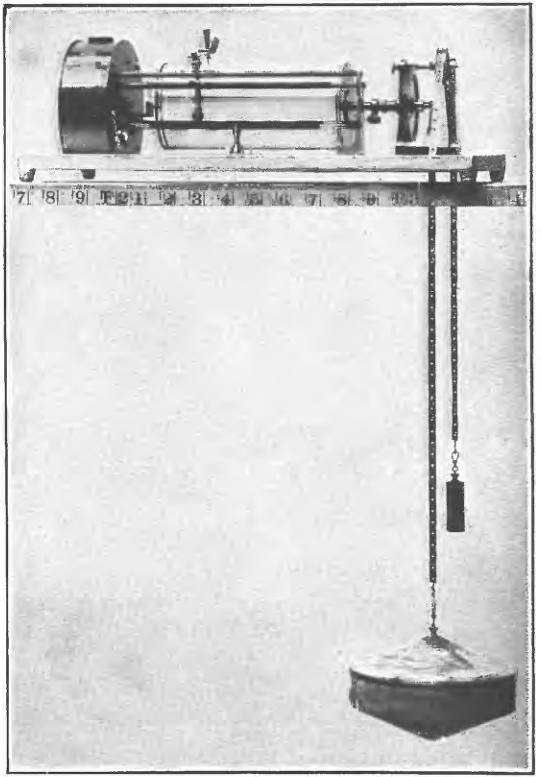
B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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

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

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1920, and ending September 30, 1921. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

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

Part 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., 33–35 Broadway.
Chattanooga, Tenn., 37 Municipal Building.
Columbus, Ohio, Orton Hall, Ohio State University.
Chicago, Ill., 1404 Kimball Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Ames, Iowa, 103 Engineering Hall, Iowa State College.
Rolla, Mo., Rolla Building, School of Mines.
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., 602 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 5,200 points in the United States, and the data obtained have been published in the reports tabulated on pages 7–8.

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

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

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.
W 431 to 444	do	1916.
W 451 to 464	do	1917.
W 471 to 484	do	1918.
W 501 to 514	do	1919–20.
W 521 to 534	do	1921.

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, 1899–1921.

Year.	I North Atlantic slope basins (St. John River to York River).	II South Atlantic and eastern Gulf of Mexico (James River to the Mississippi).	III Ohio River basin.	IV St. Lawrence River and Great Lakes basins.	V Hudson Bay and upper Mississippi River 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.		
												Pacific slope basins in Washington and upper Columbia River.	Snake River basin.	Lower Columbia River and Pacific slope basins in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130. [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	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

[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, 1921, was done in cooperation with the Railroad Commission of Wisconsin, C. M. Larson, chief engineer, and at certain stations in cooperation with the following organizations: Peninsular Power Co., D. W. Mead, consulting engineer (Menominee River at Twin Falls, near Iron Mountain, Mich.); Menominee & Marinette Light & Traction Co., Edward Daniell, general manager (Menominee River below Koss. Mich.); United States Engineer Corps (Fox River at Berlin and at Rapide Croche dam and Wolf River at New London).

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

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. The gage reader was paid by the Sanitary District of Chicago.

The work in New York has been carried on in cooperation with the State, and at certain stations in cooperation with the following organizations: Rochester Gas & Electric Corporation (Genesee River at Driving Park Avenue, Rochester, N. Y.); the city of Rochester (Conesus Creek near Lakeville, N. Y., and Canadice Lake outlet near Hemlock, N. Y.); the Black River Regulating District (Black River at Watertown, N. Y.); Beaver River Power Corporation (Beaver River at Eagle Falls, near Number Four, N. Y.); International Paper Co. (Raquette River at Piercefield, N. Y., and Lake George at Rogers Rock, N. Y.); Plattsburg Gas & Electric Co. (Saranac River near Plattsburg, N. Y.).

The work in Vermont has been carried on in cooperation with the State, the cooperating official being Herbert M. McIntosh, 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); Charles T. Middlebrook (Green River at Garfield); 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 S. R. Collins, Arthur O. Olson, and Glenn Rittenberg.

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 G. C. Stevens and A. H. Horton, district engineers.

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, assisted by A. W. Harrington, E. B. Shupe, B. F. Howe, Otto Lauterhahn, S. M. Currier, and Bessie I. Gould.

Data for stations in Vermont were collected and prepared for publication under the direction of C. H. Pierce, district engineer, assisted by J. L. Lamson, W. E. Armstrong, 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 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 September 30, 1921.

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 the gage forms a permanent control. During log-driving periods logs may collect on the outcrop and cause backwater at the gage. Right bank high, not subject to overflow; left bank of medium height and may be overflowed during extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.43 feet at 3 p. m. April 28 (discharge, 8,010 second-feet); minimum stage, 0.85 foot at 3 p. m. October 4 (discharge, 100 second-feet).

1914–1921: Maximum stage recorded, 6.66 feet at 1 a. m. April 22, 1916 (discharge, 12,200 second-feet); minimum open-water stage, 0.82 foot during afternoon of August 27, 1918 (discharge, about 88 second-feet).

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

REGULATION.—A number of small reservoirs are operated during the early spring and summer to aid log driving. During such periods the stage may fluctuate rapidly.

ACCURACY.—Stage-discharge relation permanent, except when affected by ice. Rating curve well defined between 80 and 7,270 second-feet; above 7,270, second-feet extended and may be subject to considerable error. Operation of water-stage recorder satisfactory during open-water periods, except November 10–24 and September 3–13; recorder not in operation December 19 to April 8. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of recorder graph. Open-water records good; winter records fair.

Discharge measurements of Bad River near Odanah, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 31	S. R. Collins	[a] 1.60	168	Mar. 5	S. R. Collins	[a] 1.99	201
Feb. 5	....do	[a] 1.97	132	Aug. 18	A. O. Olson	.98	158

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Bad River near Odanah, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	120	342	342					2,770	850	112	203	188
2	120	361	435					2,030	685	470	198	177
3	112	478	449					1,570	534	712	188	
4	112	494	442					1,220	387	1,010	183	
5	112	494	428				2,860	1,050	317	950	158	
6	112	478	394					870	299	694	139	
7	112	456	299					790	380	1,140	134	
8	108	387	264	155	140	225		595	760	3,220	129	165
9	108	407	299				2,200	550	810	2,770	129	
10	108		311				1,680	494	750	2,020	129	
11	104		258				1,330	463	676	1,300	139	
12	104		275				1,110	442	559	830	148	
13	112		305				1,000	435	494	595	158	
14	219		348				870	421	394	960	203	158
15	348		374				840	400	329	930	219	162
16	478	370					750	380	287	730	225	172
17	449						676	387	258	534	225	172
18	394						622	361	193	421	158	172
19	348						550	335	183	368	158	177
20	342						526	329	162	305	153	177
21	414						510	317	193	264	144	183
22	526				150		494	305	183	236	153	258
23	502			220			486	305	162	214	153	368
24	428				115	1,790	494	305	153	203	148	380
25	361	335					510	305	153	177	148	380
26	317	317					1,370	258	144	177	153	380
27	323	329					2,200	214	116	225	153	380
28	414	335					7,270	203	116	258	162	374
29	414	354			.....		5,610	209	129	258	167	354
30	394	380			.....		3,620	335	125	236	167	335
31	354	.....			.....		.....	880	.....	214	162	.....

NOTE.—Discharge, Dec. 19 to Apr. 8, estimated because of ice from discharge measurements, weather records, and comparison with records of flow in adjacent drainage basins. Discharge, Nov. 10–24 and Sept. 3–13, based on records of flow in adjacent drainage basin. Braced figures show mean discharge for periods included.

Monthly discharge of Bad River near Odanah, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 607 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum	Mean.	Per square mile.	
October	526	104	273	0.450	0.52
November	.....	.....	383	.631	.70
December	449	.....	282	.465	.54
January	.....	.....	134	.221	.25
February	.....	.....	145	.239	.25
March	.....	.....	1,030	1.70	1.96
April	7,270	486	1,920	3.16	3.53
May	2,770	203	630	1.04	1.20
June	850	116	359	.591	.66
July	3,220	112	727	1.20	1.38
August	225	129	164	.270	.31
September	380	.....	225	.371	.41
The year	7,270	104	524	.863	11.71

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, and 22 miles above mouth of river.

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

RECORDS AVAILABLE.—April 24, 1918, to September 30, 1921.

GAGE.—Chain gage fastened to downstream side of main highway bridge.

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, which should be fairly permanent. Concrete retaining walls on both sides of river below gage prevent overflow at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.8 feet at 1.30 p. m. April 5–7 (discharge, 910 second-feet); minimum stage, 0.67 foot at 2 p. m. October 4 (discharge, 2.3 second-feet).

1918–1921.—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 water supply for Ironwood and Hurley during periods of low flow; effect of this regulation on flow at station probably slight. Considerable diurnal fluctuation at gage is caused by operation of gates in a small dam one-quarter mile upstream. Dam is used to float logs to sawmill.

ACCURACY.—Stage-discharge relation fairly permanent except when affected by ice. Rating curve fairly well defined from 4 to 610 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table, except for periods of ice effect for which it was based on results of discharge measurements, observers notes, and weather records. Records fair.

Discharge measurements of Montreal River at Ironwood, Mich., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	D. W. Roberts	1.38	29.4	Mar. 7	S. R. Collins	[a] 1.25	18.2
Dec. 30	S. R. Collins	[a] 1.52	33.4	Aug. 16	A. O. Olson	1.14	13.0

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Montreal River at Ironwood, Mich., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	14	17	30	23	13	15	244	178	115	14	7.5	7.5
2	45	27	41	23	11	15	65	126	70	14	7.5	7.0
3	24	27	38	23	11	15	338	126	35	12	7.0	7.0
4	2.3	35	37	25	11	15	610	117	54	11	7.2	9.0
5	3.3	38	34	33	11	15	910	109	40	11	6.0	11
6	5.0	45	32	34	11	18	910	109	27	10	5.5	12
7	5.5	24	23	25	11	18	910	100	33	25	6.8	7.5
8	6.5	3.6	20	18	11	18	810	70	104	81	8.0	3.8
9	7.5	6	19	15	11	18	560	39	43	74	8.6	4.1
10	7.2	6	20	15	11	18	362	23	54	66	16	4.3
11	7.0	7	19	13	11	18	165	20	45	57	11	7.6
12	7.5	7	22	13	12	18	160	19	38	15	11	11
13	6.8	9	26	13	13	18	131	29	31	17	16	3.1
14	8.9	11	48	11	12	18	113	43	8.6	17	15	3.3
15	32	13	50	11	12	18	109	36	11	67	14	9.2
16	37	14	50	11	16	18	109	29	17	70	12	7.5
17	26	13	50	11	22	19	97	25	12	38	6.0	7.3
18	16	12	50	11	22	20	85	26	14	5.0	8.6	7.6
19	15	12	50	13	22	54	81	29	8.3	13	9.2	8.0
20	16	14	50	15	22	88	60	29	2.6	10	8.6	16
21	31	15	50	15	18	122	60	29	3.1	26	8.0	20
22	30	16	50	15	18	140	45	23	3.8	8.0	7.5	20
23	31	17	40	15	18	133	40	17	8.0	11	7.2	16
24	27	19	40	15	15	122	46	20	17	10	7.2	19
25	23	16	40	15	15	165	51	19	58	8.0	5.2	58
26	22	18	35	15	15	265	54	19	30	8.6	4.5	96
27	22	18	35	15	15	462	425	22	2.4	16	145	195
28	24	20	35	13	15	660	515	28	2.6	16	77	12
29	23	21	35	13	.....	515	385	44	2.6	3.3	9.8	13
30	20	23	33	13	.....	365	230	60	8.6	3.8	9.2	10
31	18	.....	23	13	.....	301	.....	230	.....	5.6	7.8	.....

NOTE.—Stage-discharge relation affected by ice Nov. 9–15, Dec. 15–30, Jan. 8 to Feb. 13, and Feb. 17 to Mar. 13. No gage readings on Sundays; discharge interpolated or estimated.

Monthly discharge of Montreal River at Ironwood, Mich., for the year ending Sept. 30, 1921.

[Drainage area, 73 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	45	2.3	18.2	0.249	0.29
November	45	3.6	17.5	.240	.27
December	50	19	36.3	.497	.57
January	34	11	16.5	.226	.26
February	22	11	14.5	.199	.21
March	660	15	119	1.63	1.88
April	910	40	289	3.96	4.42
May	230	17	57.8	.792	.91
June	115	2.4	30.0	.411	.46
July	81	3.3	24.0	.329	.38
August	145	4.5	15.5	.212	.24
September	195	3.1	20.4	.279	.31
The year	910	2.3	54.9	.752	10.20

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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, 2½ 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, 1921.

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 Lyle Slender and B. J. Peterson.

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 daily discharge estimated, 900 second-feet April 5–7 (gage not read); minimum stage, 1.32 feet September 7 (discharge, about 2.4 second-feet).

1918–1921: Maximum discharge estimated, 900 second-feet April 5–7, 1921; 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, except when affected by ice. 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 except for period of ice effect 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. Discharge, March 27 to July 5, when gage was not read estimated from study of weather records and records of discharge for adjacent drainage areas. Records for winter, fair; for other periods, good except March 27 to July 5 which are poor.

Discharge measurements of West Branch of Montreal River at Gile, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	D. W. Roberts	2.74	41.0	Mar. 7	S. R. Collins	[a] 2.30	20.5
Dec. 30	S. R. Collins	[a] 2.62	33.4	Aug. 17	A. O. Olson	2.17	19.6
Feb. 7	do	[a] 2.04	13.7				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of West Branch of Montreal River at Gile, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	42	38	35	17	21	240	260	190	75	20	5.0
2	12	42	48	35	19	22	200	160	125	120	16	5.0
3	13	42	52	35	20	21	440	160	65	160	11	5.8
4	14	42	55	35	17	22	675	150	80	200	7.6	4.8
5	14	45	52	35	19	22	900	140	70	240	5.8	3.7
6	11	48	48	30	18	21	900	140	60	270	5.8	3.7
7	11	45	42	30	17	20	900	125	60	232	5.8	2.4
8	11	42	40	30	16	22	755	100	120	214	5.8	3.2
9	7.2	38	36	30	14	19	610	75	65	184	5.8	3.2
10	7.2	36	32	29	14	17	465	50	75	199	6.7	3.2
11	7.2	35	30	27	12	20	320	45	65	214	8.7	3.2
12	7.2	34	31	25	14	18	180	40	60	170	9.9	3.2
13	9.4	32	32	25	14	18	140	50	50	100	14	3.2
14	11	31	34	22	15	18	120	55	30	120	22	7.6
15	9.4	30	45	22	14	20	115	55	30	115	31	8.7
16	9.4	30	50	22	15	20	115	45	35	92	25	7.6
17	12	26	60	22	12	21	100	40	30	76	20	6.7
18	14	24	70	22	14	22	90	40	30	60	17	7.2
19	16	24	70	22	14	24	80	45	30	48	14	8.7
20	18	26	65	23	15	80	70	45	20	38	14	14
21	20	27	60	27	16	110	70	45	20	31	14	17
22	22	28	65	29	20	135	60	40	20	32	14	20
23	24	28	55	28	21	158	55	30	20	31	11	23
24	26	28	50	27	22	198	60	35	20	27	8.7	27
25	28	29	45	25	21	198	120	35	20	25	8.7	24
26	32	30	45	23	20	198	265	35	20	22	8.7	20
27	34	30	40	22	20	230	410	35	20	19	9.9	19
28	35	31	35	23	20	260	560	75	20	27	8.3	16
29	37	32	35	20	.....	290	460	135	25	34	6.7	13
30	39	34	35	20	.....	320	360	190	30	25	6.7	11
31	40	.....	35	19	.....	280	.....	250	.....	23	5.8	.....

NOTE.—Stage-discharge relation slightly affected by ice Dec. 15 to Mar. 19. Gage not read Oct. 2, 3, 10, 17–24, 27–31, Nov. 2, 7, 11–14, 21, 25, 28, Dec. 5, 12, 19, 25, 26, Jan. 1, 2, 9, 16, 23, 30, Feb. 6, 13, 20, 27, Mar. 6, 13, 20, 25, July 10, 17, Aug. 7, 14, 21, 28, Sept. 4, 11, 18, and 25; discharge interpolated. See "Accuracy."

Monthly discharge of West Branch of Montreal River at Gile, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 70 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	40	7.2	18.2	0.260	0.30
November	48	24	33.7	.481	.54
December	70	30	46.1	.659	.76
January	35	19	26.4	.377	.43
February	22	12	16.8	.240	.25
March	320	17	91.8	1.31	1.51
April	900	55	328	4.69	5.23
May	260	30	87.9	1.26	1.45
June	190	20	50.2	.717	.80
July	270	19	104	1.49	1.72
August	31	5.8	11.9	.170	.20
September	27	2.4	10.0	.143	.16
The year	900	2.4	68.8	.983	13.35

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 the power plant of the Peninsular Power Co., 3½ miles north of city of Iron Mountain, Mich.

DRAINAGE AREA.—1,790 square miles (area in Wisconsin measured on State map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch = 6 miles; area in Michigan measured on map compiled by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1921.

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 power in 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, and the water that passes over the spillway, through the gates, and down the log sluice.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge recorded during the year, 13,100 second-feet April 29. Minimum mean daily discharge recorded, 617 second-feet October 3.

1914–1921: Maximum mean daily discharge recorded, 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 about 5 miles upstream was placed in operation by the Peninsular Power Co. Owing to variations in demand the daily discharge will bear no relation to the natural flow, but the monthly discharge probably corresponds 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, by the United States Geological Survey at a point about 1 mile downstream from power plant.

COOPERATION.—Daily-discharge records derived from power-plant records furnished by Mead and Seastone, consulting engineers, Madison, Wis.

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

Daily discharge, in second-feet, of Menominee River at Twin Falls, near Iron Mountain, Mich., for the year ending Sept. 30, 1921.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	688	889	1,010	1,250	828	908	3,770	9,410	2,050	1,220	959	987
2	681	957	1,050	955	837	955	3,090	6,920	1,540	1,070	969	983
3	617	984	1,130	1,150	855	956	3,640	6,100	1,350	844	946	975
4	732	998	1,170	1,190	847	1,000	4,700	4,780	1,390	813	988	786
5	778	1,010	1,010	1,160	851	1,060	5,830	3,750	1,340	790	987	822
6	744	986	1,160	1,220	756	742	6,610	3,410	1,280	812	882	852
7	732	843	1,170	1,270	836	835	7,150	3,220	1,220	868	760	778
8	744	947	1,060	1,200	796	792	7,860	2,700	1,860	1,000	890	815
9	693	993	974	813	808	759	7,150	3,060	1,630	1,090	820	777
10	675	1,050	1,000	1,100	830	771	6,880	2,430	1,550	846	741	805
11	704	999	1,010	1,120	795	781	6,370	2,240	1,730	1,070	745	748
12	702	986	933	1,130	754	818	5,450	2,220	1,530	1,050	758	810
13	718	977	1,000	1,130	701	673	5,130	1,980	1,860	1,040	979	799
14	750	840	1,270	1,080	868	823	4,110	2,550	2,050	1,230	804	748
15	756	966	1,560	1,090	833	833	4,180	1,680	1,480	1,090	794	746
16	874	934	1,380	745	935	858	4,180	2,220	1,440	1,070	790	726
17	761	964	1,410	953	1,010	961	3,350	2,530	1,200	1,020	757	759
18	836	910	1,570	837	945	1,020	3,180	2,640	1,210	1,110	795	735
19	910	822	1,260	798	969	1,110	3,400	2,070	1,010	1,020	974	773
20	937	751	1,290	792	733	847	2,610	2,120	1,130	1,060	1,060	794
21	940	785	1,260	763	930	1,350	2,770	1,850	1,150	993	774	1,100
22	983	848	1,230	883	888	1,560	3,320	2,270	1,140	939	955	1,610
23	945	790	1,340	730	911	1,940	3,880	2,140	1,120	960	957	3,000
24	735	776	1,550	915	899	2,370	2,840	2,130	1,130	791	1,000	3,010
25	926	711	1,080	858	968	2,180	4,810	2,060	1,040	1,020	872	2,780
26	915	880	895	811	1,050	2,560	4,880	1,600	792	1,030	955	1,960
27	908	970	1,220	802	802	3,640	7,120	1,580	847	970	1,000	1,340
28	961	796	1,160	898	890	4,510	11,300	1,580	993	957	795	1,650
29	942	952	1,200	1,170	.....	4,460	13,100	1,380	1,110	1,010	918	1,890
30	960	970	1,230	771	.....	4,340	12,100	1,430	1,230	898	923	1,610
31	795	.....	1,280	835	.....	4,350	.....	1,900	.....	815	990	.....

Monthly discharge of Menominee River at Twin Falls near Iron Mountain, Mich., for the year ending Sept. 30, 1921.

[Drainage area, 1,790 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	983	617	808	0.451	0.52
November	1,050	711	909	.508	.57
December	1,570	895	1,190	.665	.77
January	1,270	730	981	.548	.63
February	1,050	701	862	.482	.50
March	4,510	673	1,640	.916	1.06
April	13,100	2,610	5,490	3.07	3.42
May	9,410	1,380	2,840	1.59	1.83
June	2,050	792	1,350	.754	.84
July	1,230	790	984	.550	.63
August	1,060	741	888	.496	.57
September	3,010	726	1,210	.676	.75
The year	13,100	617	1,590	.888	12.09

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, 1921.

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 of the head and tail water are read 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 average discharge for the day is computed from these data, no account being taken of the water passing through the exciter turbine nor waste over the "trash gate" at power house. This amount is relatively small.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, 20,300 second-feet April 30; minimum mean daily discharge, 960 second-feet September 17.

1913–1921: Maximum mean daily discharge recorded, 23,200 second-feet, April 23 and 25, 1916; minimum mean daily discharge, 960 second-feet September 17, 1921.

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 felt at the stations generally on Tuesdays. The monthly flow probably represents the natural flow.

ACCURACY.—The tables used by the power company for computing discharge were revised November 1, 1919, on basis of seven current-meter measurements made by the United States Geological Survey in May and September, 1919. (See Water-Supply Paper 504, p. 22). Records computed by use of the revised tables represent more closely the actual flow.

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

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

Daily discharge, in second-feet, of Menominee River below Koss, Mich., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,770	1,770	2,070	2,560	1,520	1,600	10,200	20,160	5,600	1,830	1,380	2,290
2	1,440	1,570	2,060	2,630	1,600	1,530	9,140	20,000	5,120	1,790	1,660	1,990
3	1,310	2,220	2,160	2,550	1,450	1,620	7,710	18,200	4,840	1,880	1,410	2,070
4	1,770	2,290	2,250	2,430	1,450	1,440	6,990	14,900	4,100	1,720	1,300	1,760
5	1,250	2,320	2,380	2,160	1,410	1,750	7,860	12,400	3,440	1,410	1,250	1,440
6	1,030	2,280	2,250	2,160	1,220	1,830	9,640	11,000	3,010	1,270	1,290	1,470
7	1,530	2,160	2,150	2,040	1,350	1,570	10,800	8,060	3,170	1,520	1,080	1,500
8	1,530	2,080	2,430	2,040	1,350	1,620	11,500	7,440	3,260	1,490	1,410	1,070
9	1,560	1,960	2,340	2,070	1,460	1,720	12,400	6,560	3,470	1,850	1,350	1,520
10	1,530	2,300	2,220	2,060	1,340	1,700	13,200	5,810	3,580	1,820	1,320	1,350
11	1,750	2,400	1,980	1,840	1,420	1,530	12,800	5,320	3,610	1,540	1,470	1,460
12	1,460	1,980	2,000	1,850	1,440	1,630	11,500	5,300	3,700	1,750	1,470	1,600
13	1,600	1,350	2,000	1,710	1,460	1,540	10,400	4,430	2,660	2,130	1,490	1,280
14	1,600	1,180	2,320	1,810	1,460	1,440	8,550	4,220	2,520	2,100	1,440	1,450
15	1,470	1,780	2,870	1,770	1,410	1,240	8,020	4,280	2,540	1,970	1,440	1,490
16	1,390	1,590	3,460	1,600	1,630	1,310	7,400	4,260	2,560	1,860	1,450	1,490
17	1,150	1,830	2,620	1,760	1,550	1,330	7,460	4,470	3,160	2,000	1,330	960
18	1,570	2,080	2,120	1,620	1,620	1,380	6,940	4,330	2,800	1,780	1,530	1,280
19	1,610	1,970	1,920	1,530	1,740	2,110	6,080	4,410	2,590	1,690	1,740	1,630
20	1,780	1,980	2,210	1,470	1,220	2,370	5,650	4,520	2,010	2,180	1,810	1,610
21	1,860	1,770	2,640	1,460	1,630	4,490	5,560	3,880	1,620	1,780	1,980	1,590
22	1,840	1,590	2,520	1,680	1,480	5,820	4,870	3,970	2,420	1,530	1,830	2,160
23	1,840	1,520	2,660	1,420	1,590	6,480	6,390	3,340	2,410	1,340	1,930	2,300
24	2,070	1,710	2,630	1,540	1,480	6,660	8,380	4,110	2,150	1,590	2,340	4,000
25	1,890	2,140	2,650	1,770	1,550	6,330	9,250	4,280	2,410	1,530	2,030	5,540
26	1,690	1,930	2,720	1,720	1,670	7,000	10,400	4,720	1,930	1,190	1,880	3,600
27	1,880	1,670	2,480	1,620	1,440	9,870	10,400	5,670	1,610	1,670	2,300	4,100
28	1,790	1,860	2,180	1,570	1,470	9,270	13,300	4,420	1,300	1,530	1,890	3,040
29	1,910	1,810	1,970	1,640	.....	11,500	16,400	4,500	1,740	1,410	1,880	2,990
30	2,160	1,930	2,190	1,640	.....	11,700	20,300	3,880	1,610	1,640	2,280	2,310
31	2,000	.....	2,440	1,820	.....	11,100	.....	4,030	.....	1,490	2,280	.....

Monthly discharge of Menominee River below Koss, Mich., for the year ending Sept. 30, 1921.

[Drainage area, 3,790 square miles.]

Month.	Discharge in second-feet.				Run-off. in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	2,160	1,030	1,650	0.435	0.50
November	2,400	1,180	1,900	.501	.56
December	3,460	1,920	2,350	.620	.71
January	2,630	1,420	1,860	.491	.57
February	1,740	1,220	1,480	.391	.41
March	11,700	1,240	3,950	1.04	1.20
April	20,300	4,870	9,650	2.55	2.84
May	20,100	3,340	6,990	1.84	2.12
June	5,600	1,300	2,900	.765	.85
July	2,180	1,190	1,690	.446	.51
August	2,340	1,080	1,650	.435	.50
September	5,540	960	2,090	.551	.61
The year	20,300	960	3,180	.839	11.38

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

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, 1921.

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, 7.45 feet April 28 (discharge, 2,960 second-feet); minimum discharge, estimated 155 second-feet, February 1 and 2.

1914–1921: Maximum stage recorded, 9.25 feet at noon April 23, 1916 (discharge, about 4,520 second-feet); minimum stage, 1.6 feet, September 6 and 7, 1915 (discharge, about 118 second-feet).

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year except when affected by ice. Rating curve is fairly well defined below 1,800 second-feet; extended above that limit. 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 fair; winter records subject to error.

Discharge measurements of Pine River near Florence, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 2	S. R. Collins	[a] 4.30	300	Mar. 8	S. R. Collins	[a] 3.14	184
Feb. 8	do	[a] 2.87	169	July 19	A. O. Olson	1.72	232

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Pine River near Florence, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	250	412	444	300	155	240	1,460	2,480	382	250	172	324
2	226	428	476	300	155	225	1,410	1,970	382	250	162	298
3	238	444	382	300	160	205	1,360	1,810	367	250	162	274
4	250	444	367	285	160	205	1,360	1,660	352	250	162	274
5	262	476	382	275	170	195	1,310	1,460	352	238	162	274
6	250	476	397	250	170	195	1,310	1,260	352	226	162	274
7	274	476	382	225	170	180	1,310	1,170	352	274	162	298
8	262	476	382	215	170	185	1,260	1,120	367	324	162	298
9	250	508	367	215	180	195	1,260	1,040	382	382	162	324
10	250	542	352	225	180	195	1,220	945	382	382	382	324
11	262	542	352	225	170	195	1,170	900	382	382	412	324
12	250	508	340	260	170	205	1,120	815	352	382	428	324
13	274	508	325	260	180	205	990	746	352	352	444	324
14	286	476	310	225	180	205	945	712	352	352	444	298
15	274	476	300	225	205	205	900	610	367	324	444	298
16	298	476	285	240	205	215	855	610	382	324	476	274
17	298	508	275	215	225	225	855	576	382	298	476	274
18	324	542	275	180	225	275	855	576	382	274	476	298
19	338	508	260	160	250	325	900	542	352	226	476	298
20	324	542	250	170	250	410	945	508	352	250	476	324
21	324	508	250	160	250	610	945	476	324	250	476	382
22	338	542	300	160	250	746	945	476	324	250	476	444
23	298	542	300	160	215	815	990	476	311	250	508	542
24	324	542	300	170	205	990	1,120	476	298	226	508	678
25	352	542	285	195	205	1,120	1,220	444	274	226	476	678
26	367	542	285	205	215	1,260	1,460	444	274	204	476	678
27	352	542	285	180	215	1,460	2,620	444	274	204	476	644
28	382	508	275	195	215	1,510	2,920	428	262	193	444	610
29	397	476	275	195	.....	1,510	2,840	412	250	193	412	610
30	382	476	275	225	.....	1,560	2,620	412	250	182	382	576
31	382	.....	285	205	.....	1,610	.....	397	.....	182	352	.....

NOTE.—Stage-discharge relation affected by ice Dec. 12 to Mar. 21. Gage not read July 1 and 2; discharge interpolated.

Monthly discharge of Pine River near Florence, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 488 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	397	226	301	0.617	0.71
November	542	412	500	1.02	1.14
December	476	250	323	.662	.76
January	300	160	219	.449	.52
February	250	155	196	.402	.42
March	1,610	180	570	1.17	1.35
April	2,920	855	1,350	2.77	3.09
May	2,480	397	851	1.74	2.01
June	382	250	339	.695	.78
July	382	182	269	.551	.64
August	508	162	367	.752	.87
September	678	274	395	.809	.90
The year	2,920	155	474	.971	13.19

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, 1921.

GAGE.—Chain gage fastened to guard rail 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, 5.60 feet 10 a. m. March 21 (discharge, 1,650 second-feet); minimum mean daily discharge 100 second-feet January 13–18 and February 20.

1914–1921: Maximum stage recorded, 5.60 feet at 10 a. m. March 21, 1921 (discharge, 1,650 second-feet). Estimated minimum discharge, 70 second-feet December 9–11, 30, and 31, 1917.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent, except when affected by ice. Rating curve well defined between 180 and 1,120 second-feet. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table, except for periods 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; winter records fair.

Discharge measurements of Pike River at Amberg, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 3	S. R. Collins	[a] 2.65	186
Feb. 9	do	[a] 1.80	124
July 20	A. O. Olson	1.69	135

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Pike River at Amberg, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	138	148	192	205	130	140	626	1,220	310	148	128	158
2	138	262	218	190	130	160	522	740	294	148	122	148
3	138	232	232	185	130	160	514	626	326	148	122	148
4	142	218	204	180	130	160	505	590	342	145	122	154
5	142	204	247	180	130	160	505	522	326	142	122	148
6	142	204	247	205	125	160	505	480	302	145	128	142
7	148	192	232	160	125	160	522	438	278	148	122	134
8	145	180	218	140	125	160	590	390	294	180	118	128
9	142	169	204	130	125	155	522	374	286	204	114	128
10	142	160	199	115	130	150	505	358	278	183	148	134
11	148	140	180	105	135	150	488	342	326	162	192	138
12	148	120	192	105	140	150	454	342	294	148	204	138
13	142	120	199	100	140	150	390	342	278	142	232	138
14	142	120	232	100	140	150	406	358	262	148	195	138
15	148	120	205	100	145	150	390	342	232	158	158	138
16	154	120	185	100	155	160	390	326	232	154	153	138
17	169	140	175	100	140	170	390	326	218	142	148	169
18	180	180	165	100	120	185	374	326	204	138	183	180
19	176	192	160	120	110	204	358	326	198	138	218	180
20	169	169	160	140	100	1,450	342	294	192	134	211	176
21	180	138	160	160	120	1,650	326	294	180	138	204	204
22	185	118	160	160	140	1,170	488	294	176	134	204	232
23	192	158	160	160	130	990	700	310	172	134	204	247
24	180	204	160	150	120	947	780	326	169	144	192	232
25	169	192	160	145	115	904	760	342	158	154	180	204
26	158	186	160	140	110	820	740	342	154	148	192	192
27	158	180	160	140	105	1,170	1,120	342	148	142	204	180
28	158	186	160	140	120	1,040	1,400	342	169	142	249	169
29	154	192	160	140	.....	904	1,350	326	162	142	294	162
30	148	180	180	135	.....	802	1,170	326	158	142	228	169
31	148	.....	205	130	.....	700	.....	326	.....	135	162	.....

NOTE.—Stage-discharge relation affected by ice Nov. 10–18 and Dec. 15 to Mar. 18. Gage not read Oct. 5, 8, Nov. 26, 28, Jan. 22–27, Mar. 24, 30, Apr. 3, 5, 18, 25, May 6, 9, 12, June 6, 9, 13, 19, 23, July 4, 6, 10, 24, 31, Aug. 14, 16, 18, 20, 22, 24, 26, 28, and 30; discharge interpolated.

Monthly discharge of Pike River at Amberg, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	192	138	156	0.650	0.75
November	262	118	171	.712	.79
December	247	160	189	.788	.91
January	205	100	141	.588	.68
February	155	100	127	.529	.55
March	1,650	140	503	2.10	2.42
April	1,400	326	604	2.52	2.81
May	1,220	294	407	1.70	1.96
June	342	148	237	.988	1.10
July	204	134	149	.621	.72
August	294	114	176	.733	.85
September	247	128	165	.688	.77
The year	1,650	100	253	1.05	14.31

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.—October 1, 1912, to September 30, 1921.

GAGE.—Gurley graphic water-stage recorder, set over a wooden well 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 at control and measuring section are 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 apparently drowned out and is probably formed by some section farther downstream.

EXTREMES OF DISCHARGE.—Maximum stage during the year, from water-stage recorder, 7.85 feet at 11 a. m., April 29 (discharge, 3,890 second-feet); minimum stage, 1.76 feet at 10 p. m. August 14 (discharge, 60 second-feet).

1912–1921: Maximum stage from water-stage recorder occurred April 29, 1921; 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 larger service reservoir ice does not form on the river in the vicinity of the 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, however, is probably not materially affected by operation of the power plant except during the months of March, April, August, and September.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined between 145 and 3,980 second-feet. Daily discharge for periods when recording gage was in operation ascertained by use of the discharge inte-

grator; discharge for periods when gage did not operate based on power plant records corrected by comparison with records from water-stage recorder during times when gage was in operation. Records good.

The following discharge measurement was made by A. O. Olson:
July 20, 1921: Gage height, 2.83 feet; discharge, 716 second-feet.

Daily discharge, in second-feet, of Peshtigo River at High Falls, near Crivitz, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	300	364	436	218	430	363	1,720	3,040	816	482	271	513
2	372	304	445	412	439	287	1,250	2,700	805	440	418	542
3	145	360	360	220	446	324	1,300	1,940	586	140	408	516
4	358	287	310	300	479	337	1,090	1,310	713	83	212	202
5	326	252	229	542	377	360	1,220	1,390	206	374	225	92
6	316	176	252	337	304	209	1,380	1,590	432	488	311	411
7	314	153	288	338	292	520	1,420	1,080	494	467	74	525
8	405	317	290	336	396	535	1,420	510	612	374	184	477
9	384	419	269	213	403	574	1,470	469	381	439	246	470
10	230	385	260	251	409	560	1,370	812	464	146	302	525
11	412	160	250	338	335	526	1,280	872	656	312	230	140
12	384	418	85	403	341	500	1,120	746	582	460	190	363
13	405	270	340	388	138	164	1,120	602	716	462	175	511
14	310	212	334	364	411	268	1,010	795	753	338	65	491
15	381	358	366	293	436	234	1,030	608	741	225	226	514
16	282	450	378	178	347	422	1,050	953	725	240	257	506
17	128	472	280	305	568	284	596	990	614	102	245	430
18	278	422	217	323	406	314	996	961	344	327	280	129
19	331	497	113	331	423	480	918	885	242	440	280	421
20	366	365	276	289	120	427	980	902	511	509	268	530
21	371	153	349	413	358	730	1,050	660	536	360	143	509
22	368	350	394	419	369	765	1,010	533	588	414	262	457
23	388	390	308	100	444	759	1,000	858	543	558	288	285
24	104	350	292	290	425	805	570	910	520	151	278	292
25	398	88	131	375	437	940	1,310	908	491	450	230	80
26	365	308	95	382	457	1,420	1,270	852	148	518	462	476
27	312	354	218	383	231	1,670	2,140	838	556	394	1,090	483
28	288	130	203	385	463	1,990	2,540	832	690	388	437	470
29	307	406	128	390	.....	2,070	3,430	492	490	363	612	426
30	259	466	98	275	.....	2,020	2,900	464	458	269	638	415
31	112	.....	120	361	.....	1,970	.....	850	.....	79	453	.....

NOTE.—Water-stage recorder operated satisfactorily about 65 per cent of the time. Discharge for periods when recorder did not operate determined from records of the power plant.

Monthly discharge of Peshtigo River at High Falls, near Crivitz, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	412	104	313	0.602	0.69
November	497	88	321	.617	.69
December	445	85	262	.504	.58
January	542	100	327	.629	.73
February	568	120	382	.735	.77
March	2,070	164	736	1.42	1.64
April	3,430	570	1,370	2.63	2.93
May	3,040	464	1,010	1.94	2.24
June	816	148	547	1.05	1.17
July	558	79	348	.669	.77
August	1,090	65	315	.606	.70
September	542	80	407	.783	.87
The year	3,430	65	528	1.02	13.78

NOTE.—See "Regulation" in station description.

OCONTO RIVER NEAR GILLETT, WIS.

LOCATION.—In sec. 34, T. 28 N., R. 18 E., at highway bridge 2½ miles southeast of Gillett, Oconto County, and 27 miles above mouth of river.

DRAINAGE AREA.—678 square miles (measured on maps 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, 1921.

GAGE.—Chain gage attached to iron railing on upstream side of bridge; read by Harvie 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 extreme high stages water may overflow around right end of bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.80 feet April 29, 30, and May 1 (discharge, 2,890 second-feet); minimum stage, 0.40 foot at 9 a. m. December 17 (discharge, 116 second-feet).

1906–1921: Maximum stage recorded, 5.3 feet at 3.30 p. m. April 25, 1916, and 10 a. m. March 28, 1920 (discharge, 3,220 second-feet); minimum open-water discharge, 95 second-feet January 3 and 6, 1907.

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

REGULATION.—A dam above the station stores water to float logs during the spring; except when this dam is in operation flow at the gage is natural.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice. Rating curve well defined between 239 and 1,790 second-feet. Gage read to quarter-tenths once daily except December 24 to March 8, when it was read every other day. 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 fair.

Discharge measurements of Oconto River near Gillett, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 4	S. R. Collins	[a] 3.13	496	Mar. 10	S. R. Collins	[a] 1.48	476
Feb. 10	do	[a] 2.34	379	July 21	A. O. Olson	1.24	381

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Oconto River near Gillett, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	407	449	516	490	360	415	1,690	2,890	695	348	471	587
2	387	587	539	495	340	425	1,610	2,890	614	310	449	563
3	387	695	563	495	360	430	1,290	2,490	539	292	329	539
4	367	755	587	495	380	440	1,450	2,010	493	310	329	516
5	367	815	587	470	380	445	1,450	1,770	407	407	329	493
6	367	755	563	460	385	450	1,450	1,610	516	407	329	493
7	367	695	540	450	390	455	1,370	1,530	516	387	329	471
8	367	668	450	460	395	460	1,290	1,370	516	387	310	449
9	367	640	365	470	390	470	1,290	1,290	493	387	407	449
10	367	614	290	470	380	475	1,290	1,150	493	407	407	449
11	407	516	240	465	390	470	1,290	1,150	449	407	387	493
12	493	257	329	435	405	470	1,370	1,010	428	387	387	493
13	516	330	449	405	405	460	1,290	875	471	387	407	493
14	493	365	539	380	405	455	908	845	539	367	329	367
15	493	405	640	350	430	449	1,040	845	516	367	329	367
16	428	430	563	390	450	449	908	815	493	348	348	387
17	449	430	116	430	420	449	668	755	493	257	367	428
18	449	449	130	390	385	449	1,610	755	449	407	367	471
19	428	449	140	350	340	449	640	755	329	407	367	587
20	428	449	195	390	290	1,290	587	755	471	387	387	640
21	471	539	275	430	320	2,570	755	755	449	367	428	940
22	516	539	365	400	350	2,570	1,080	695	449	367	449	785
23	516	539	450	370	360	2,250	1,370	640	428	348	471	815
24	493	563	450	390	365	2,090	1,610	668	407	257	449	845
25	493	539	450	410	365	1,930	1,850	640	387	387	449	845
26	493	516	470	400	365	1,770	1,930	539	292	387	428	845
27	471	493	470	395	385	1,770	2,010	587	449	387	493	755
28	428	493	470	385	405	1,850	2,410	640	224	471	587	640
29	387	493	470	375	.....	1,930	2,890	815	348	428	640	407
30	367	493	485	375	.....	1,930	2,890	785	329	407	695	449
31	539	.....	490	375	.....	1,770	.....	755	.....	240	587	.....

NOTE.—Stage-discharge relation affected by ice Nov. 13–17, Dec. 7–10, and Dec. 18 to Mar. 14.

Monthly discharge of Oconto River near Gillett, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 678 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	539	367	436	0.643	0.74
November	815	257	532	.785	.88
December	640	116	425	.627	.72
January	495	350	421	.621	.72
February	450	290	378	.558	.58
March	2,570	415	1,040	1.53	1.76
April	2,890	587	1,440	2.12	2.36
May	2,890	539	1,130	1.67	1.92
June	695	224	456	.673	.75
July	471	240	368	.543	.63
August	695	310	421	.621	.72
September	940	367	569	.839	.94
The year	2,890	116	636	.938	12.72

FOX RIVER AT BERLIN, WIS.

LOCATION.—In sec. 16, T. 17 N., R. 13 E., at Government lock and dam, 2½ 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, 1921.

GAGE.—Staff gage in pool immediately below the 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 2⅛ miles downstream from gage. Rating curves at gage corrected for any small inflow between the gage and measuring section.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge recorded during year, 2,450 second-feet May 1 and 2; minimum mean daily discharge, 435 second-feet July 24, 25, August 4, 5, 8, and 9.

1898–1921: Maximum mean daily discharge, 6,400 second-feet March 28 and 30, 1916; minimum mean daily discharge, 250 second-feet February 1–4, 1900.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation practically permanent except for effect of ice. Rating curve well defined between 800 and 6,000 second-feet. Gage read three times daily; in general, however, noon reading alone is used in determination of daily discharge. Daily discharge ascertained by applying mean daily gage height to rating table, corrected for period 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.

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

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	705	765	1,270	865	1,100	1,060	1,420	2,450	1,180	705	560	645
2	705	800	1,270	905	1,060	1,140	1,360	2,450	1,180	675	590	645
3	705	830	1,220	905	1,020	1,220	1,270	2,380	1,220	705	560	645
4	705	865	1,220	865	1,020	1,320	1,220	2,310	1,180	645	535	645
5	675	865	1,180	865	1,020	1,320	1,180	2,240	1,140	645	535	645
6	675	865	1,140	865	975	1,420	1,140	2,170	1,060	645	560	675
7	675	905	1,100	905	1,020	1,520	1,100	2,040	1,100	645	560	615
8	675	940	1,060	905	975	1,570	1,060	1,980	1,140	705	535	615
9	675	975	1,060	905	975	1,620	1,140	1,910	1,100	675	535	615
10	675	1,060	1,020	905	975	1,680	1,180	1,800	1,100	645	560	615
11	675	1,020	1,020	830	975	1,680	1,220	1,680	1,060	645	560	615
12	645	675	1,020	800	975	1,680	1,220	1,570	1,020	615	590	615
13	675	1,020	1,020	735	975	1,680	1,180	1,460	975	615	590	615
14	675	940	1,060	705	975	1,620	1,180	1,420	975	590	615	615
15	675	940	1,100	705	975	1,570	1,180	1,320	940	590	615	645
16	675	905	905	705	1,100	1,570	1,140	1,270	940	590	615	645
17	675	865	800	705	1,180	1,570	1,020	1,220	905	560	615	645
18	675	865	905	675	1,140	1,620	1,100	1,270	865	560	615	675
19	735	905	940	645	1,140	1,620	1,100	1,270	830	590	615	675
20	735	975	940	705	1,140	1,680	1,100	1,270	800	590	615	675
21	735	975	940	905	1,140	1,680	1,140	1,220	800	590	645	765
22	735	1,100	865	1,100	1,140	1,620	1,220	1,220	765	560	645	800
23	735	1,140	865	1,140	1,140	1,570	1,360	1,140	765	560	645	800
24	735	1,180	865	1,100	1,100	1,570	1,420	1,100	615	535	615	765
25	735	1,220	865	1,100	1,100	1,680	1,420	1,100	705	535	615	765
26	705	1,220	830	1,140	1,140	1,680	1,520	1,020	675	560	615	735
27	705	1,270	830	1,140	1,060	1,740	1,740	1,100	735	590	615	705
28	705	1,270	830	1,140	1,020	1,680	2,040	1,270	765	590	615	705
29	705	1,270	830	1,140	.....	1,570	2,240	1,270	735	615	615	705
30	705	1,270	830	1,140	.....	1,520	2,380	1,220	735	590	615	705
31	705	.....	865	1,100	.....	1,520	.....	1,180	.....	560	645	.....

Monthly discharge of Fox River at Berlin, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 1,430 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	735	645	697	0.487	0.56
November	1,270	675	996	.697	.78
December	1,270	800	989	.692	.80
January	1,140	645	911	.637	.73
February	1,180	975	1,060	.741	.77
March	1,740	1,060	1,550	1.08	1.24
April	2,380	1,020	1,330	.930	1.04
May	2,450	1,020	1,560	1.09	1.26
June	1,220	615	934	.653	.73
July	705	535	610	.427	.49
August	645	535	595	.416	.48
September	800	615	674	.471	.53
The year	2,450	535	991	.693	9.41

NOTE.—Monthly discharge computed by U. S. Geol. Survey from records of daily discharge furnished by the United States Engineer Corps.

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, 1921.

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 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, 14,200 second-feet April 28; minimum mean daily discharge, 742 second-feet August 15.

1918–1921: Maximum mean daily discharge, 16,600 second-feet April 10, 1920; minimum mean daily discharge, 742 second-feet August 15, 1921. Information relative to daily maximum and minimum, 1896–1917, may be obtained from the United States Army Engineers office, Milwaukee, Wis.

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 being operated for power purposes and in the interests of navigation. Throughout the period covered by the records the same storage conditions have existed.

ACCURACY.—Records are considered good.

COOPERATION.—The records were collected and computations of daily discharge made by the United States Army engineers 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 Rapid Croche dam, near Wrightstown, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Ang.	Sept.
1	2,530	2,110	4,280	4,170	4,960	4,780	5,880	12,300	5,400	4,080	1,790	1,380
2	2,440	3,040	4,180	3,300	4,550	5,140	5,910	11,400	5,570	3,760	2,000	1,290
3	2,050	3,060	4,180	3,860	4,570	5,010	5,360	11,700	5,410	2,320	2,030	1,260
4	1,540	3,210	4,160	4,580	4,830	4,990	5,840	11,800	4,980	1,630	2,300	1,210
5	2,270	3,110	3,050	4,370	4,760	4,490	5,810	12,200	3,810	2,410	2,360	1,380
6	2,380	3,220	2,620	4,190	3,740	4,160	5,490	9,020	3,970	2,620	2,390	1,560
7	2,340	2,400	4,210	4,350	4,370	4,860	5,660	9,290	4,470	3,070	1,730	1,240
8	2,360	2,750	4,420	4,370	4,180	5,060	5,380	5,490	4,440	3,080	1,780	1,340
9	2,290	4,000	4,490	3,420	4,260	4,810	5,170	7,340	4,800	2,940	1,990	1,470
10	1,940	3,900	4,490	3,320	4,710	4,920	4,730	10,300	5,120	2,120	1,960	1,380
11	1,600	4,120	4,380	4,060	4,990	4,850	5,610	10,600	4,700	1,980	1,990	1,230
12	2,690	3,900	3,440	3,950	4,540	4,430	5,760	8,800	3,510	2,630	1,870	1,570
13	2,570	3,970	3,360	4,480	3,610	4,190	5,360	8,920	3,530	2,520	1,360	1,520
14	2,500	2,950	4,680	4,270	4,480	4,850	5,990	8,750	4,710	2,440	908	1,440
15	2,400	2,290	4,490	4,180	4,510	4,800	5,890	6,890	4,860	2,240	742	1,450
16	2,320	3,900	3,450	3,240	4,730	4,830	4,930	6,350	5,090	2,440	1,040	1,540
17	1,860	4,000	4,000	3,630	4,220	5,080	4,420	6,900	5,010	1,640	771	1,500
18	2,010	4,070	3,730	4,060	4,350	5,270	5,440	7,140	4,800	1,720	1,050	1,170
19	2,780	3,740	3,040	4,240	4,340	5,030	5,840	7,160	3,180	2,020	1,160	1,450
20	2,840	3,980	2,650	4,980	3,640	4,940	5,840	5,970	3,600	2,040	2,060	1,570
21	2,880	2,780	4,240	5,490	4,500	5,120	5,900	5,260	4,740	2,360	1,420	1,430
22	2,890	2,550	4,560	5,200	4,840	5,360	6,340	4,310	4,680	2,330	942	1,370
23	2,720	4,090	4,510	4,170	4,720	5,520	6,780	4,930	4,670	2,000	1,350	1,280
24	1,870	4,340	3,970	4,650	4,770	5,630	7,550	5,650	4,740	1,490	1,200	1,340
25	1,820	4,100	3,040	4,740	4,800	5,700	8,620	5,500	4,480	1,900	1,220	1,170
26	2,630	4,240	3,410	4,410	4,200	5,340	11,300	5,550	3,280	2,120	1,580	1,330
27	2,700	4,400	4,200	4,760	3,750	4,930	13,700	5,660	3,060	2,330	1,400	1,580
28	2,740	3,090	3,990	4,750	4,520	5,200	14,200	5,520	4,100	2,360	1,200	1,560
29	2,810	2,620	4,120	4,570	.....	5,800	13,700	4,310	4,280	2,510	1,260	1,660
30	2,820	4,050	4,380	3,710	.....	5,980	13,300	4,130	4,160	2,610	1,280	1,570
31	2,130	.....	4,440	4,450	.....	5,540	.....	4,580	.....	1,900	1,280	.....

Monthly discharge of Fox River at Rapid Croche dam, near Wrightstown, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 6,150 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	2,890	1,540	2,380	0.387	0.45
November	4,400	2,110	3,470	.564	.63
December	4,680	2,620	3,940	.641	.74
January	5,490	3,240	4,260	.693	.80
February	4,990	3,610	4,440	.722	.75
March	5,980	4,160	5,050	.821	.95
April	14,200	4,420	7,060	1.15	1.28
May	12,300	4,130	7,540	1.23	1.42
June	5,570	3,060	4,440	.722	.81
July	4,080	1,490	2,370	.385	.44
August	2,390	742	1,530	.249	.29
September	1,660	1,170	1,410	.229	.26
The year	14,200	742	3,990	.649	8.82

NOTE.—Monthly discharge computed by U. S. Geol. Survey from daily-discharge record furnished by U. S. Engineer Corps.

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, 1921.

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, 6.5 feet April 29 and 30 (discharge, 3,760 second-feet); minimum discharge, estimated because of ice, 380 second-feet February 19.

1907–1909 and 1911–1921: Maximum discharge recorded, 3,910 second-feet September 2, 1912; 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. Rating curve well defined between 380 and 1,920 second-feet; extension above and below these limits subject to error. 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 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 good; winter records roughly approximate.

Discharge measurements of Wolf River at Keshena, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 5	S. R. Collins	a 4.76	660	Mar. 11	S. R. Collins	a 2.99	509
Feb. 11	do	a 3.24	449	July 21	A. O. Olson	1.55	563

a 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	590	806	672	715	515	480	1,660	2,990	853	552	479	672
2	590	806	630	715	480	515	1,530	2,190	760	552	515	630
3	590	760	672	670	480	515	1,460	2,120	806	552	479	590
4	552	760	760	670	480	515	1,460	1,990	806	590	479	590
5	590	760	760	660	480	515	1,530	1,530	806	552	479	590
6	571	715	715	590	480	515	1,400	1,530	715	552	479	552
7	552	715	672	590	445	515	1,460	1,460	901	630	479	552
8	515	715	672	590	445	515	1,660	1,400	1,000	630	479	590
9	515	715	630	515	445	515	1,590	1,400	950	630	479	590
10	590	715	672	515	480	515	1,530	1,280	950	630	552	590
11	672	672	590	550	450	510	1,400	1,460	950	630	715	552
12	630	630	590	515	445	515	1,340	1,340	1,000	630	672	590
13	590	590	552	515	445	515	1,280	1,110	950	630	715	590
14	590	550	715	550	445	515	1,280	1,340	901	590	672	552
15	715	550	901	630	445	515	1,280	1,220	853	672	672	552
16	806	550	853	590	445	515	1,220	1,160	806	630	672	552
17	760	552	806	550	445	515	1,220	1,000	901	590	672	479
18	672	590	760	590	445	515	1,160	1,160	715	590	590	479
19	630	630	760	515	380	515	1,000	1,000	672	630	444	479
20	672	672	760	630	410	550	1,000	950	630	590	715	479
21	715	715	715	670	410	590	1,050	950	630	590	672	479
22	715	760	715	670	445	715	1,280	1,050	515	552	630	479
23	715	901	715	630	445	900	1,530	1,000	552	515	590	479
24	715	760	715	630	445	1,110	1,530	901	552	515	515	479
25	715	630	715	590	445	1,400	1,590	760	590	552	479	479
26	590	444	715	550	445	1,850	1,660	909	552	552	479	479
27	715	552	715	515	445	2,190	2,840	950	590	590	672	760
28	630	552	715	515	445	2,260	3,680	1,000	630	552	672	760
29	672	552	715	515	.....	2,060	3,760	1,000	552	552	715	715
30	672	630	715	445	.....	1,660	3,760	1,000	552	552	715	672
31	672	.....	715	515	.....	1,850	.....	950	.....	515	715	.....

NOTE.—Stage-discharge relation affected by ice Nov. 12–16, 18, 19, and Dec. 18 to Mar. 25. Gage not read Oct. 6; discharge interpolated.

Monthly discharge of Wolf River at Keshena, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 840 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	806	515	643	0.765	0.88
November	901	444	665	.792	.88
December	901	552	710	.845	.97
January	715	445	584	.695	.80
February	515	380	450	.536	.56
March	2,260	480	867	1.03	1.19
April	3,760	1,000	1,670	1.99	2.22
May	2,990	760	1,290	1.54	1.78
June	1,000	515	755	.899	1.00
July	672	515	584	.695	.80
August	715	444	590	.702	.81
September	760	479	568	.676	.75
The year	3,760	380	783	.932	12.64

WOLF RIVER AT NEW LONDON, WIS.

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

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

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1921. Unpublished gage heights March 1, 1899, to September 30, 1913, are in the files of the office of the United States Engineer Corps, Milwaukee, Wis.

GAGE.—Staff gage, graduated from 1.0 to 13.0 feet, fastened to right hand downstream pier of Pearl Street Bridge. Datum of the gage raised 0.641 foot on March 1, 1911, according to information furnished by United States Engineer Corps; zero of gage is at an elevation of 748.874 feet above mean sea level, New York City datum.

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

CHANNEL AND CONTROL.—Sand, 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 year, 8.8 feet May 3 (discharge, 6,560 second-feet); minimum stage, 0.8 foot August 8 and 9 (discharge, 780 second-feet.

1914–1921: Maximum discharge recorded, 10.3 feet March 28 and 29, 1920 (discharge, 10,800 second-feet); minimum discharge, about 700 second-feet, February 6–9, 1918. The United States Army 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 fluctation due to operation of power plants above station, has been observed at gage.

ACCURACY.—Stage-discharge relation not permanent. Rating curve only fairly 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 daily gage height corrected for ice effect by means of discharge measurements, observer's notes, and weather records. Open-water records fair; winter records roughly approximate.

Discharge measurements of Wolf River at New London, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	D. W. Roberts	2.42	1,360	Apr. 26	S. R. Collins	6.29	3,290
Jan. 6	S. R. Collins	[a] 3.85	1,310	July 22	A. O. Olson	1.80	1,080
Feb. 12	do	[a] 3.15	1,010				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Wolf River at New London, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	900	1,180	1,540	1,340	960	1,100	4,480	5,570	2,290	1,060	930	1,060
2	930	1,380	1,540	1,340	960	1,100	4,480	6,350	2,090	1,030	900	1,060
3	930	1,500	1,590	1,380	1,030	1,100	4,360	6,560	1,950	1,030	870	1,030
4	930	1,770	1,680	1,340	1,030	1,140	4,030	6,350	1,900	995	870	995
5	930	1,900	1,680	1,340	1,030	1,180	3,850	5,950	1,770	870	870	995
6	930	1,860	1,720	1,300	960	1,180	3,760	5,570	1,590	870	870	960
7	900	1,860	1,720	1,300	960	1,220	3,670	5,210	1,640	900	870	900
8	900	1,820	1,640	1,260	930	1,260	3,430	4,610	1,640	1,030	780	870
9	960	1,720	1,540	1,260	900	1,260	3,430	4,030	1,720	995	780	900
10	960	1,820	1,500	1,180	900	1,300	3,430	3,760	1,860	1,030	810	960
11	900	1,770	1,460	1,260	930	1,340	3,430	3,510	2,040	1,180	840	960
12	1,140	1,640	1,460	1,300	900	1,420	3,360	3,290	2,040	1,100	840	960
13	1,380	1,500	1,420	1,300	995	1,500	3,220	3,160	2,140	1,060	960	995
14	1,460	1,260	1,500	1,180	1,030	1,590	3,430	2,990	2,240	995	1,060	995
15	1,420	1,260	1,680	1,030	1,030	1,770	3,360	2,820	2,290	900	1,140	960
16	1,380	1,340	1,640	960	1,030	1,900	3,220	2,720	2,290	900	1,100	930
17	1,340	1,420	1,590	930	1,030	2,090	3,100	2,550	2,190	900	1,100	960
18	1,420	1,500	1,590	1,030	1,060	2,290	3,100	2,500	2,000	900	1,100	960
19	1,460	1,380	1,540	1,030	1,060	2,500	2,990	2,390	1,770	960	995	930
20	1,540	1,300	1,500	900	1,060	2,720	2,940	2,340	1,540	1,030	930	995
21	1,420	1,420	1,500	900	1,060	2,940	2,820	2,190	1,460	1,060	960	1,220
22	1,380	1,640	1,460	900	1,060	3,040	2,720	2,140	1,340	1,100	1,030	1,300
23	1,380	1,590	1,420	1,300	1,060	3,160	2,940	2,140	1,300	1,100	995	1,300
24	1,380	1,680	1,420	1,300	1,060	3,360	3,040	2,090	1,260	1,060	960	1,340
25	1,340	1,820	1,380	1,300	1,060	3,850	3,160	2,040	1,180	960	930	1,460
26	1,340	1,860	1,380	1,220	1,060	4,480	3,290	2,000	1,100	930	900	1,340
27	1,300	1,770	1,340	1,220	1,060	4,610	3,670	1,900	1,060	995	930	1,380
28	1,300	1,680	1,340	1,180	1,060	4,900	4,030	1,900	1,030	1,100	960	1,340
29	1,220	1,540	1,340	1,060	.....	4,900	4,240	2,190	1,100	1,030	930	1,300
30	1,140	1,540	1,300	1,060	.....	4,900	4,900	2,290	1,060	995	960	1,260
31	1,140	.....	1,340	960	.....	4,610	.....	2,340	.....	960	1,030	.....

NOTE.—Stage-discharge relation affected by ice Dec. 16 to Mar. 18.

Monthly discharge of Wolf River at New London, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 2,240 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	1,540	900	1,200	0.536	0.62
November	1,900	1,180	1,590	.710	.79
December	1,720	1,300	1,510	.674	.78
January	1,380	900	1,170	.522	.60
February	1,060	900	1,010	.451	.47
March	4,900	1,100	2,440	1.09	1.26
April	4,900	2,720	3,530	1.58	1.76
May	6,560	1,900	3,400	1.52	1.75
June	2,290	1,030	1,700	.759	.85
July	1,180	870	1,000	.446	.51
August	1,140	780	942	.421	.49
September	1,460	870	1,090	.487	.54
The year	6,560	780	1,720	.768	10.42

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, Shawano 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, 1921.

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

CHANNEL AND CONTROL.—Bed of channel at gage and downstream heavy gravel. Riffle about 100 feet downstream forms control. Right bank high and will never be overflowed. Left bank of medium height and will be overflowed at a stage of about 9 feet.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge to which gage is attached.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.20 feet at 5 p. m. March 21 (discharge, 3,150 second-feet); minimum discharge, 100 second-feet, January 10.

1919–1921: Maximum stage recorded, 8.20 feet at 5. p. m. March 21, 1921 (discharge, 3,150 second-feet); minimum stage, 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 create head for the development of power but they do not have enough storage to cause any but slight daily fluctuations in stage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 114 and 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 good; winter records fair.

Discharge measurements of Embarrass River near Embarrass, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 5	S. R. Collins	[a] 3.51	184	May 5	S. R. Collins	3.84	516
Feb. 11	do	[a] 3.45	159	July 22	A. O. Olson	3.06	185
Mar. 11	do	3.18	231				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Embarrass River near Embarrass, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	149	183	278	240	130	155	647	1,240	282	143	140	146
2	140	346	282	240	135	165	502	1,120	247	132	143	149
3	149	598	333	220	145	177	478	902	225	127	143	146
4	130	550	307	205	135	170	502	672	217	127	137	137
5	112	502	342	185	145	183	526	502	200	127	132	127
6	104	478	303	180	125	239	526	478	196	124	124	137
7	130	364	282	115	125	247	550	409	196	130	117	164
8	117	364	251	110	120	299	550	386	255	135	124	170
9	130	338	235	105	125	203	647	364	364	286	124	180
10	143	320	235	100	130	196	672	342	364	247	124	177
11	235	280	214	105	160	232	672	324	455	183	167	161
12	386	240	200	110	165	282	647	303	502	143	247	167
13	312	205	210	105	170	270	598	286	502	143	364	164
14	259	205	364	110	170	247	502	274	502	140	342	164
15	247	205	455	110	185	228	502	262	478	143	274	158
16	274	185	386	115	196	217	455	259	455	146	193	161
17	312	185	365	125	196	221	409	266	303	143	177	170
18	299	177	320	125	190	282	409	282	251	146	155	170
19	299	164	280	120	190	282	364	278	203	203	152	180
20	266	161	240	170	183	409	342	295	186	232	149	193
21	251	167	205	210	170	2,870	342	329	177	262	140	247
22	239	221	365	260	170	2,590	364	324	183	203	137	291
23	225	351	340	260	164	1,720	697	266	161	173	146	262
24	221	351	320	250	170	1,240	798	239	149	170	143	225
25	221	333	280	260	170	1,120	798	214	143	225	143	210
26	232	316	260	240	155	902	850	214	143	274	143	214
27	221	278	240	205	155	955	1,540	274	186	243	152	193
28	221	255	220	185	155	955	2,450	342	149	221	149	183
29	183	243	205	170	.....	1,010	2,380	346	161	183	149	186
30	167	255	220	135	.....	955	1,780	329	164	158	137	183
31	158	.....	240	145	.....	772	.....	286	.....	143	146	.....

NOTE.—Stage-discharge relation affected by ice Nov. 10–17, Dec. 17 to Feb. 15, and Feb. 25 to Mar. 2.

Monthly discharge of Embarrass River near Embarrass, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	386	104	211	0.534	0.62
November	598	161	294	.744	.83
December	455	200	283	.716	.83
January	260	100	168	.425	.49
February	196	120	158	.400	.42
March	2,870	155	638	1.62	1.87
April	2,450	342	750	1.90	2.12
May	1,240	214	400	1.01	1.16
June	502	143	267	.676	.75
July	286	124	176	.446	.51
August	364	117	165	.418	.48
September	291	127	180	.456	.51
The year	2,870	100	308	.780	10.59

LITTLE WOLF RIVER AT ROYALTON, WIS.

LOCATION.—In sec. 1, T. 22 N., R. 13 E., at highway bridge at Royalton, Waupaca 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, 1921.

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, about 500 feet upstream from gage or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year 4.04 feet at 6 p. m. April 28 (discharge, 2,110 second-feet); minimum stage recorded, 1.15 feet at 7 a. m. August 22 and 5.30 p. m. September 2 (discharge, 161 second-feet).

1914–1921: Maximum stage recorded, 7.5 feet at 7.15 p. m. June 7, 1914 (discharge, 5,350 second-feet); minimum discharge, about 130 second-feet, March 5 and 6, 1916, and January 23, 1917.

ICE.—Stage-discharge relation affected by ice.

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

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined between 170 and 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, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	D. W. Roberts	1.59	275	Apr. 26	S. R. Collins	2.57	827
Feb. 12	S. R. Collins	[a] 1.97	267	July 23	A. O. Olson	1.40	185
Mar. 12	do	2.25	650				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Little Wolf River at Royalton, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	235	297	620	445	270	590	590	1,570	461	238	221	170
2	240	392	590	440	270	650	620	1,300	407	216	216	166
3	221	472	530	440	270	620	650	865	356	197	211	170
4	214	466	530	435	270	530	530	710	356	204	216	174
5	204	466	501	430	270	590	560	590	356	204	211	174
6	204	501	530	420	270	830	590	530	366	204	216	188
7	214	501	501	420	270	770	650	472	461	188	204	181
8	230	501	530	415	270	740	650	407	590	192	192	192
9	221	466	342	395	265	770	650	472	650	211	192	188
10	240	466	361	375	265	710	710	590	590	192	188	174
11	250	428	342	355	265	650	650	501	530	188	192	192
12	328	376	444	335	265	620	710	444	472	192	188	211
13	466	361	590	320	265	650	650	328	461	197	192	181
14	376	376	650	310	265	650	620	366	530	211	192	238
15	412	342	650	300	265	620	620	407	472	211	181	221
16	412	342	620	295	265	650	650	417	444	216	192	204
17	402	342	710	290	265	710	590	392	407	216	197	197
18	412	297	740	285	265	680	530	444	376	221	192	211
19	428	314	770	280	265	710	444	530	342	238	192	192
20	402	342	770	375	265	900	392	461	328	216	192	188
21	412	501	770	275	265	935	530	417	276	211	174	276
22	328	620	710	275	265	970	770	407	276	216	166	269
23	314	560	590	275	260	900	770	356	276	211	188	230
24	297	530	500	275	260	865	620	342	269	216	181	243
25	297	444	470	275	260	830	740	310	243	221	174	243
26	297	392	465	275	260	900	830	243	269	230	188	238
27	260	444	460	275	318	830	1,770	310	269	238	197	243
28	235	560	460	275	366	830	2,070	830	250	243	188	221
29	221	560	455	275	.....	740	2,070	800	238	238	170	204
30	230	650	450	275	.....	650	1,870	710	243	238	174	204
31	221	.....	450	275	.....	650	.....	530	.....	243	174	.....

NOTE.—Stage-discharge relation affected by ice Dec. 19 to Feb. 26.

Monthly discharge of Little Wolf River at Royalton, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 485 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	466	204	298	0.614	0.71
November	650	297	444	.915	1.02
December	770	342	552	1.14	1.31
January	445	275	332	.685	.79
February	366	260	271	.559	.58
March	970	530	734	1.51	1.74
April	2,070	392	803	1.66	1.85
May	1,570	243	550	1.13	1.30
June	650	238	385	.794	.89
July	243	188	215	.443	.51
August	221	166	192	.396	.46
September	276	166	206	.425	.47
The year	2,070	166	416	.858	11.63

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.

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, 1921; June 28, 1916, to October 18, 1917, records were obtained at a station near Weyauwega, about 1 mile downstream from present site.

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

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

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.14 feet at 8.20 a. m. April 27 and 8.30 a. m. April 28 (discharge, 806 second-feet); minimum stage, 1.45 feet at 8.30 a. m. July 4, 9 a. m. July 5, and 8 a. m. July 7 (discharge, 120 second-feet).

1918–1921: Maximum stage recorded, 5.6 feet March 17, 1919 (discharge, 2,600 second-feet); minimum stage, 1.28 feet November 21, 1920, probably caused by regulation (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. The pondage at the various plants is small and mean monthly discharge is believed to represent nearly the natural flow.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined between 180 and 330 second-feet. Shifting-control method used March 21 to September 30. For the periods during which the stage-discharge relation was affected by ice discharge was determined by applying to rating curve the daily gage heights corrected for ice effect by means of discharge measurements, observer's notes, and climatic data. Open-water records fair; winter records poor.

Discharge measurements of Waupaca River near Waupaca, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 7	S. R. Collins	[a] 2.72	246	Apr. 26	S. R. Collins	2.34	440
Feb. 14	do	[a] 3.00	234	July 23	A. O. Olson	1.70	166
Mar. 14	do	2.12	338				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Waupaca River near Waupaca, Wis., for the year ending Sept 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.
1	193	234	180	265	205	483	278	376	263	168	168	168
2	193	294	263	265	180	248	220	342	263	155	155	168
3	193	326	248	265	170	234	310	376	234	131	155	168
4	193	294	248	265	195	310	278	359	220	120	180	168
5	220	278	220	265	205	234	278	294	220	120	168	168
6	206	286	248	250	205	428	248	278	206	120	155	168
7	206	294	248	245	205	410	234	263	234	120	155	193
8	206	263	248	235	205	446	278	263	294	168	143	180
9	206	278	220	220	235	294	310	263	294	168	155	168
10	220	278	278	180	250	278	310	248	234	120	155	180
11	206	294	248	180	235	294	326	248	248	155	168	180
12	206	278	206	130	205	294	310	248	220	168	168	168
13	220	235	206	170	220	294	310	310	234	168	155	168
14	206	235	206	170	235	310	310	278	234	168	168	168
15	206	235	205	160	265	294	294	248	206	168	155	168
16	263	235	205	155	295	326	263	263	193	143	143	180
17	234	235	205	155	325	294	234	263	193	143	143	180
18	248	220	205	170	310	294	263	294	180	168	168	155
19	248	206	205	195	310	310	220	310	180	168	168	180
20	220	206	205	265	295	263	234	278	193	168	168	180
21	206	282	205	310	295	376	278	263	193	168	168	220
22	234	359	205	340	295	376	310	234	180	168	155	248
23	206	359	180	295	295	342	359	278	180	168	155	220
24	220	310	170	280	295	310	310	310	180	143	168	206
25	220	278	155	265	295	310	310	263	180	168	168	234
26	248	278	155	205	325	310	393	248	180	168	168	248
27	206	180	155	170	360	310	784	234	180	155	168	206
28	206	180	155	170	585	310	784	263	168	155	168	193
29	180	180	155	155	.....	310	631	278	234	143	168	193
30	206	263	180	155	.....	263	464	278	180	143	168	193
31	220	.....	205	235	.....	310	.....	263	.....	155	168	.....

NOTE.—Stage-discharge relation affected by ice Nov. 13–17 and Dec. 15 to Feb. 28.

Monthly discharge of Waupaca River near Waupaca, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 305 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	263	180	214	0.702	0.81
November	359	180	262	.859	.96
December	278	155	207	.679	.78
January	340	130	219	.718	.83
February	585	170	268	.879	.92
March	483	234	318	1.04	1.20
April	784	220	338	1.11	1.24
May	376	234	281	.921	1.06
June	294	168	213	.698	.78
July	168	120	153	.502	.58
August	180	143	162	.531	.61
September	248	155	187	.613	.68
The year	784	120	235	.770	10.45

SHEBOYGAN RIVER NEAR SHEBOYGAN, WIS.

LOCATION.—In sec. 28, T. 15 N., R. 23 E., 2 miles west of Sheboygan, Sheboygan County, and 2½ 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, 1921.

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

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, clear and free from aquatic grass. Banks are of medium height and are seldom overflowed.

EXTREMES OF STAGE.—Maximum stage recorded during year, 8.05 feet at 4 p. m. April 26 and 8 a. m. April 27 (discharge, 5,060 second-feet); minimum stage, 1.82 feet at 6 p. m. July 24 (discharge, 17 second-feet).

1916–1921: Maximum stage recorded, 9.40 feet at 7 a. m. March 26, 1920 (discharge, 7,140 second-feet); minimum stage, 1.68 feet at 8.30 a. m. August 3 (discharge, about 7 second-feet).

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; extended above that point. Gage read to hundredths twice daily; slight diurnal fluctuation may somewhat impair the accuracy of the daily mean gage height. 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 based on results of discharge measurements, observer's notes, and climatological records. Open-water records fair; those for periods of ice effect roughly approximate.

Discharge measurements of Sheboygan River near Sheboygan, Wis., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 25	S. B. Soulé	2.40	128	Apr. 25	S. R. Collins	4.56	1,250
Apr. 24	S. R. Collins	5.12	1,590	28	S. B. Soulé	5.76	2,240
24	do	4.87	1,380	28	do	5.70	2,240

Daily discharge, in second-feet, of Sheboygan River near Sheboygan, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	35	84	281	100	125	120	98	1,110	101	37	30	44
2	34	158	306	100	125	125	98	930	101	52	40	37
3	48	172	235	100	125	125	256	760	91	52	26	30
4	38	129	216	95	125	125	272	650	70	52	40	46
5	54	96	227	80	125	125	227	600	60	48	35	37
6	38	84	186	125	120	125	158	575	66	34	35	48
7	56	106	139	160	120	125	96	346	54	29	28	35
8	28	129	176	135	120	130	142	115	58	56	37	35
9	51	172	162	120	120	140	252	106	46	52	26	79
10	74	148	148	105	120	150	500	129	56	62	38	62
11	68	136	142	95	115	170	338	109	72	49	43	56
12	72	120	58	80	115	210	272	126	91	28	81	51
13	70	105	126	70	115	280	201	132	76	26	60	32
14	70	85	342	65	98	428	172	129	66	38	74	33
15	79	85	382	60	120	788	179	118	76	40	48	81
16	79	85	120	55	158	815	193	104	60	41	43	81
17	66	88	126	55	193	650	120	104	66	46	29	52
18	81	98	120	55	185	575	306	109	48	30	58	56
19	52	115	110	55	180	575	1,180	132	58	32	38	49
20	48	101	110	110	170	625	650	76	64	24	41	66
21	54	136	110	195	160	760	650	96	38	25	38	120
22	51	186	105	230	150	550	1,460	74	58	25	30	88
23	37	235	95	270	132	428	3,300	86	40	35	38	62
24	41	193	90	210	109	500	1,540	126	60	24	29	62
25	51	158	85	160	84	870	2,240	132	35	23	33	93
26	74	145	80	160	79	760	4,980	118	38	38	32	72
27	74	126	75	150	74	525	4,040	123	49	72	43	76
28	56	294	75	145	126	450	2,140	120	88	70	26	79
29	74	289	70	140	.....	360	1,540	126	239	44	33	60
30	74	328	65	130	.....	405	1,180	106	88	30	25	72
31	68	....	75	125	.....	328	.....	101	.....	38	33	.....

NOTE.—Stage-discharge relation affected by ice Nov. 12–16, Dec. 19 to Feb. 12, Feb. 18–22, and Mar. 2–13.

Monthly discharge of Sheboygan River near Sheboygan, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 403 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	81	28	57.9	0.144	0.17
November	328	84	146	.362	.40
December	382	58	150	.372	.43
January	270	55	120	.298	.34
February	193	74	128	.318	.33
March	870	120	398	.988	1.14
April	4,980	96	959	2.38	2.66
May	1,110	74	247	.613	.71
June	239	35	70.4	.175	.20
July	72	23	40.2	.0998	.12
August	81	25	39.0	.0968	.11
September	120	30	59.8	.148	.17
The year	4,980	23	201	.499	6.78

MILWAUKEE RIVER NEAR MILWAUKEE, WIS.

LOCATION.—In NW. ¼ sec. 5, T. 7 N., R. 22 E., immediately above old quarry near north limits of Milwaukee, Milwaukee County, half a mile below concrete highway bridge, 1 mile above Mineral Spring Road, and 5½ 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, 1921.

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 gage section; at medium and high stages from a concrete highway bridge about 1 mile upstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.7 feet at 5 p. m. April 23 and 5 p. m. April 27 (discharge, 4,310 second-feet); minimum stage, 0.32 foot July 24, 25, 26, 30, 31, August 7, and 14 (discharge, about 29 second feet).

1914–1921: 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 permanent; not affected by ice during year. Rating curve fairly well defined throughout range of stage which occurred during the year. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. At low and medium stage records are good; at high stages, fair.

Discharge measurements of Milwaukee River near Milwaukee, Wis., during the year ending Sept. 30, 1921.

[Made by S. B. Soulé.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 26	[a] 0.91	176
Apr. 27	4.58	4,120

[a] Only small amount of ice; stage-discharge relation not affected.

Daily discharge, in second-feet, of Milwaukee River near Milwaukee, Wis., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	87	208	239	490	323	167	338	1,100	183	175	39	145
2	82	208	275	655	348	230	298	810	217	152	80	130
3	75	234	266	655	323	376	284	770	196	141	80	156
4	75	364	298	655	188	298	284	655	167	130	69	137
5	99	266	323	730	221	298	270	585	152	63	50	252
6	87	252	348	655	208	230	200	520	141	67	42	217
7	87	208	323	585	188	348	192	520	130	55	32	130
8	87	239	284	552	148	355	261	333	121	59	35	111
9	69	293	248	552	208	615	284	308	130	92	42	105
10	65	298	239	552	188	692	386	280	137	92	50	217
11	33	252	239	432	167	585	490	270	118	55	69	270
12	33	208	230	520	167	520	460	270	137	92	63	196
13	75	167	188	323	167	490	386	270	134	80	39	167
14	114	239	323	323	167	950	318	266	121	49	29	137
15	99	196	520	275	167	950	370	261	121	69	39	130
16	99	208	552	275	323	950	403	261	121	85	45	130
17	108	179	520	348	323	1,000	308	261	121	71	55	443
18	99	167	403	298	323	950	308	196	111	63	45	359
19	118	148	230	364	323	770	1,540	226	105	75	130	183
20	75	127	520	432	275	1,000	1,780	243	99	55	121	298
21	99	141	376	432	323	900	1,900	239	85	35	121	1,000
22	108	156	376	810	252	770	2,020	217	63	42	121	386
23	108	230	348	900	230	615	4,150	208	75	35	111	284
24	99	376	403	950	230	730	2,820	145	69	29	102	386
25	82	343	585	855	230	692	1,900	313	85	29	92	460
26	87	275	585	855	188	730	4,150	261	82	42	85	239
27	121	275	520	655	188	692	4,150	196	63	69	156	221
28	130	275	585	490	130	655	3,540	192	99	35	108	167
29	179	275	490	323	.....	490	2,410	221	243	35	105	145
30	167	188	490	298	.....	520	1,840	239	179	29	121	167
31	156	.....	420	323	.....	585	.....	217	.....	29	284	.....

Monthly discharge of Milwaukee River near Milwaukee, Wis., for the year ending Sept. 30, 1921.

[Drainage area, 661 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	179	33	96.8	0.146	0.17
November	376	127	233	.352	.39
December	585	188	379	.573	.66
January	950	275	534	.808	.93
February	348	130	233	.352	.37
March	1,000	167	634	.959	1.11
April	4,150	192	1,270	1.92	2.14
May	1,100	145	350	.530	.61
June	243	63	127	.192	.21
July	175	29	68.7	.104	.12
August	284	29	82.6	.125	.14
September	1,000	105	246	.372	.42
The year	4,150	29	354	.536	7.27

LITTLE CALUMET RIVER AT HARVEY, ILL.

LOCATION.—In NW. ¼ 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, 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, 1921; also daily gage heights, collected by Sanitary District of Chicago, June 10, 1907, to September 30, 1916.

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

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed of river composed of clay and gravel. Low-water control is at "The Rocks," about a mile below gage; bed of river, heavy gravel; somewhat shifting. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.48 feet at 8 a. m. April 23 (discharge, 905 second-feet); minimum discharge, 40 second-feet July 21 and August 1.

1910–1920: Maximum stage recorded, 13.4 feet March 6, 1908 (discharge not determined); minimum stage, 2.9 feet August 10, 1916 (discharge, 39 second-feet).

ACCURACY.—Stage-discharge relation changed materially by construction of cofferdam for highway bridge about 2,000 feet below gage which caused backwater at gage from about July 1 to September 30; seriously affected by ice for short periods during the winter. Rating curve well defined above and fairly well defined below 60 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table October 1 to June 30; correction for backwater July 1 to September 30 estimated from results of discharge measurements. Records good for open-water periods October 1 to June 30; fair, July 1 to September 30; poor for periods of ice effect.

Discharge measurements of Little Calumet River at Harvey, Ill., during the year ending Sept. 30, 1921.

[Made by H. E. Grosbach.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 27	3.35	123
September 13	[a] 3.37	92

[a] Backwater from cofferdam at highway bridge.

Daily discharge, in second-feet, of Little Calumet River at Harvey, Ill., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr	May.	June.	July.	Aug.	Sept.
1	93	123	111		218	218	680	635	109	89	40	76
2	93	125	107	275	192	205	635	635	125	82	63	69
3	96	119	111		205	205	590	590	146	71	79	79
4	102	123	119	290	205	192	590	590	125	65	66	73
5	107	125	168	290	275	192	548	590	115	56	65	79
6	104	125	168	322	322	192	508	548	111	56	63	79
7	96	123	168	340	290	246	508	508	100	54	60	79
8	89	119	180	376	306	290	508	508	93	57	51	76
9	82	119	192	376	322	860	468	468	89	58	54	73
10	79	119	192	431	357	590	431	431	86	61	48	79
11	76	123	205	468	357	508	412	412	89	54	54	88
12	76	115	192	468	357	508	394	394	93	54	60	88
13	74	113	192	376	357	590	357	376	86	52	54	86
14	73	107	218	357	376	590	357	340	84	51	63	102
15	73	104	192	322	394	680	357	306	82	63	76	113
16	69	93	157		394	635	508	290	81	54	69	115
17	74	104	146		376	590	770	275	79	51	76	125
18	74	106			275	590	725	260	76	45	76	106
19	86	111		230	322	590	590	246	76	60	77	96
20	82	113			431	508	508	218	73	48	168	96
21	82	113	175		412	548	548	192	73	40	150	89
22	82	107		246	322	548	508	168	73	62	106	73
23	82	113		306	306	590	905	146	79	62	106	73
24	79	115		260	232	590	725	135	73	56	106	77
25	82	115		290	275	770	635	127	73	52	106	76
26	86	113		357	246	815	680	146	82	52	100	73
27	88	115	200	260	246	770	725	135	115	50	96	63
28	89	115		246	218	770	635	125	157	41	88	60
29	93	113		218	.....	725	590	125	157	52	82	57
30	107	113		232	.....	680	635	117	121	52	76	106
31	115	.....		246	.....	680	.....	111	.....	50	79	.....

NOTE.—Discharge estimated Dec. 18 to Jan. 3 and Jan. 16–21 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, 1921.

[Drainage area, 570 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	115	69	86.5	0.152	0.18
November	125	93	115	.202	.23
December	.....	107	176	.309	.36
January	468	.....	299	.525	.61
February	431	192	307	.539	.58
March	860	192	531	.932	1.07
April	905	357	568	.996	1.11
May	635	111	327	.573	.66
June	157	73	97.4	.171	.19
July	89	40	56.5	.099	.11
August	168	40	79.3	.139	.16
September	125	57	84.1	.148	.17
The year	905	40	227	.398	5.43

STREAMS TRIBUTARY TO LAKE HURON.

TITTABAWASSEE RIVER AT FREELAND, MICH.

LOCATION.—At highway bridge at Freeland.

DRAINAGE AREA.—2,530 square miles.

RECORDS AVAILABLE.—August 22, 1903, to August 3, 1906; October 28, 1906, to December 31, 1909; January 1, 1912, to September 30, 1921.

COOPERATION.—Estimates of daily discharge were made and 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, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	960	900	1,300	2,700	866	770	4,750	3,520	786	786	620	1,480
2	930	930	1,300	3,055	804	648	4,050	3,285	786	730	566	1,270
3	930	960	1,377	3,760	787	838	3,285	3,100	815	675	489	1,050
4	900	930	1,450	4,050	821	1,112	2,610	3,055	845	646	646	930
5	900	815	1,480	4,550	858	1,522	2,105	3,015	815	566	465	870
6	930	786	1,785	4,550	804	1,760	1,905	2,920	760	489	465	815
7	870	730	1,785	4,250	750	2,920	1,825	2,835	700	513	465	815
8	845	700	1,745	3,760	735	2,890	2,400	2,655	646	513	472	845
9	760	700	1,670	3,285	681	4,330	3,520	2,520	592	540	489	870
10	730	730	1,600	2,835	663	7,500	3,520	2,400	566	540	513	870
11	730	730	1,450	2,400	612	6,930	3,285	2,190	540	566	513	930
12	760	760	1,235	1,058	577	5,805	2,835	1,985	540	566	540	990
13	760	786	1,235	1,058	648	6,360	2,400	1,825	566	592	566	930
14	786	786	1,410	1,058	770	6,480	2,230	1,785	566	620	566	870
15	786	845	1,785	1,040	804	5,275	1,985	1,785	592	620	592	870
16	815	960	2,065	1,040	821	4,250	1,905	1,670	566	620	646	845
17	845	960	2,105	983	858	6,360	2,400	1,600	566	592	786	815
18	845	990	2,105	928	838	7,160	3,760	1,450	566	579	845	845
19	815	1,020	2,400	1,020	787	6,360	4,750	1,235	540	566	930	870
20	815	1,020	2,270	1,244	787	5,805	6,035	1,140	540	540	930	990
21	786	1,050	2,400	1,522	770	5,275	4,750	930	540	513	1,080	1,050
22	786	1,110	3,100	3,285	750	4,700	4,750	930	513	489	1,170	1,050
23	760	1,200	3,810	4,250	770	4,250	9,320	900	513	465	1,235	990
24	760	1,235	4,150	3,860	787	4,750	16,695	930	489	465	1,235	960
25	730	1,235	3,860	2,150	821	5,180	15,260	1,600	540	472	1,170	930
26	730	1,235	3,810	1,760	838	8,890	10,200	1,600	646	513	1,140	930
27	760	1,270	3,285	1,432	804	11,350	8,455	1,235	845	540	1,080	900
28	760	1,270	2,835	1,365	787	9,660	6,930	930	930	566	1,050	845
29	786	1,300	2,400	1,300	.....	8,700	5,805	930	900	592	1,110	815
30	815	1,300	2,655	1,112	.....	6,930	4,750	870	815	620	1,235	815
31	870	.....	2,655	928	.....	5,275	.....	815	.....	646	1,410	.....

Monthly discharge of Tittabawassee River at Freeland, Mich., for the year ending Sept. 30, 1921.

[Drainage area, 2,530 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	960	730	815	0.322	0.37
November	1,300	700	975	.385	.43
December	4,150	1,235	2,210	.874	1.01
January	4,550	928	2,310	.913	1.05
February	866	577	771	.305	.32
March	11,350	648	5,160	2.04	2.35
April	16,695	1,825	4,950	1.96	2.19
May	3,520	815	1,860	.735	.85
June	930	489	654	.258	.29
July	786	465	572	.226	.26
August	1,410	465	807	.319	.37
September	1,480	815	935	.370	.41
The year	16,695	465	1,840	.727	9.90

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

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, 4 miles above station at Geddes.

DRAINAGE AREA.—723 square miles.

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1921.

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 ¼-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 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, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	124	184	358	459	231	225	789	750	205	393	130	571
2	130	222	441	612	220	323	801	689	201	356	138	518
3	68	238	383	583	237	452	734	608	203	269	133	530
4	224	223	434	574	227	444	750	569	202	327	128	495
5	115	211	592	569	229	389	616	521	150	223	127	487
6	100	250	570	515	220	510	598	507	158	225	134	504
7	107	151	545	524	229	618	513	497	154	196	66	351
8	102	190	526	504	245	641	598	379	175	190	139	325
9	108	224	465	476	233	825	613	449	163	186	134	295
10	44	200	467	442	236	842	627	383	182	178	126	312
11	120	183	462	460	243	825	678	332	158	186	122	272
12	114	177	389	370	246	843	622	347	117	178	107	308
13	112	174	445	381	208	923	609	322	163	177	130	295
14	126	162	520	335	262	992	623	338	157	182	86	282
15	107	157	518	355	232	973	687	307	155	153	133	244
16	114	163	526	277	248	954	733	275	148	175	118	235
17	71	176	494	227	260	894	841	271	144	120	128	205
18	110	163	479	242	242	822	820	283	140	172	135	202
19	116	171	466	242	277	827	882	260	261	193	159	210
20	109	195	417	298	237	827	884	252	263	126	152	259
21	115	182	394	356	238	781	852	244	246	150	116	496
22	112	319	365	339	223	778	864	240	274	160	151	462
23	144	440	558	331	228	722	967	205	287	174	142	409
24	68	425	517	330	227	799	1,009	206	235	83	122	365
25	125	450	476	249	220	893	963	169	192	157	124	456
26	141	431	392	273	241	984	868	182	164	187	128	453
27	188	379	470	237	291	1,040	867	230	297	143	140	407
28	212	369	362	271	258	1,139	867	232	456	145	135	355
29	208	345	352	255	.....	1,001	840	312	673	147	269	389
30	197	319	472	254	.....	953	814	262	478	152	457	367
31	193	.....	458	258	.....	921	.....	257	.....	68	617	.....

Monthly discharge of Huron River at Barton, Mich., for the year ending Sept. 30, 1921.

[Drainage area, 723 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	224	44	127	0.176	0.20
November	450	151	249	.344	.38
December	592	352	462	.639	.74
January	612	227	374	.517	.60
February	291	208	239	.331	.34
March	1,139	225	779	1.08	1.24
April	1,009	513	764	1.06	1.18
May	750	169	351	.485	.56
June	673	117	227	.314	.35
July	393	68	186	.257	.30
August	617	66	159	.220	.25
September	571	202	369	.510	.57
The year	1,139	44	358	.495	6.71

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

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 September 30, 1921.

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 year, 5.2 feet March 29; minimum stage, 1.1 feet October 4, 5, 12, August 2, and 3.

ICE.—Ice jams form below the 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 year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.50	1.40	1.70	2.40	1.60	1.60	4.50	.....	1.50	3.00	1.20	4.00
2	1.50	1.40	1.70	.....	1.60	1.60	4.00	3.60	1.40	2.60	1.10	3.10
3	.....	1.40	2.00	4.00	1.60	2.30	.....	3.50	1.40	.....	1.10	2.80
4	1.10	1.40	2.00	3.30	1.60	2.40	3.60	3.30	1.30	.....	1.20	.....
5	1.10	1.40	.....	3.10	1.50	2.50	3.30	3.00	.....	1.50	1.30	2.60
6	1.20	1.40	3.00	3.00	.....	.....	3.00	3.00	1.50	1.60	1.30	2.60
7	1.30	.....	2.90	3.00	1.50	2.70	3.00	2.60	1.40	1.60	.....	2.50
8	1.40	1.40	2.70	3.00	1.60	3.20	2.90	.....	1.40	1.60	1.10	2.20
9	1.40	1.50	2.60	.....	1.40	3.50	3.20	2.40	1.40	1.40	1.10	1.80
10	.....	1.40	2.60	2.60	1.50	4.00	.....	2.00	1.40	.....	1.30	2.60
11	1.20	1.40	2.40	2.70	1.60	4.20	3.50	2.00	1.30	1.30	1.30	.....
12	1.10	1.40	.....	2.40	1.60	4.00	3.50	2.00	.....	1.30	1.40	2.20
13	1.30	1.40	1.60	1.70	.....	.....	3.10	2.00	1.30	1.30	1.40	2.00
14	1.30	.....	2.00	1.80	1.50	4.80	3.10	2.00	1.30	1.40	.....	1.90
15	1.30	1.30	2.50	1.80	1.40	4.50	3.10	.....	1.30	1.40	.....	1.70
16	1.20	1.30	2.30	.....	1.40	4.50	3.50	1.60	1.40	1.40	.....	1.70
17	.....	1.40	2.40	1.70	1.50	4.40	.....	1.90	1.30	.....	.....	1.70
18	1.20	1.40	2.40	1.60	1.50	4.40	4.50	1.50	1.30	1.40	.....	.....
19	1.30	1.40	.....	1.60	1.60	4.20	4.50	1.30	.....	1.40	.....	1.40
20	1.20	1.30	2.10	1.70	.....	.....	4.70	1.30	1.40	1.40	.....	1.40
21	1.30	.....	2.30	1.70	1.80	3.90	4.50	1.30	1.30	1.50	.....	1.70
22	1.30	1.30	2.20	1.70	1.70	3.60	4.40	.....	1.30	1.40	1.20	1.90
23	1.30	1.50	2.50	.....	1.50	3.60	4.80	1.30	1.30	1.40	1.20	2.00
24	.....	2.20	2.40	1.60	1.50	3.80	.....	1.30	1.40	.....	1.20	2.00
25	1.80	2.40	2.40	1.60	1.50	3.90	5.00	1.40	1.40	1.30	1.20	.....
26	1.20	2.40	.....	1.70	1.50	4.80	4.80	1.60	.....	1.30	1.30	2.50
27	1.40	2.40	2.30	1.70	.....	.....	4.80	1.40	1.30	1.30	1.30	2.40
28	1.50	.....	2.30	1.60	1.70	5.00	4.50	1.60	1.40	1.30	.....	2.00
29	1.40	1.80	2.20	1.60	.....	5.20	4.50	.....	3.50	1.30	1.30	1.80
30	1.50	1.80	2.10	.....	.....	4.50	4.30	.....	4.00	1.30	1.40	1.80
31	.....	.....	2.10	1.60	.....	4.50	.....	1.50	.....	.....	1.50	.....

NOTE.—Gage not read on days for which no reading appears in table. Stage-discharge relation probably affected by ice during parts of December, January, and February

CATTARAUGUS CREEK AT VERSAILLES, N. Y.

LOCATION.—At three-span highway bridge in Versailles, Cattaraugus County, 2¼ 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, 1921.

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, 8.5 feet at 5. p. m. February 16 (discharge, 9,260 second-feet); minimum discharge 70 second-feet on September 1, 2, 3, and 4.

1910–1921: Maximum open-water stage recorded, 11.6 feet at 5.40 p. m. March 25, 1913 (discharge, about 30,000 second-feet); minimum stage recorded, 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 fair.

Discharge measurements of Cattaraugus Creek at Versailles, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	Otto Lauterhahn	4.81	112	Feb. 8	Otto Lauterhahn	[a] 5.40	561
25	do	4.81	109	Mar. 17	do	5.62	827
Dec. 17	do	5.50	732	17	do	5.61	805
17	do	5.50	709	June 6	Lauterhahn and Howe.	5.07	167
Jan. 22	do	[a] 6.82	3,570	6	do	5.06	164
31	do	[a] 6.05	496	Sept. 13	Shupe and Covert	4.98	94.9
Feb. 8	do	[a] 5.40	561				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Cattaraugus Creek at Versailles, N. Y., for the year ending Sept 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	800	140	550	800	380	550	1,400	850	220	260	100	70
2	750	170	1,900	4,800	500	800	950	750	220	200	160	75
3	440	300	1,200	1,600	440	2,200	750	650	200	170	180	75
4	260	340	800	1,200	440	950	650	550	180	160	150	80
5	220	240	750	1,200	420	800	550	480	180	140	150	80
6	190	220	1,400	1,100	800	3,000	500	440	160	140	110	100
7	150	180	1,000	850	600	4,200	500	400	160	140	160	90
8	180	190	750	1,200	550	4,600	480	380	160	140	140	80
9	180	160	550	1,100	650	3,200	1,400	360	160	140	120	80
10	170	200	500	700	750	1,900	900	340	160	160	100	80
11	170	220	500	700	550	1,200	650	320	160	240	100	95
12	170	220	480	650	500	1,000	550	280	240	160	220	95
13	170	220	600	600	480	1,200	500	320	200	150	150	90
14	140	180	3,600	600	480	1,000	460	320	170	140	180	75
15	140	200	1,400	600	500	850	550	280	160	140	180	75
16	140	180	850	500	3,800	1,000	500	280	150	180	140	80
17	100	200	750	440	3,800	800	1,600	280	170	130	120	100
18	140	600	650	240	1,200	1,000	1,200	280	180	120	380	160
19	140	380	600	440	850	800	950	260	150	260	220	120
20	140	600	600	380	750	750	650	240	140	500	140	85
21	120	1,400	600	700	550	800	850	240	140	260	130	110
22	110	4,000	650	3,200	550	750	1,200	240	140	200	120	180
23	100	2,400	2,800	2,200	550	650	1,000	650	130	170	95	140
24	120	1,800	1,900	950	550	550	950	360	130	150	85	100
25	100	1,400	850	700	500	650	650	700	130	130	100	120
26	120	1,000	850	700	700	650	550	550	130	130	85	160
27	140	800	850	550	600	600	500	340	160	130	95	140
28	170	700	800	480	650	2,400	460	300	460	110	85	130
29	200	700	650	380	.....	1,500	2,400	320	320	120	85	100
30	180	600	700	320	.....	1,100	1,200	260	460	140	85	110
31	170	.....	650	320	.....	1,000	.....	240	.....	120	75	.....

NOTE.—Discharge, Jan. 8 to Feb. 15, determined from gage heights corrected for ice effect from four discharge measurements, comparison with record of Allegheny River at Red House, and study of gage-height graph and weather records.

Monthly discharge of Cattaraugus Creek at Versailles, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 467 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	800	100	204	0.437	0.50
November	4,000	140	665	1.42	1.58
December	3,600	480	991	2.12	2.44
January	4,800	240	974	2.09	2.41
February	3,800	380	825	1.77	1.84
March	4,600	550	1,370	2.93	3.38
April	2,400	460	848	1.82	2.03
May	850	240	395	.846	.98
June	460	130	191	.409	.46
July	500	110	172	.368	.42
August	380	75	137	.293	.34
September	180	70	102	.218	.24
The year	4,800	70	572	1.22	16.62

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, 1921.

GAGE.—Vertical staff on upstream side of right abutment; lower 2 feet of enameled iron, graduated to hundredths of a foot; upper 7 feet of bronze graduated to half-tenths; read by C. L. Schenck.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—The weir formerly in use was entirely destroyed by ice February 20, 1918. It was replaced September 18, 1920, and forms the control for the gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.88 feet at 6 p. m. February 16 (discharge, about 1,230 second-feet); minimum discharge, 0.4 second-foot, September 20, 23, 24, and 27.

1912–1921: Maximum stage recorded, 9.0 feet at 6 p. m. May 10, 1919 (discharge, 2,500 second-feet); minimum discharge recorded, 0.4 second-foot September 20, 23, 24, and 27, 1921.

ICE.—Ice forms above weir, but control is cleared of ice by observer before reading gage.

ACCURACY.—Stage-discharge relation permanent. 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 except those for period when gage was not read, which are fair.

Discharge measurements of Little Tonawanda Creek at Linden, N. Y., during the year ending Sept. 30, 1921.

Gage.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	Lauterhahn and Covert.	0.79	5.68	Dec. 16	Otto Lauterhahn	1.25	26.4
12	....do	.79	5.08	Mar. 8	....do	3.84	267
26	Otto Lauterhahn	.60	2.70	8	....do	3.74	260
26	....do	.60	2.80	8	....do	3.55	235
Dec. 16	....do	1.25	25.8				

Daily discharge, in second-feet, of Little Tonawanda Creek at Linden, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	June.	July.	Aug.	Sept.
1	50	5.5	66	30	12	24	5.2	1.8	0.8	0.7
2	38	12	211	223	12	223	4.7	1.7	.7	.7
3	16	12	90	70	11	104	4.5	1.5	.8	.7
4	8.8	8.0	99	58	10	46	4.2	1.4	.7	.6
5	5.5	6.5	86	43	14	37	3.8	1.4	.6	.6
6	6.0	6.0	58	37	22	261	3.5	1.3	.7	.5
7	5.5	5.5	37	32	18	199	3.3	1.2	.7	.5
8	5.2	5.2	30	58	17	360	3.1	1.2	.7	.5
9	4.7	5.5	23	30	20	154	2.9	1.2	.7	.5
10	4.5	5.8	21	19	24	90	2.7	1.2	.5	.5
11	4.0	5.5	20	19	24	58	2.6	1.2	.5	.6
12	5.3	5.2	20	15	17	43	2.4	1.2	1.5	.5
13	4.8	5.3	30	14	17	50	2.4	1.2	.9	.5
14	4.5	5.2	74	18	18	40	2.2	1.2	1.5	.5
15	3.8	4.8	40	14	16	37	2.0	2.4	.9	.5
16	3.6	4.5	27	12	468	78	2.0	1.2	.7	.5
17	3.5	5.3	27	11	154	39	2.4	1.1	.8	.6
18	3.2	5.2	23	24	66	50	2.3	1.0	1.5	.5
19	3.1	7.2	22	12	58	36	1.9	1.6	1.0	.5
20	3.3	19	20	19	30	86	1.8	1.9	.9	.4
21	3.1	25	16	82	22	43	1.7	1.2	.9	.5
22	2.9	37	22	99	24	32	1.7	1.1	.8	.6
23	2.9	104	104	82	19	29	1.5	1.0	.7	.4
24	2.8	74	40	32	12	26	1.5	1.0	.7	.4
25	2.8	50	24	24	14	30	1.5	.9	.7	.5
26	3.0	40	24	28	14	25	1.4	.8	.7	.5
27	3.6	37	28	16	18	23	1.3	.8	.6	.4
28	4.2	35	23	12	20	74	1.7	.8	.6	.5
29	4.5	37	25	13	.....	43	6.0	.8	.5	.5
30	4.5	35	26	22	.....	40	2.1	.9	.5	.5
31	4.2	.....	22	14	.....	37	.....	.9	1.0	.....

NOTE.—No gage-height record Apr. 1 to May 31; discharge, Apr. 1-30, estimated at 35 second-feet and May 1-31, at 10 second-feet from comparison with records of flow of Keshequa and Canaseraga creeks.

Monthly discharge of Little Tonawanda Creek at Linden, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 22 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	50	2.8	7.15	0.325	0.37
November	104	4.5	20.4	.927	1.03
December	211	16	44.5	2.02	2.33
January	223	11	38.1	1.73	1.99
February	468	10	41.8	1.90	1.98
March	360	23	78.0	3.55	4.09
April	.....	.....	35.0	1.59	1.77
May	.....	.....	10.0	.455	.52
June	6.0	1.3	2.68	.122	.14
July	2.4	.8	1.23	.056	.06
August	1.5	.5	.800	.036	.04
September	.7	.4	.523	.024	.03
The year	468	.4	23.3	1.06	14.35

BARGE CANAL AT LOCK 30, MACEDON, N. Y.

LOCATION.—At Lock 30, Barge Canal, in the village of Macedon, Wayne County.

RECORDS AVAILABLE.—November 1, 1919, to December 28, 1920, when the station was discontinued.

GAGE.—Vertical staff attached to right wall about 50 feet above dam in diversion channel. Gage read by H. G. O'Dea, lock tender.

DISCHARGE MEASUREMENTS.—Made by wading about 35 feet below gage.

CONTROL.—Control is crest of spillway dam.

DETERMINATION OF DISCHARGE.—Daily discharge over spillway determined by applying mean daily gage height to rating table. Daily discharge through lock obtained from record of lockages and computation of discharge per lockage. The following tables of discharge include the flow over the spillway and through the lock.

ACCURACY.—Stage-discharge relation probably permanent, except for possible backwater effect from weeds in summer. Rating curve fairly well defined. Gage-height record, approximate only. Records fair.

Discharge measurements of Barge Canal at Lock 30, Macedon, N. Y., during the year ending Sept. 30, 1921.

[Made by Otto Lauterhahn.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 22	1.13	156	Nov. 10	0.65	69.2
Nov. 10	1.34	222	10	.66	69.2
10	.42	35.7	11	.90	107
10	.42	36.8	11	1.34	223

Daily discharge, in second-feet, of Barge Canal at Lock 30, Macedon, N. Y., for period Oct. 1 to Dec. 28, 1920.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	162	144	129	11	164	135	129	21	164	118	129
2	162	135	129	12	155	115	129	22	152	115	125
3	172	117	129	13	158	126	129	23	155	112	109
4	152	103	129	14	166	115	129	24	161	118	105
5	155	100	129	15	164	123	125	25	158	115	105
6	155	103	129	16	164	121	125	26	158	135	105
7	158	97	129	17	161	121	125	27	152	141	60
8	161	97	135	18	161	112	129	28	152	129	6
9	161	103	129	19	166	109	129	29	135	129	.....
10	158	108	129	20	152	115	131	30	141	135	.....
								31	147	.....	.....

Monthly discharge, in second-feet, of Barge Canal at Lock 30, Macedon, N. Y., for the period Oct. 1 to Dec. 28, 1920.

Month.	Maximum.	Minimum.	Mean.
October	172	135	157
November	144	97	118
December 1-28	135	6	119

BARGE CANAL AT LOCK 32, PITTSFORD, N. Y.

LOCATION.—At Lock 32 of Barge Canal, 5 miles east of the city of Rochester and three-fourths mile above the village of Pittsford, Monroe County.

RECORDS AVAILABLE.—May 17, 1919, to June 30, 1921, when operation of station was assumed by the State engineer and surveyor.

GAGE.—Gurley 7-day graph water-stage recorder located 25 feet upstream from concrete weir in diversion channel south of the lock house. Recorder inspected by M. H. Quigley, lock tender.

DISCHARGE MEASUREMENTS.—Made by wading about 50 feet below gage.

CONTROL.—Control is the crest of spillway.

DETERMINATION OF DISCHARGE.—Daily discharge over spillway determined by discharge integration. Daily discharge through lock obtained by multiplying the lock capacity by the number of lockages per day. The following tables of discharge include the flow over the spillway and through the lock.

ACCURACY.—Stage-discharge relation practically permanent. Records good.

Discharge measurements of Barge Canal at Lock 32, Pittsford, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 20	Otto Lauterhahn	1.80	171	Nov. 23	Otto Lauterhahn	1.26	52.9
20	do	1.78	166	23	do	1.25	52.0
Nov. 4	do	1.40	77.2	May 28	Lauterhahn and Howe.	1.24	53.2
9	do	1.33	65.7	28	do	1.22	49.6
9	do	1.32	64.0				

Daily discharge, in second-feet, of Barge Canal at Lock 32, Pittsford, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	May.	June.	Day.	Oct.	Nov.	Dec.	May.	June.
1	113	103	80	.....	44	16	139	132	152	48	108
2	131	94	92	.....	32	17	132	139	121	77	96
3	129	131	88	50	31	18	129	105	142	84	81
4	142	92	56	116	41	19	148	82	142	57	76
5	161	54	109	57	58	20	163	116	134	66	89
6	141	96	163	76	114	21	172	170	60	62	122
7	125	88	114	95	87	22	132	143	46	50	100
8	132	84	154	131	83	23	131	64	.....	42	83
9	125	81	180	125	80	24	132	91	.....	49	104
10	140	80	162	69	109	25	137	89	.....	53	129
11	125	67	163	76	98	26	132	116	.....	32	92
12	130	150	144	57	109	27	128	123	.....	93	122
13	169	182	125	70	180	28	135	118	.....	51	119
14	197	118	158	55	85	29	125	135	.....	45	120
15	169	112	174	55	118	30	138	95	.....	49	118
						31	137	.....	.....	47	.....

NOTE.—Discharge over spillway estimated from recorder graph Oct. 1–2, Dec. 16–17, and 21–22; imperfect gage-height record.

Monthly discharge of Barge Canal at Lock 32, Pittsford, N. Y., for the year ending Sept. 30, 1921.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
October	197	113	140
November	182	54	108
December 1-22	180	46	125
May 3-31	131	32	66.8
June	180	31	94.3

GENESEE RIVER AT SCIO, N. Y.

LOCATION.—At steel highway bridge one-fourth 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, 1921.

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, 5.1 feet at 8.30 a. m. February 17 (discharge, 3,810 second-feet); minimum stage recorded, 0.22 foot at 7 p. m. September 3 and 9.30 a. m. September 4 (discharge, 21 second-feet).

1916–1921: Maximum stage recorded, 9.1 feet at noon May 22, 1919 (discharge, 10,600 second-feet); minimum stage occurred September 3 and 4, 1921.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation practically permanent except as affected by ice during most of January and February. 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 to rating table. Open-water records good; winter records fair.

Discharge measurements of Genesee River at Scio, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	Otto Lauterhahn	1.36	308	Feb. 24	Otto Lauterhahn	[a] 1.16	199
29	do	.58	69.2	24	do	[a] 1.16	214
29	do	.58	67.3	Mar. 16	do	2.31	840
Jan. 29	do	[a] 1.18	110	June 8	B. F. Howe	.69	92.1
Feb. 7	do	[a] 1.11	125	Sept. 12	Covert and Shupe	.30	26.8

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Genesee River at Scio, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	700	50	510	189	100	410	700	700	200	86	86	25
2	510	50	1,040	385	110	410	562	672	144	62	95	25
3	236	90	790	349	160	1,290	485	618	141	46	160	21
4	144	77	680	287	120	672	460	535	.....	43	108	22
5	130	66	590	283	130	535	385	562	.....	40	98	35
6	121	56	535	304	150	1,120	362	460	.....	36	72	26
7	113	52	435	221	140	2,640	331	385	.....	35	70	.....
8	105	54	376	313	130	1,760	291	376	.....	34	182	.....
9	93	52	318	247	85	2,070	435	313	.....	35	105	.....
10	77	70	300	192	100	1,470	376	271	.....	271	79	.....
11	72	72	275	206	140	960	322	247	.....	251	70	26
12	72	72	259	190	140	855	291	236	.....	308	127	25
13	68	68	255	180	150	1,560	279	240	88	300	84	25
14	62	62	890	160	120	925	259	179	79	196	.....	24
15	58	52	672	150	120	820	275	169	72	618	.....	23
16	54	54	510	160	320	790	244	153	66	304	.....	23
17	52	118	435	170	2,800	618	283	172	60	186	.....	25
18	52	100	410	170	900	590	287	160	56	156	.....	244
19	52	88	336	160	500	485	259	150	52	138	.....	95
20	49	150	318	160	440	645	236	130	49	855	.....	54
21	49	340	287	500	380	618	240	111	44	435	50	49
22	46	1,040	251	480	320	562	228	100	.....	287	44	200
23	43	960	410	360	260	460	1,040	214	.....	236	38	93
24	43	890	331	240	220	435	760	156	.....	182	35	72
25	42	700	300	730	180	535	535	200	31	144	32	68
26	58	590	283	130	170	460	460	232	29	172	30	90
27	74	485	308	130	180	435	820	166	29	141	29	62
28	77	460	247	130	410	460	535	144	251	111	27	62
29	68	410	200	110	.....	485	590	300	127	93	26	54
30	64	362	196	95	.....	435	700	400	113	98	24	54
31	58	.....	203	100	.....	460	.....	179	.....	103	22	.....

NOTE.—Discharge, Jan. 12 to Feb. 27, determined from gage heights corrected for ice effect by means of four discharge measurements, study of weather records, and comparison with records of flow at other stations. Discharge for following periods when gage was not read, estimated from hydrographs: June 4–12, 75 second-feet; June 22–24, 38 second-feet; Aug. 14–20, 60 second-feet; Sept. 7–10, 30 second-feet; Oct. 26, Nov. 10, Dec. 4, 25, Apr. 30, May 22, 30, July 30, Aug. 7, estimated as shown in table.

Monthly discharge of Genesee River at Scio, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 288 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	700	42	111	0.385	0.44
November	1,040	50	256	.889	.99
December	1,040	196	418	1.45	1.67
January	500	95	222	.771	.89
February	2,800	85	321	1.11	1.16
March	2,640	410	838	2.91	3.36
April	1,040	228	434	1.51	1.68
May	700	100	288	1.00	1.15
June	251	29	80.7	.280	.31
July	855	34	194	.674	.78
August	182	22	68.2	.237	.27
September	244	21	54.7	.190	.21
The year	2,800	21	274	.951	12.91

GENESEE RIVER AT ST. HELENA, N. Y.

LOCATION.—At steel highway bridge in St. Helena, Wyoming County, 5½ miles below Portageville and site of proposed storage dam of New York State Conservation Commission and 9½ miles above mouth of Canaseraga Creek.

DRAINAGE AREA.—992 square miles.

RECORDS AVAILABLE.—August 14, 1908, to September 30, 1921.

GAGE.—Stevens continuous water-stage recorder on left bank just below bridge installed September 28, 1917, and a chain gage on upstream side of bridge, installed August 14, 1908. Below stage of 3.3 feet readings of chain gage are used owing to difficulty in keeping lower intake to gage well open. Water-stage recorder inspected and chain gage read by Herman Piper and 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, 9.46 feet at 1 a. m. February 17 (discharge, 18,100 second-feet); minimum stage (chain gage), 2.13 feet several times September 2–16 (discharge, 26 second-feet).

1908–1921: 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 in December, January, and February. Chain gage rating curve for 1920 was revised below gage height 2.6 feet, on basis of discharge measurements, and is fairly well defined between 40 and 4,000 second-feet. Curve for automatic gage fairly well defined between 500 and 30,000 second-feet. Gage heights above 3.3 feet taken from recorder; below 3.3 feet, from chain gage. Daily discharge ascertained by applying mean daily gage height to proper rating table except for days of great range in stage, when it was determined by averaging hourly discharge. Records fair.

Discharge measurements of Genesee River at St. Helena, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	Lauterhahn and Covert.	2.72	256	Feb. 1	Otto Lauterhahn.....	[a] 4.18	354
27	Otto Lauterhahn.....	2.60	198	21	.....do.....	3.32	816
27	.....do.....	2.65	211	21	.....do.....	3.47	981
Dec. 15	.....do.....	5.16	3,210	Mar. 18	.....do.....	4.15	1,580
15	.....do.....	4.96	2,700	June 3	B. F. Howe.....	2.91	390
Jan. 3	.....do.....	4.85	2,680	Sept. 12	E. B. Shupe.....	2.25	54.2
20	.....do.....	[a] 3.07	343				

[a] 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, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,330	222	1,250	680	280	1,280	2,500	1,510	481	377	262	79
2	1,880	233	3,530	2,300	220	1,390	2,060	1,750	520	268	292	49
3	1,050	195	3,300	3,070	240	6,220	1,570	1,450	357	195	357	63
4	680	256	2,290	1,570	340	3,600	1,300	1,170	317	162	370	37
5	520	280	1,880	1,390	320	1,880	1,100	1,060	256	176	324	63
6	428	239	1,940	1,450	380	5,210	1,000	960	233	162	324	115
7	357	201	1,690	1,060	360	9,350	815	860	201	212	262	49
8	317	185	1,350	960	240	7,090	680	1,060	181	107	344	79
9	304	212	1,050	1,280	180	6,950	1,420	815	195	206	413	79
10	250	233	770	860	300	5,650	1,420	680	195	83	244	79
11	256	233	815	960	240	3,160	1,100	600	233	185	233	49
12	268	292	680	680	170	2,440	860	520	256	363	357	115
13	233	250	770	481	200	3,420	680	520	311	640	481	115
14	233	201	2,430	300	320	2,840	680	520	256	520	292	63
15	212	222	3,110	170	550	2,150	680	442	212	399	262	96
16	217	233	1,750	190	1,500	2,150	600	428	217	910	181	49
17	190	292	1,350	200	11,700	1,950	1,900	337	222	481	157	63
18	166	256	1,100	220	3,620	1,690	1,880	330	171	298	206	206
19	190	317	950	240	1,940	1,510	1,570	292	171	162	262	292
20	166	520	815	320	1,570	1,400	1,200	274	166	2,990	181	357
21	143	1,170	600	600	860	1,820	1,220	268	127	1,420	181	262
22	123	3,960	520	2,010	860	1,630	1,400	250	123	770	135	157
23	96	6,250	1,620	1,880	860	1,350	2,490	428	103	481	135	324
24	152	4,550	2,150	1,150	560	1,200	3,940	481	76	399	157	233
25	135	2,930	800	240	520	1,250	2,040	481	96	298	79	181
26	135	2,290	480	300	520	1,400	1,510	910	96	268	181	206
27	152	1,880	750	200	600	1,400	1,410	640	201	212	135	206
28	166	1,630	600	280	680	1,950	1,380	442	181	212	37	135
29	233	1,570	500	200	.....	2,420	1,570	960	725	185	135	181
30	222	1,400	700	280	.....	1,980	1,880	1,050	600	268	79	157
31	233	.....	680	180	.....	1,630	.....	680	.....	330	115	.....

NOTE.—Discharge, Dec. 25–30, Jan. 2, 14–21, and Jan. 25 to Feb. 16, determined from gage-heights corrected for ice effect from two discharge measurements, study of weather records, and comparison with records of flow for other stations in the basin. Discharge for following periods when stage was below 3.3 feet or when recorder was not in operation, determined from chain-gage readings: Oct. 4 to Nov. 21, Dec. 10–13, 20–22, 26, 28–31, Jan. 1, 4–21, 25–31, Feb. 1–15, 21–28, Mar. 1–5, Apr. 7, 8, 12–16, 29–30, May 1–29, 31, July 1–19, and July 22 to Sept. 30.

Monthly discharge of Genesee River at St. Helena, N. Y., for the year ending Sept. 30, 1921.

[Drainage area,992 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	3,330	96	421	0.424	0.49
November	6,250	185	1,090	1.10	1.23
December	3,530	480	1,360	1.37	1.58
January	3,070	170	829	.836	.96
February	11,700	170	1,080	1.09	1.14
March	9,350	1,200	2,880	2.90	3.34
April	3,940	600	1,460	1.47	1.64
May	1,750	250	715	.721	.83
June	725	76	249	.251	.28
July	2,990	83	443	.447	.52
August	481	37	231	.233	.27
September	357	37	138	.139	.16
The year	11,700	37	909	.916	12.44

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

LOCATION.—At highway bridge known as Jones Bridge, 1½ miles below Canaseraga Creek, 1¾ 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, 1921.

GAGE.—Gurley 7-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 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 stage during year from water-stage recorder, 20.95 feet at 8.30 a. m. February 17 (discharge, 17,900 second-feet); minimum stage from water-stage recorder, 0.22 foot at 1 a. m. September 10 (discharge, 52 second-feet).

1903–1906, 1908–1913, and 1915–1921: 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 practically permanent except as affected by ice during the most of January and February. Previous rating curve revised below gage height 1.00 foot and is very well defined between 75 and 7,000 second-feet and fairly well defined between 7,000 and 60,000 second-feet. Operation of water-stage recorder satisfactory throughout year. 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. Open-water records good; winter records fair.

Discharge measurements of Genesee River at Jones Bridge, near Mount Morris, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 26	Otto Lauterhahn	[a] 5.12	362	Feb. 19	Otto Lauterhahn	5.96	2,920
Feb. 4	do	[a] 3.24	481	Mar. 5	do	5.55	2,630
16	do	[a] 2.47	777	May 31	do	2.54	823
19	do	[a] 6.34	2,750	Sept. 9	E. B. Shupe	.51	87.0

[a] 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, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept
1	3,520	288	1,540	1,700	400	1,440	2,960	2,020	690	590	305	164
2	2,740	291	4,590	3,140	480	2,170	2,750	1,960	690	430	264	120
3	1,420	298	4,840	4,200	500	6,660	2,220	1,900	545	334	295	124
4	920	353	2,960	2,280	500	4,720	1,840	1,600	438	295	377	132
5	690	361	2,410	1,900	440	2,680	1,600	1,420	377	254	334	114
6	565	302	2,340	1,960	750	4,440	1,420	1,280	345	216	271	94
7	492	258	2,020	1,420	650	12,300	1,300	1,220	330	190	254	103
8	434	271	1,660	1,540	600	11,800	1,220	1,140	295	176	295	117
9	381	271	1,300	1,900	550	10,500	1,480	1,080	268	178	365	118
10	337	271	1,140	1,300	750	10,100	1,900	920	261	305	341	102
11	323	278	1,060	1,080	600	5,130	1,540	840	254	357	271	173
12	312	323	948	1,000	550	3,530	1,280	765	323	399	295	142
13	316	316	920	840	500	3,900	1,170	740	361	448	565	115
14	298	274	2,000	650	550	4,060	1,080	740	345	690	434	132
15	298	291	3,760	480	600	3,030	1,030	715	319	590	327	131
16	298	291	2,150	300	2,350	2,820	1,030	640	302	780	285	143
17	214	305	1,540	300	14,800	2,610	1,650	590	288	715	248	112
18	219	312	1,300	300	8,390	2,220	2,960	545	261	479	254	284
19	288	390	1,110	400	3,100	2,080	2,280	506	222	381	291	287
20	268	492	1,140	650	2,150	1,900	1,840	479	207	2,720	285	349
21	210	812	1,060	1,000	1,600	2,150	1,420	438	198	1,760	241	268
22	213	3,920	1,110	3,000	1,330	2,150	1,780	403	184	1,020	222	258
23	192	8,180	1,500	3,000	1,220	1,900	2,290	470	173	690	241	251
24	187	6,670	2,750	1,400	1,060	1,660	5,800	615	164	535	207	302
25	222	3,830	1,500	1,200	948	1,900	3,100	640	154	434	159	222
26	235	2,820	1,100	480	1,030	1,720	2,080	815	148	377	137	281
27	238	2,340	1,000	320	920	1,840	1,720	840	353	377	167	288
28	248	2,020	1,000	340	1,080	2,060	1,780	665	271	323	175	251
29	238	1,960	900	340	.....	3,240	1,660	790	264	291	99	216
30	251	1,720	1,000	420	.....	2,610	2,150	1,170	615	278	131	222
31	226	.....	1,000	400	.....	2,150	.....	865	.....	349	136	.....

NOTE.—Discharge, Dec. 25 to Jan. 1 and Jan. 14 to Feb. 15 determined from gage-heights corrected for ice effect from 4 discharge measurements and study of weather records: May 28, 29, June 9 to 11, June 15 to July 15, and Aug. 13 determined from gage-heights estimated from recorder graph.

Monthly discharge of Genesee River at Jones Bridge, near Mount Morris, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 1,400 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	3,250	187	542	0.387	0.45
November	8,180	258	1,350	.964	1.08
December	4,840	900	1,760	1.26	1.45
January	4,200	300	1,270	.907	1.05
February	14,800	400	1,730	1.24	1.29
March	12,300	1,440	3,920	2.80	3.23
April	5,800	1,030	1,940	1.39	1.55
May	2,020	403	929	.664	.77
June	690	148	322	.230	.26
July	2,720	176	547	.391	.45
August	565	99	267	.191	.22
September	349	94	187	.134	.15
The year	14,800	94	1,230	.879	11.95

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

LOCATION.—In station No. 5 of Rochester Gas & Electric Corporation, 400 feet above Driving Park Avenue Bridge, 1½ 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, 1921.

GAGES.—Gurley 7-day water-stage recorder installed in northwest corner of power house, December 14, 1919, to March 8, 1920, and November 2, 1920, to September 30, 1921. Staff gage above Court Street dam, March 17 to April 4, 1920, and chain gage at site of water-stage recorder April 5 to August 19, 1920, when the water-stage recorder was out of commission. Recorder inspected by C. M. Hawkins, employee of Rochester Gas & Electric Corporation.

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

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

EXTREMES OF DISCHARGE.—1919–1921: Maximum discharge recorded, about 26,000 second-feet at 2.30 p. m. March 17, 1920 (observed at Court Street dam); minimum stage occurs nearly every day during low-water period, when power plant shuts down.

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 probably permanent; not affected by ice. Rating curve for water-stage recorder fairly well defined between 500 and 5,000 second-feet and well defined between 5,000 and 15,000 second-feet. Rating curve for Court Street dam fairly well defined between 1,000 and 25,000 second-feet; gage read to tenths twice daily. Chain gage rating curve, based on and parallel to water-stage recorder rating curve, approximate only; gage read to tenths at six-hour intervals. Operation of water-stage recorder satisfactory, except as indicated in footnotes to daily-discharge table. Daily discharge ascertained from water-stage recorder graph by discharge integrator; from gage heights at Court Street dam, by applying mean daily gage height to rating table and adding discharge through East and West mill races; from chain gage readings, by applying each gage reading to rating table and determining mean discharge for day. Records fair, except for period when chain gage was used, for which they are roughly approximate.

Discharge measurements of Genesee River at Driving Park Avenue, Rochester, N. Y., for the years ending Sept. 30, 1920 and 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1920.		*Feet.*	*Sec.-ft.*	1921.		*Feet.*	*Sec.-ft.*
June 5	Lauterhahn and Howe.	[a] 3.80	1,800	Feb. 17	Otto Lauterhahn.....	8.97	12,700
26	Otto Lauterhahn.....	[a] 3.80	1,870	Mar. 15	.....do.....	5.83	5,280
July 21	.....do.....	[a] 3.95	2,230	23	.....do.....	4.48	3,170
Aug. 17	.....do.....	[a] 3.72	1,820	24	.....do.....	4.37	3,090
19	.....do.....	[a] 3.72	2,590	May 27	B. F. Howe.....	3.95	2,450
Nov. 8	.....do.....	2.40	1,300	Sept. 10	Covert and Shupe.....	2.57	784
24	.....do.....	7.92	9,460				
24	.....do.....	7.77	9,630				
Dec. 13	.....do.....	3.50	2,630				

[a] Gage height read on chain gage and reduced to datum of water-stage recorder.

NOTE.—Measurements June 5 to Aug. 19, 1920, supersede those previously published.

Daily discharge, in second-feet, of Genesee River at Driving Park Avenue, Rochester, N. Y., during the years ending Sept. 30, 1920 and 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1				500	440	550	3,200	3,800	1,400	1,300	1,300	850
2				550	480	550	2,800	3,000	1,300	1,200	1,600	750
3				550	480	550	2,800	3,200	1,300	1,000	1,400	800
4				460	500	550	2,400	2,200	1,400	900	1,400	850
5				380	500	550	2,400	1,900	1,000	900	1,100	850
6				400	500	850	2,000	1,700	850	900	1,100	800
7				420	550	2,300	1,900	1,500	1,300	1,100	1,500	900
8				420	550		2,400	1,300	1,300	1,200	1,000	850
9				500	650		2,200	1,400	1,200	950	1,200	800
10				320	600		1,900	1,600	1,300	1,000	1,200	900
11				460	600		2,400	1,500	1,300	900	1,100	900
12				440	650	13,000	2,200	1,300	1,100	1,100	1,200	950
13				500	600		1,800	1,200	800	1,000	1,500	1,200
14				400	650		2,000	950	1,400	950	1,400	1,400
15				460	600		2,000	1,000	1,100	800	1,600	1,100
16				420	700		2,000	1,100	1,100	950	1,800	1,100
17				440	600	26,000	4,000	1,700	1,200	750	1,800	1,000
18				460	550	24,000	4,000	1,300	1,200	800	1,400	950
19				440	550	18,000	3,400	1,400	1,600	1,100	2,000	950
20				440	550	10,000	2,200	1,700	1,700	1,700	1,500	800
			800									
21				440	600	5,500	2,000	1,700	1,700	2,200	1,300	800
22				400	550	5,000	1,600	1,600	1,500	1,500	1,200	850
23				420	650	5,500	1,600	1,700	1,400	1,400	1,100	750
24				440	600	7,000	2,200	1,900	1,300	3,800	1,100	800
25			750	420	550	7,500	2,600	1,900	1,200	11,000	1,000	850
26			750		550	7,500	2,200	1,800	1,200	11,000	950	750
27			650		500	7,500	1,600	1,500	850	5,000	900	850
28			600	440	550	7,500	2,400	1,400	1,200	3,400	850	800
29			550		400	5,000	5,000	1,400	1,000	2,200	900	800
30			600	500		4,000	4,600	1,000	1,200	1,700	900	900
31			650	550		3,600		1,100		1,400	850	
1920–21.												
1			2,800		860	1,850	3,400	4,200	2,050	1,550	1,160	
2			4,400		740	3,000	4,000	3,800	2,050	1,850	1,160	
3			7,800	3,200	740	6,700	3,500	3,900	1,950	1,400	1,140	
4			6,700		720	9,100		3,400	1,850	1,450	1,000	800
5			4,500	3,400	740	6,100		3,000	1,450	1,500	1,100	
6			3,700	2,900	1,080	5,400		2,800	1,700	1,350	1,100	
7			3,500	2,600	1,750	10,600	1,800	2,450	1,500	1,300	1,020	760
8			2,400		1,550	15,200		2,700	1,450	1,300	980	780
9			2,450		1,220	15,800		2,250	1,500	1,250	1,020	740
10			1,750		1,550	15,500		2,200	1,400	1,200	1,120	800
11			1,800		1,600	12,300	2,350	2,000	1,450	1,250	1,180	620
12		1,040	2,000		1,250	7,400	1,850	1,900	1,250	1,160	1,120	880
13			1,750	1,350	1,200	5,800	1,400	2,000	1,500	1,500	960	780
14			1,550		1,240	6,100	1,300	2,100	1,400	1,450	1,240	740
15			3,800		1,140	5,600	1,120	2,250	1,400	1,800	1,140	760
16	1,250		4,500		1,420	4,800	1,100	2,100	1,350	1,550	1,060	860
17			3,100		10,600	4,700	1,300	1,750	1,350	1,250	1,080	800
18			2,450		15,900	4,100	3,100	1,750	1,400	1,850	1,060	800
19			2,100	560	9,900	3,800	4,600	1,750	1,350	1,500	820	900
20			1,800	600	4,600	3,800	3,900	1,800	1,350	1,450	940	760
21			1,700	720	3,100	4,100	2,900	1,850	1,300	4,000	940	940
22			1,700	960	2,400	3,700	2,700	1,550	1,350	2,700	920	960
23		6,200	2,600	2,300	2,000	3,200	3,500	1,700	1,250	2,100	880	960
24		9,700	3,900	2,900	1,850	2,600	5,700	1,450	1,220	1,500	780	900
25		7,800		1,400	1,180	2,050	7,100	1,450	1,240	1,400	820	960
26		5,000		980	1,160	2,200	4,100	1,850	1,200	1,300	860	940
27		4,400	1,800	860	1,160	2,500	2,400	1,800	1,300	1,300		980
28		3,700		800	1,500	2,600	3,000	2,250	1,220	1,300		880
29		3,300		840		4,300	3,700	1,850	1,350	1,250	800	980
30		3,100		960		4,600	3,700	2,150	1,300	1,200		840
31				880		3,900		2,250		1,080		

NOTE.—Discharge for the following periods were infrequent when water-stage recorder did not operate satisfactorily or when readings of chain gage estimated on basis of record of power generation at station No. 5, and comparison with records of flow of Genesee River at Jones Bridge: Dec. 17–24, 1919, Jan. 26–29, Feb. 1, 2, 19, 27, 29, Mar. 1, 4, 8–16, May 15, June 3, 20, July 5, 6, Aug. 15, 22, Nov. 2–23, Dec. 22, 25–31, 1920, Jan. 1–4, 8–18, Apr. 4–10, Aug. 27–31, and Sept. 1–6, 1921, automatic gage records either faulty, fragmentary, or missing or chain gage readings incomplete. Discharge, Aug 20 to Nov. 1, 1920, based on records of power generation at station No. 5; chain gage heights either missing or incomplete. Braced figures show mean discharge for periods indicated.

Monthly discharge of Genesee River at Driving Park Avenue, Rochester, N. Y., for the years ending Sept. 30, 1920 and 1921.

[Drainage area, 2,460 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919–20.					
December 17–31	.....	550	730	0.297	0.17
January	550	320	448	.182	.21
February	700	400	560	.228	.25
March	26,000	550	8,600	3.50	4.04
April	5,000	1,600	2,530	1.03	1.15
May	3,800	950	1,670	.679	.78
June	1,700	850	1,250	.508	.57
July	11,000	800	2,100	.854	.98
August	2,000	850	1,260	.512	.59
September	1,400	750	895	.364	.41
1920–21.					
October	.....	.....	1,250	.508	.59
November	9,700	.....	2,200	.894	1.00
December	7,800	1,550	2,820	1.15	1.33
January	3,400	560	1,660	.675	.78
February	15,900	720	2,650	1.08	1.12
March	15,800	1,850	5,920	2.41	2.78
April	7,100	1,100	2,810	1.14	1.27
May	4,200	1,450	2,270	.923	1.06
June	2,050	1,200	1,450	.589	.66
July	4,000	1,080	1,550	.630	.73
August	1,240	.....	987	.401	.46
September	980	620	837	.340	.38
The year	15,900	560	2,200	.894	12.16

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 to June 16, 1919; March 17, 1920, to September 30, 1921.

GAGE.—Gurley 7-day water-stage recorder installed October 19, 1920. Prior to this date, gage was a vertical staff at the downstream side of left abutment. Observer, Frank S. Fox.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand and gravel; shifting frequently.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 8.78 feet at 6.10 p. m. March 9 during a discharge measurement (discharge, 1,270 second-feet); minimum stage, 6.03 feet at 4 p. m. September 10 (discharge, 14 second-feet).

1910–1912, 1915–1917, and 1919–1921: 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 changed during high water in March. Rating curves fairly well defined between 30 and 2,000 second-feet. Operation of water-stage recorder generally satisfactory except for periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph or for periods of considerable daily fluctuation in stage by averaging discharge for intervals of day. Records fair.

Discharge measurements of Canaseraga Creek near Dansville, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	Otto Lauterhahn	7.60	476	Feb. 26	Otto Lauterhahn	[a] 6.61	77.5
9	do	6.24	38.5	28	do	6.78	139
30	do	6.19	34.0	Mar. 9	do	8.29	905
Dec. 18	do	6.55	90.8	9	do	8.68	1,200
18	do	6.55	90.4	10	do	7.80	598
Jan. 6	do	6.82	157	June 2	do	6.30	40.6
6	do	6.82	156	2	B. F. Howe	6.30	37.5
26	do	[a] 7.50	84.1	2	Howe and Lauterhahn	6.30	38.6
Feb. 5	do	[a] 6.89	61.7	Sept. 11	Covert and Shupe	6.58	80.4
18	do	7.25	313				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Canaseraga Creek near Dansville, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	427	35	190	81	50	181	323	155	39	39	22	16
2	175	36	604	406	46	653	247	161	40	32	28	16
3	112	41	418	255	46	563	192	136	38	28	28	23
4	70	42	306	184	70	310	161	117	35	26	23	35
5	58	41	246	178	80	427	139	104	32	26	22	21
6	54	38	211	162	75	592	122	95	34	27	22	20
7	46	36	172	127	65	988	112	86	31	25	28	18
8	40	36	140	169	65	988	107	78	31	23	27	18
9	40	36	112	134	70	1,060	164	70	30	40	25	16
10	34	41	94	112	72	1,130	136	65	31	37	22	16
11	34	41	94	112	70	332	117	62	39	30	29	70
12	34	40	94	85	72	288	104	60	40	32	68	40
13	34	34	94	79	63	453	95	63	38	30	39	25
14	34	33	165	79	63	288	88	60	34	48	31	22
15	30	33	183	74	66	247	86	55	30	72	28	22
16	30	33	127	70	294	288	84	53	31	35	24	18
17	34	49	107	65	1,010	209	143	52	35	28	26	43
18	32	49	94	60	422	192	161	49	34	25	39	184
19	31	55	90	60	250	161	145	49	28	77	29	56
20	30	75	83	70	151	161	134	46	27	97	27	37
21	31	152	87	110	120	164	139	46	25	62	26	34
22	30	362	83	180	90	142	145	45	25	39	24	37
23	31	479	136	160	70	122	467	74	25	34	22	30
24	30	375	151	120	60	117	448	63	24	27	21	24
25	30	270	80	95	60	136	259	62	23	26	20	45
26	32	218	80	85	75	158	198	65	24	48	19	52
27	38	187	90	50	90	158	164	55	25	39	19	35
28	36	175	85	50	151	194	148	52	32	28	18	30
29	38	172	75	44	.....	228	158	65	50	27	17	25
30	36	160	75	46	.....	224	158	55	55	27	18	32
31	34	.....	70	50	.....	226	.....	47	.....	23	17	.....

NOTE.—Discharge, Dec. 25–31, Jan. 17 to Feb. 7, and Feb. 21–27 determined from gage heights corrected for ice effect from three discharge measurements, study of weather record, and comparison with records of flow at other stations. Discharge estimated Feb. 19, June 29 and 30. Staff-gage readings used Oct. 1–18, Jan. 23, 24, Jan. 26 to Feb. 5, and Feb. 20 to Mar. 18; no record from water-stage recorder.

Monthly discharge of Canaseraga Creek near Dansville, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 158 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	427	30	56.3	0.356	0.41
November	479	33	112	.709	.79
December	604	70	150	.949	1.09
January	406	44	115	.728	.84
February	1,010	46	136	.861	.90
March	1,130	117	367	2.32	2.68
April	467	84	171	1.08	1.20
May	161	45	72.4	.458	.53
June	55	23	32.8	.208	.23
July	97	23	37.3	.236	.27
August	68	17	26.1	.165	.19
September	184	16	35.3	.223	.25
The year	1,130	16	109	.690	9.38

CANASERAGA CREEK AT SHAKERS CROSSING, N. Y.

LOCATION.—At highway bridge at Shakers Crossing, 1 mile above mouth and 1¼ 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, 1921.

GAGE.—Gurley 7 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, 23.37 feet at 9.30 a.m. February 17; minimum stage from water-stage recorder, 7.68 feet from 8 to 10 p. m. September 3.

1915–1921: Maximum stage from water-stage recorder, 28.92 feet at 1 p. m. May 17, 1916; minimum stage from water-stage recorder occurred 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, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar	Apr.	May.	June.	July.	Aug.	Sept.
1	12.30	8.28	.....	9.25	8.88	9.87	11.03	9.72	8.54	8.13	7.76	7.77
2	10.59	8.40	.....	11.54	8.80	10.51	10.95	9.70	8.43	8.03	7.75	7.76
3	9.33	8.42	.....	11.78	8.80	14.59	10.38	9.58	8.40	7.97	7.87	7.70
4	8.97	8.45	.....	10.21	8.85	12.60	10.00	9.27	8.45	7.91	7.86	7.86
5	8.80	8.41	10.31	9.90	8.97	10.80	9.77	9.13	8.36	7.89	7.80	7.82
6	8.70	8.39	10.17	9.90	9.57	12.56	9.51	8.97	8.31	7.87	7.79	7.78
7	8.65	8.35	9.88	9.34	9.31	18.96	9.35	8.91	8.39	7.85	7.86	7.78
8	8.60	8.35	9.52	9.72	9.05	18.74	9.26	8.84	8.37	7.82	7.89	7.76
9	8.59	8.36	9.20	9.70	9.18	17.80	9.61	8.74	8.38	7.79	7.85	7.75
10	8.51	8.38	9.12	9.25	9.50	17.45	9.84	8.67	8.38	8.16	7.78	7.71
11	8.51	8.39	9.10	9.34	9.15	13.20	9.56	8.64	8.34	8.00	7.73	7.88
12	8.49	8.40	9.03	9.11	9.19	11.52	9.23	8.66	8.44	7.89	8.06	8.13
13	8.49	8.36	9.07	8.85	9.11	12.18	9.09	8.93	8.43	8.07	8.05	7.89
14	8.45	8.13	10.09	9.01	9.03	12.01	9.02	8.99	8.40	8.35	7.93	7.81
15	8.42	8.49	11.30	8.92	9.08	11.14	9.03	8.93	8.41	8.40	7.87	7.80
16	8.40	8.49	9.78	8.81	11.43	11.02	9.06	8.84	8.38	8.12	7.84	7.78
17	8.20	8.55	9.29	8.70	20,98	10.75	10.02	8.81	8.33	7.96	7.80	7.76
18	8.20	8.62	9.10	8.82	15.62	10.31	11.10	8.78	8.27	7.91	7.93	8.60
19	8.31	8.70	8.98	8.96	11.62	10.10	10.55	8.74	8.07	7.92	7.92	8.26
20	8.19	8.86	9.11	8.85	10.27	10.04	9.93	8.68	8.08	10.21	7.85	8.00
21	8.01	9.22	9.03	9.01	9.57	10.19	9.64	8.68	8.15	8.91	7.84	7.92
22	8.01	11.88	9.01	10.00	9.46	10.05	9.80	8.46	8.10	8.09	7.78	7.93
23	8.00	15.80	9.70	10.10	9.21	9.78	10.91	8.65	8.04	8.01	7.82	7.93
24	7.98	14.43	10.38	9.45	9.08	9.64	13.58	8.96	7.96	8.00	7.73	7.88
25	7.95	11.73	9.31	9.06	9.05	9.66	11.13	8.90	7.86	7.98	7.70	7.88
26	7.97	10.79	9.33	9.12	9.00	9.74	10.11	8.98	7.86	7.95	7.69	8.17
27	8.00	.....	9.37	9.20	8.91	9.75	9.70	8.91	7.90	8.19	7.71	8.04
28	8.07	.....	9.23	9.06	9.53	9.96	9.60	8.69	7.95	7.97	7.71	7.92
29	8.08	.....	9.28	8.95	.....	11.20	9.61	8.79	8.16	7.88	7.70	7.89
30	8.11	.....	9.25	8.91	.....	10.74	9.89	8.85	8.28	7.92	7.71	7.86
31	8.09	.....	9.15	8.94	.....	10.29	.....	8.66	.....	7.88	7.79	.....

NOTE.—No gage-height record Nov. 27 to Dec. 4; recorder did not operate. Estimates for portions of day made from recorder graph Jan. 1, Apr. 2, 29, 30, May 7, 13, 14, 20, 21, 27, 28, June 1, July 1, 2, 14–16, and Sept. 30.

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

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

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

RECORDS AVAILABLE.—October 31, 1917, to September 30, 1921, 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 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 8 p. m. February 16 (discharge, 1,410 second-feet); minimum stage, 0.09 foot several times, September 2–13 (discharge, 1.3 second-feet).

1917–1921: Maximum stage recorded, 5.9 feet at 10 a. m. May 22, 1919 (discharge not determined); minimum stage recorded, 0.13 foot at 8 a. m. August 20, 1918 (discharge, 0.7 second-foot).

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

ACCURACY.—Stage-discharge relation permanent except for change caused by use of flashboards on control, October 1 to November 11. Rating curve used November 12 to September 30 well defined below 500 second-feet; curve used for period of backwater effect from flashboards approximate only. Gage read to hundredths twice daily. Daily discharge determined by applying mean daily gage-height to rating table. Records good except for period when flashboards were on dam and for period of ice effect.

Discharge measurements of Keshequa Creek at Craig Colony, Sonyea, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	Otto Lauterhahn	[a] 2.26	7.9	Mar. 10	Otto Lauterhahn	1.39	175
Dec. 18	do	.68	26.0	10	do	1.38	175
Jan. 7	do	.70	30.3	June 1	Howe and Lauterhahn	.46	9.3
7	do	.745	34.6	2	do	.395	7.5
7	do	.815	44.5	2	do	.39	7.0

[a] Flashboards on dam.

Daily discharge, in second-feet, of Keshequa Creek at Craig Colony, Sonyea, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	160	9	63	30	11	61	109	47	8.6	7.5	2.4	1.5
2	40	9	296	235	14	186	70	53	8.0	7.2	2.0	1.3
3	19	10	105	95	16	223	52	42	7.5	5.4	3.0	2.0
4	16	10	87	58	14	82	46	36	6.8	3.7	3.7	1.5
5	12	9	67	60	21	70	40	31	6.8	3.4	2.4	1.4
6	11	10	58	52	58	291	39	28	4.7	3.4	2.2	1.4
7	10	8	50	29	37	470	35	24		2.7	2.7	1.4
8	9	9	39	69	40	680	30	21	5.5	2.7	3.4	1.3
9	9	9	27	39	46	505	100	20		2.7	5.4	1.3
10	9	9	29	20	65	197	56	19			2.4	1.4
11	8	9	29	29	31	119	41	16	6.1		2.4	1.4
12	8	13	29	26	34	91	37	16	13		4.7	1.4
13	9	12	30	21	29	141	35	18	8.0	3.5	5.8	1.4
14	8	8.6	67	22	34	93	30	19	8.0		6.1	2.0
15	8	7.5	53	20	34	80	28	15	6.4		4.4	2.1
16	8	8.6	36	17	458	133	27	14	4.0		5.0	2.1
17	8	12	29	12	340	69	166	13	4.4	2.6	4.0	2.3
18	8	16	26	20	117	63	153	12	6.8	2.4	6.1	7.5
19	8	17	20	24	65	54	127	13	5.4	2.4	6.4	7.5
20	8	27	24	26	39	87	78	12	4.0	7.5	4.7	4.7
21	7	52	24	44	31	60	76	9.7	3.8	6.1	4.0	5.4
22	8	173	24	67	35	50	84	9.7	4.0	4.0	3.0	3.4
23	8	410	144	67	31	41	219	24	3.7	2.7	3.7	4.0
24	7	179	56	25	24	40	127	17	4.7	2.7	3.0	2.7
25	8	119	29	15	12	50	74	28	3.7	2.3	2.4	2.4
26	8	97	25	17	19	44	56	20	5.0	2.2	2.6	5.8
27	8	82	39	20	27	41	50	14	6.8	2.2	2.4	6.8
28	9	82	29	7	54	122	39	16	9.0	2.2	2.2	5.4
29	9	82	22	8	.....	100	42	14	14	2.2	2.4	4.0
30	9	61	31	10	.....	91	53	16	12	2.7	1.8	5.4
31	9	.....	31	11	.....	74	.....	11	.....	3.5	2.2	.....

NOTE.—Discharge estimated Jan. 25 to Feb. 3 because of ice effect; Feb. 8, June 7–10, 26, 28, July 10–16, and Aug. 21, because gage was not read. Discharge, Oct. 1 to Nov. 11, determined from special rating on account of backwater from flashboards on dam.

Monthly discharge of Keshequa Creek at Craig Colony, Sonyea, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 70 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	160	7	15.0	0.214	0.25
November	410	7.5	52.0	.743	.83
December	296	22	52.2	.746	.86
January	235	7	38.5	.550	.63
February	458	11	62.0	.886	.92
March	680	40	142	2.03	2.34
April	219	27	70.6	1.01	1.13
May	53	9.7	20.9	.299	.34
June	14	3.7	6.57	.094	.10
July	7.5	2.2	3.58	.051	.06
August	6.4	1.8	3.51	.050	.06
September	7.5	1.3	3.07	.044	.05
The year	680	1.3	39.1	.559	7.57

CONESUS CREEK NEAR LAKEVILLE, N. Y.

LOCATION.—At highway bridge known locally as Millville Bridge, 1½ 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, 1921.

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

DISCHARGE MEASUREMENTS.—Made from highway bridge about one-fourth 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, 2.10 feet at 5 p. m. February 16 (discharge, 157 second-feet); minimum stage recorded, 0.27 foot at 7.30 a. m. September 29 (discharge, about 2.7 second-feet).

1919–1921: Maximum stage recorded, 2.10 feet at 8 a. m. March 17, 1920 (discharge, 159 second-feet); minimum stage occurred September 29, 1921.

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 was revised for low stages owing to leakage; fairly well defined between 4 and 150 second-feet. 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, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 11	Otto Lauterhahn	1.87	122	May 28	Lauterhahn and Howe.	1.24	46.2
11	.....do.....	1.86	119	Sept. 11	Covert and Shupe.....	.54	4.7

Daily discharge, in second-feet, of Conesus Creek near Lakeville, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	28	16	43	47	38	71	101	94	36	16	9.6	3.6
2	28	17	55	49	38	70	101	88	34	16	7.3	3.5
3	28	17	61	51	38	75	101	88	34	16	6.7	3.7
4	28	17	61	51	37	74	101	88	30	16	5.5	3.4
5	26	16	62	51	51	73	101	88	28	16	5.0	3.8
6	25	15	62	51	57	75	94	82	28	15	4.9	3.7
7	25	15	61	56	41	82	94	82	26	15	4.6	3.8
8	25	15	61	57	41	94	94	75	25	15	4.6	3.7
9	25	15	61	58	49	121	94	75	24	14	4.3	3.5
10	24	15	61	56	41	114	94	70	24	14	4.3	3.5
11	22	15	58	52	43	121	88	69	24	14	4.3	5.2
12	22	14	58	51	42	121	88	65	23	14	4.0	4.3
13	22	13	58	51	43	121	88	64	22	13	3.6	3.7
14	22	14	63	51	42	121	82	64	20	15	3.7	3.4
15	21	13	59	49	42	121	82	62	20	15	3.2	3.3
16	21	12	58	49	94	121	82	59	20	15	3.2	3.1
17	20	13	56	49	68	121	88	58	18	14	3.0	3.7
18	20	16	55	47	75	121	94	56	18	14	3.8	3.0
19	19	16	53	47	75	121	94	56	18	15	3.3	3.0
20	17	16	53	47	75	121	94	56	18	14	3.2	2.8
21	20	16	51	44	75	114	88	55	17	14	3.0	3.2
22	20	17	55	44	73	114	94	55	17	14	2.9	3.8
23	17	30	51	46	73	108	88	56	17	12	3.0	3.8
24	17	30	50	44	71	114	108	52	16	12	3.8	3.1
25	17	32	49	44	70	108	101	52	16	11	3.8	3.4
26	17	34	51	42	68	101	101	47	17	11	4.3	3.1
27	18	34	50	42	67	101	101	47	16	11	5.7	2.9
28	17	35	49	40	74	108	94	44	17	10	5.7	2.9
29	17	36	48	40	.....	108	94	42	16	10	5.5	2.9
30	17	36	47	40	.....	108	94	42	16	9.6	4.0	3.3
31	16	.....	45	40	.....	108	.....	40	.....	9.6	3.8	.....

Monthly discharge of Conesus Creek near Lakeville, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 71 square miles.]

Month.	Discharge in second-feet.				Run-off in inches
	Maximum.	Minimum.	Mean.	Per square mile.	
October	28	16	21.3	0.300	0.35
November	36	12	20.0	.282	.31
December	63	43	55.0	.775	.89
January	58	40	48.0	.676	.78
February	94	37	57.2	.806	.84
March	121	70	105	1.48	1.71
April	108	82	93.9	1.32	1.47
May	94	40	63.6	.896	1.03
June	36	16	21.8	.307	.34
July	16	9.6	13.6	.192	.22
August	9.6	2.9	4.44	.063	.07
September	5.2	2.8	3.47	.049	.05
The year	121	2.8	42.2	.594	8.06

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, 1921.

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 effected 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, 1921.

[Drainage area, 12.6 square miles.]

Month.	Discharge Mean.	Mean elevation of lake above low-water mark.	Month.	Discharge Mean.	Mean elevation of lake above low-water mark.
	Sec.-ft.	*Feet.*		*Sec.-ft.*	*Feet.*
October	2.991	0.190	May	9.836	2.768
November	2.441	.174	June	16.409	.767
December	17.705	1.029	July	2.999	.184
January	11.898	.685	August	.164	−.024
February	11.525	.667	September	2.023	−.391
March	11.072	1.880			
April	17.811	2.697	The year	8.906	.8855

NOTE.—Terminal water surface for the year was 1.17 feet lower than for the previous year, corresponding to a loss in storage of 32,810,375 cubic feet, or a discharge of 1.040 second-feet for the year. This correction applied to the above mean for the year gives 7.866 second-feet.

OWASCO LAKE OUTLET NEAR AUBURN, N. Y.

LOCATION.—On farm of Charles H. Pearce, 2 miles below center of Auburn, Cayuga County, and 3¼ 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, 1921.

GAGE.—Gurley water-stage recorder in a concrete shelter on left bank. Recorder inspected by Charles H. Pearce.

DISCHARGE MEASUREMENTS.—Made from 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 ½: 1. A small horizontal apron built on a level with bed of stream extends downstream 2½ 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 2.13 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.44 feet at 1.30 p. m. March 16 (discharge, 1,040 second-feet); minimum stage from water-stage recorder, 1.41 feet at 3 p. m. September 25 (discharge, 5.6 second-feet).

1912–1921: 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 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 except as affected by aquatic growth during portions of year; not affected by ice. Rating curve well defined between 1 and 1,700 second-feet. Operation of the water-stage recorder satisfactory throughout year. Daily discharge ascertained by averaging the hourly discharge; indirect method used October 1 to November 25. Records excellent.

Discharge measurements of Owasco Lake outlet near Auburn, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	Lauterhahn and Covert.	2.36	198	Dec. 28	Otto Lauterhahn.....	2.67	390
14	Otto Lauterhahn.....	2.35	210	28	.....do.....	2.67	381
19	.....do.....	2.34	211	Feb. 3	.....do.....	2.46	277
Dec. 4	.....do.....	2.83	529	May 24	Howe and Lauterhahn.	2.41	254

Daily discharge, in second-feet, of Owasco Lake outlet near Auburn, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	106	128	199	286	250	281	454	380	193	129	155	115
2	70	136	324	292	242	335	451	392	169	133	145	110
3	26	122	457	299	253	335	416	386	192	129	.....	108
4	97	124	476	295	224	205	364	362	162	126	.....	106
5	127	125	549	296	187	208	352	368	146	130	.....	110
6	164	130	564	310	222	278	329	363	171	134	.....	128
7	163	124	566	299	220	509	342	346	171	136	.....	110
8	159	126	559	292	211	556	343	332	171	141	.....	112
9	158	136	550	285	192	686	333	309	176	142	.....	114
10	146	66	510	293	200	794	325	271	178	143	.....	100
11	169	52	454	276	209	805	299	262	168	147	.....	106
12	152	97	444	282	181	789	224	239	168	144	.....	124
13	153	55	448	286	199	785	228	234	175	142	.....	129
14	144	30	453	288	213	810	225	227	175	145	.....	99
15	150	53	440	274	205	780	229	221	169	140	.....	102
16	144	46	450	244	208	738	228	222	176	148	.....	88
17	96	116	431	271	221	787	232	211	175	129	.....	112
18	125	116	429	283	216	765	240	223	150	148	.....	70
19	131	142	398	280	211	772	229	240	105	160	.....	108
20	122	124	408	260	209	744	220	218	136	162	.....	90
21	128	33	382	259	212	676	228	218	142	138	.....	70
22	117	147	381	254	204	603	222	214	157	143	.....	77
23	91	185	381	246	201	573	222	207	145	162	.....	76
24	25	159	374	265	206	589	240	180	138	156	.....	69
25	131	149	359	266	224	536	276	167	141	157	.....	19
26	125	148	363	262	228	472	271	180	142	175	.....	58
27	104	151	374	269	250	470	416	181	145	161	121	72
28	120	143	354	250	279	482	415	163	139	182	85	72
29	117	157	352	251	.....	459	391	149	137	161	122	66
30	106	152	326	242	.....	443	381	141	135	140	105	68
31	109	.....	292	260	.....	463	.....	181	.....	130	93	.....

NOTE.—Discharge, Aug. 3-26, estimated at 135 second-feet from study of lake levels of Owasco Lake and of rainfall, evaporation, and run-off data; recorder out of commission.

Monthly discharge of Owasco Lake outlet near Auburn, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 206 square miles]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	169	25	122	0.592	0.68
November	185	30	116	.563	.63
December	566	199	421	2.04	2.35
January	310	242	275	1.33	1.53
February	279	181	217	1.05	1.09
March	810	205	572	2.78	3.20
April	454	220	304	1.48	1.65
May	392	141	251	1.22	1.41
June	193	105	158	.767	.86
July	182	126	146	.709	.82
August			131	.636	.73
September	129	19	92.9	.451	.50
The year	810	19	235	1.14	15.45

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, 1921.

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 cable half a mile above gage or by wading.

CHANNEL AND CONTROL.—Rough and full of boulders, permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.20 feet at 8 a. m. December 15 (discharge, 4,410 second-feet); minimum stage recorded, 3.00 feet at 5 p. m. September 3 (discharge, 27 second-feet).

1911–1921: 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 recorded, 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 about 2,000,000,000 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 and enters Black River at the foot of Lyons Falls. A spillway from the basin overflows into Mill Creek, a tributary of Black River. Water flowing through these two channels returns to the river below the gaging station, 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.

Occasional discharge measurements have been made at three points to indicate the distribution of the diverted water. The water entering Boonville through the Forestport feeder has been measured at the highway bridge about 1 mile northeast of Boonville. During October, 1915, two water-stage recorders were installed on this canal to obtain a continuous record of flow, which is published as a separate station "Forestport feeder near Boonville, N. Y." The water flow-

ing north from the basin through the Black River canal has been measured at the highway bridge just below the lock into this canal near the railroad station. The water flowing south from the basin has been measured at a private farm bridge about 1 mile southeast of Boonville. During September, 1915, two water-stage recorders were installed on this canal to obtain a continuous record of the flow, which is published as a separate station, "Black River canal (flowing south) near Boonville, N. Y."

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice during most of January and February. 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, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 28	S. M. Currier	[a] 4.90	345
May 17	Howe and Currier	4.30	204

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Black River near Boonville, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	535	97	920	580	420	795	2,620	920	305	535	370	44
2	580	136	1,940	630	420	1,060	1,740	630	275	535	335	44
3	630	205	2,620	795	440	990	1,540	512	164	410	352	30
4	735	335	2,160	920	440	855	1,640	490	127	370	275	49
5	735	490	2,500	920	400	735	1,210	580	119	352	262	78
6	680	512	1,460	1,210	320	1,060	1,060	558	119	370	227	84
7	630	580	1,060	1,460	300	1,460	920	410	111	410	250	70
8	490	535	680	1,060	340	2,380	1,060	335	127	535	227	63
9	450	490	630	680	380	3,360	1,060	352	111	335	216	66
10	305	490	630	680	320	3,110	1,460	390	184	275	145	61
11	164	535	605	920	340	2,860	1,540	580	97	227	145	56
12	164	580	795	990	340	2,740	1,940	305	63	194	184	49
13	184	535	920	795	380	2,740	2,160	290	250	184	174	61
14	136	512	2,500	750	300	2,620	2,380	320	335	238	154	49
15	97	450	4,140	700	280	2,740	2,270	227	335	410	164	46
16	68	370	3,360	800	280	2,500	2,860	262	250	305	127	42
17	66	320	2,620	850	260	2,380	2,380	205	227	275	97	46
18	72	370	1,370	900	300	2,740	1,940	227	174	250	63	78
19	78	335	1,460	750	340	2,740	1,740	184	127	184	63	68
20	63	305	1,460	700	340	2,980	1,640	145	119	194	70	59
21	84	335	920	600	460	2,860	1,460	184	119	145	78	70
22	97	370	630	650	500	2,740	1,140	154	104	136	59	84
23	57	470	535	750	460	2,380	990	70	72	127	59	97
24	40	450	580	750	400	2,620	990	36	78	127	78	90
25	37	535	605	700	380	3,360	855	111	78	111	70	84
26	53	490	535	600	360	3,110	735	127	238	104	70	84
27	84	490	512	500	340	2,980	855	227	450	97	56	70
28	97	630	630	460	380	2,740	990	370	535	111	70	59
29	111	558	605	460	.....	2,740	1,060	470	535	194	72	56
30	84	630	535	460	.....	2,740	1,140	370	490	410	59	51
31	72	.....	490	440	.....	3,110	.....	335	.....	490	40	.....

NOTE.—Discharge, Jan. 14 to Feb. 28, determined from gage-heights corrected for ice effect from one discharge measurement, study of weather records, and comparison with records of flow at other stations in the basin.

Monthly discharge of Black River near Boonville, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 303 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	735	37	248	0.818	0.94
November	630	97	438	1.45	1.62
December	4,140	490	1,300	4.29	4.95
January	1,460	440	757	2.50	2.88
February	500	260	365	1.20	1.25
March	3,360	735	2,390	7.89	9.10
April	2,860	735	1,510	4.98	5.56
May	920	36	335	1.11	1.28
June	535	63	211	.696	.78
July	535	97	279	.921	1.06
August	370	40	149	.492	.57
September	97	30	62.9	.208	.23
The year	4,140	30	675	2.23	30.22

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 below this point.

DRAINAGE AREA. 1,890 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 18, 1920, to September 30, 1921, at present site; March 24, 1917, to July 17, 1920, at site three-fourths mile below Black River.

GAGE.—Vertical staff attached to downstream side of right bridge abutment, and inclined staff on right bank about 150 feet below. Gurley 7-day water-stage recorder installed September 3, 1921, in concrete shelter on downstream side of right bridge abutment. Staff gage read and recorder inspected by employees of Black River Regulating District.

DISCHARGE MEASUREMENTS.—Made from cable just below inclined gage.

CHANNEL AND CONTROL.—Channel rocky and rough; control permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.78 feet at 4.30 p. m. March 11 (discharge, 23,100 second-feet); minimum stage, 0.56 foot from 5 to 6 a. m. September 6 (discharge, 315 second-feet).

1920–1921: Maximum stage recorded March 11, 1921; minimum stage recorded, 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 "Diversion" in description of station on Black River near Boonville.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined between 400 and 25,000 second-feet. Daily discharge ascertained by applying mean daily gage height to rating table except for periods of considerable fluctuation when discharge was averaged for bi-hourly periods. Records good.

Discharge measurements of Black River at Watertown, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	Currier and Cooper [a]	1.57	1,280	Apr. 20	A. W. Harrington	4.48	7,500
21	Lamoureux and Burns [a]	1.56	1,260	20	do	4.48	7,500
Nov. 18	Covert and Harrington.	2.72	3,440	21	do	4.40	6,880
24	Currier and Burns [a]	4.80	8,300	July 12	do	2.07	2,100
24	do	4.78	8,150	Aug. 16	do	1.30	1,040
Dec. 16	do	6.14	12,900	18	do	1.59	1,340
16	do	6.17	12,900	19	do	1.40	1,090
Jan. 26	S. M. Currier	2.66	3,170	22	do	1.03	669
Mar. 10	A. W. Harrington	7.72	18,700	22	do	1.11	784
11	do	8.38	21,600	29	do	.71	420

[a] Employee of Black River Regulating District.

Daily discharge, in second-feet, of Black River at Watertown, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,370	1,500	2,960	3,160	2,370	3,160	12,000	3,580	2,370	1,580	1,580	750
2	3,790	2,460	5,350	3,160	2,000	4,000	11,400	4,440	2,090	2,000	1,420	850
3	3,580	2,560	7,050	5,580	1,830	5,580	10,500	4,890	1,660	1,080	1,280	700
4	2,960	4,000	7,800	6,060	2,090	6,300	10,200	4,440	1,350	850	1,020	610
5	2,000	4,220	7,050	6,550	1,830	6,060	9,000	4,000	1,080	1,080	960	514
6	1,740	4,000	10,200	7,300	1,830	5,580	7,800	3,370	850	1,080	905	813
7	2,000	2,460	10,200	5,580	2,000	8,100	6,800	2,960	1,210	850	960	867
8	1,660	2,370	9,600	4,890	2,280	9,000	5,820	2,370	1,080	905	596	1,050
9	1,740	2,280	8,400	4,440	2,000	14,000	5,120	2,180	850	800	960	1,020
10	1,080	2,180	7,550	3,580	2,180	19,600	5,350	2,370	905	700	1,080	921
11	1,210	2,370	5,350	3,160	2,180	22,800	5,350	2,000	750	2,560	1,020	760
12	1,350	2,370	4,890	3,160	2,370	21,600	5,350	2,000	1,020	2,370	905	876
13	1,350	2,280	4,660	2,460	2,180	18,800	4,220	2,000	1,350	3,580	850	932
14	960	2,000	5,820	2,560	1,830	14,800	3,580	1,830	1,660	2,560	700	1,190
15	1,210	2,090	11,400	2,560	2,280	13,200	3,580	1,580	1,660	2,280	1,140	1,080
16	1,210	2,000	12,800	2,660	2,180	13,600	3,790	1,420	1,500	3,160	960	854
17	800	2,090	15,200	3,160	3,790	14,000	4,660	1,830	1,210	3,790	960	865
18	1,210	3,580	13,200	3,370	5,120	14,400	6,300	1,580	1,140	2,960	1,210	898
19	1,020	4,000	10,500	3,160	4,440	14,400	7,300	1,350	905	2,370	750	964
20	1,350	3,580	9,600	2,460	3,790	15,600	7,550	1,350	800	2,370	1,020	932
21	1,140	2,760	6,550	2,560	3,370	17,200	7,300	1,210	960	2,370	960	1,300
22	1,350	2,460	4,890	2,960	2,960	18,000	6,300	1,210	905	2,560	905	1,010
23	1,280	4,890	5,580	3,790	2,760	20,000	5,820	850	905	2,000	850	1,020
24	900	8,400	6,800	4,000	2,280	18,400	5,580	1,140	960	1,580	1,140	1,170
25	1,280	8,400	5,350	4,000	2,180	14,800	5,350	1,420	800	1,210	750	760
26	850	7,300	4,890	3,370	2,090	14,800	5,120	1,500	850	905	905	863
27	1,350	5,820	4,000	2,760	2,180	15,200	4,440	1,740	650	1,140	905	1,040
28	1,350	4,440	3,790	2,280	2,370	16,000	3,790	1,580	1,080	1,140	905	1,140
29	1,280	4,000	3,580	2,180	.....	15,200	3,370	1,350	1,210	1,140	750	1,200
30	1,580	3,580	3,580	2,280	.....	14,400	3,160	1,740	1,280	1,580	750	1,140
31	900	.....	3,790	2,180	.....	12,800	.....	2,760	.....	1,280	850	.....

NOTE.—Discharge partly estimated Sept. 11 and 16; Sept. 17 and 18 determined from corrected staff gage readings. Records from water-stage recorder Sept. 4–30.

Monthly discharge of Black River at Watertown, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 1,890 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	3,790	800	1,540	0.815	0.94
November	8,400	1,500	3,560	1.88	2.10
December	15,200	2,960	7,170	3.79	4.37
January	7,300	2,180	3,590	1.90	2.19
February	5,120	1,830	2,530	1.34	1.40
March	22,800	3,160	13,600	7.20	8.30
April	12,000	3,160	6,200	3.28	3.66
May	4,890	850	2,190	1.16	1.34
June	2,370	650	1,170	.619	.69
July	3,790	700	1,800	.952	1.10
August	1,580	596	966	.511	.59
September	1,300	514	936	.495	.55
The year	22,800	514	3,790	2.01	27.23

NOTE.—See "Regulation" and "Diversions" in station description.

FORESTPORT FEEDER NEAR BOONVILLE, N. Y.

LOCATION.—At lower end of feeder, above point where it enters the basin at Boonville, Oneida County.

RECORDS AVAILABLE.—Occasional discharge measurements 1900 and 1905–1915; continuous record October 30, 1915, to September 30, 1921.

GAGES.—Two Gurley 7-day water-stage recorders, with natural scale for gage heights. 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; gages are 2.53 miles apart. These gages and the two in the Black River canal (flowing south) near Boonville are all set at the same datum; recorders inspected by Charles Nugent.

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 variation 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 the Forestport feeder just below gage No. 2 and a second spillway takes water from the basin in Boonville. Both discharge into Mill Creek, which enters Black River below 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 gage 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 winter. Water was observed in the canal several times during winters of 1917–18, 1918–19, 1919–20, and 1920–21, and occasional current-meter measurements of the discharge were made.

ACCURACY.—Records good except when either recorder is out of commission. At such times estimates of missing gage heights are made from gage height hydrographs or by comparison with gage heights from other recorder. Records for such periods, fair.

Discharge measurements of Forestport feeder near Boonville, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height (feet).		Discharge (sec.-ft.).	Date.	Made by—	Gage height (feet).		Discharge (sec.-ft.).
		Gage No. 1.	Gage No. 2.				Gage No. 1.	Gage No. 2.	
Nov. 16	Currier and Lauterhahn.	2.443	1.284	175	May 29	Covert and Au....	2.555	1.345	206
					June 8	C. C. Covert.....	2.447	1.113	195
16	.....do.....	2.443	1.284	175	July 1	.....do.....	2.543	1.515	182
21	.....do.....	2.138	1.250	141	22	Otto Lauterhahn.	3.060	1.770	236
Feb. 28	S. M. Currier.....	.....	.....	59.5	Aug. 24	A. W. Harrington	3.000	1.700	212
May 16	.....do.....	1.735	.670	125	Sept. 20	.....do.....	3.190	1.920	224

Daily discharge, in second-feet, of Forestport feeder near Boonville, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	May.	June.	July.	Aug.	Sept.
1	229	235	.....	216	177	220	220
2	189	243	.....	211	174	225	228
3	175	228	.....	195	184	222	228
4	188	212	.....	218	182	221	221
5	188	210	.....	209	200	223	232
6	184	211	.....	200	196	222	229
7	198	207	.....	200	219	219	220
8	210	205	.....	200	213	221	208
9	204	210	.....	197	181	221	208
10	202	191	.....	198	181	217	208
11	191	184	.....	198	207	225	217
12	189	194	.....	194	218	233	219
13	187	185	.....	213	217	220	213
14	189	182	.....	222	222	219	210
15	182	185	.....	235	258	217	208
16	198	179	131	229	261	214	212
17	194	206	147	230	246	213	211
18	187	211	169	221	237	214	214
19	191	198	223	180	259	216	223
20	190	188	246	175	244	217	223
21	183	.....	253	174	232	210	219
22	181	.....	249	176	232	207	215
23	185	.....	246	189	230	211	222
24	196	.....	247	210	229	220	221
25	192	.....	242	225	228	220	225
26	196	.....	248	192	232	207	205
27	208	.....	262	192	246	209	200
28	200	.....	203	194	236	215	198
29	206	.....	201	196	224	207	198
30	231	.....	163	207	246	206	200
31	236	.....	170	.....	258	206	.....

NOTE.—Discharge estimated Oct. 1-2, 26-30, Nov. 9-11, 13-16, May 26-28, June 2-8, 16-18, July 10, and 29-30 from comparative gage-height graphs, study of recorder graphs, and comparison with record of Black River canal; recorder graph incomplete.

Monthly discharge, in second-feet, of Forestport feeder near Boonville, N. Y., for the year ending Sept. 30, 1921.

Month.	Maximum.	Minimum.	Mean.
October	236	175	196
November 1-20	243	179	203
May 16-31	262	131	212
June	235	174	203
July	261	174	222
August	233	206	217
September	232	198	215

BLACK RIVER CANAL (FLOWING SOUTH) NEAR BOONVILLE, N. Y.

LOCATION.—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, 1921.

GAGES.—Two Gurley 7-day water-stage recorders, 1.81 miles apart, with natural scale for gage heights. Gage No. 1 is on right bank (opposite tow-path) about 50 feet downstream from collector's office in Boonville; gage No. 2 is on right bank (opposite tow-path) 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 show the variation of "C" through the season, and the coefficient for each day is taken off the curve. The other factors in the Chezy formula are obtained from gage-height records and cross-section of canal.

DIVERSIONS.—No diversions 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.

ACCURACY.—Records good except when either recorder is out of commission. At such times estimates of missing gage-heights are made from gage-height graph or by comparison with gage-height graph from other recorder. Records for such periods, fair.

Discharge measurements of Black River canal (flowing south) near Boonville, N. Y. during the year ending Sept. 30, 1921.

Date.	Made by.	Gage height (feet).		Discharge (sec.-ft.).	Date.	Made by.	Gage height (feet).		Discharge (sec.-ft.).
		Gage No. 1.	Gage No. 2.				Gage No. 1.	Gage No. 2.	
Oct. 21	V. B. Lamoureux	1.442	1.150	157	May 29	Covert and Au...	0.995	0.835	137
Nov. 15	Currier and Lauterhahn.....	.697	.531	90.3	June 9	C. C. Covert.....	1.055	.828	141
Nov. 16	.....do.....	.896	.652	125	July 1	.....do.....	1.318	1.061	148
21	.....do.....	1.291	1.032	130	22	Otto Lauterhahn	1.378	.884	179
May 16	S. M. Currier.....	.335	.110	111	Aug. 24	A. W. Harrington	1.190	.570	150
					Sept. 20	.....do.....	1.510	1.000	169

Daily discharge, in second-feet, of Black River canal (flowing south) near Boonville, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	May.	June.	July.	Aug.	Sept.
1	140	149	.....	130	146	163	148
2	130	176	.....	155	140	162	151
3	124	151	.....	138	141	161	155
4	133	135	.....	160	141	160	149
5	126	144	.....	156	159	168	156
6	126	161	.....	133	183	165	154
7	143	154	.....	161	160	158	160
8	160	153	.....	139	173	164	156
9	158	147	.....	139	158	156	150
10	144	158	.....	139	149	160	152
11	142	155	.....	138	156	162	161
12	144	141	.....	131	168	159	159
13	142	127	.....	150	167	148	157
14	139	123	.....	157	163	156	153
15	137	125	.....	157	168	156	153
16	139	130	107	162	173	155	156
17	141	144	114	166	171	157	161
18	134	143	89	157	175	157	157
19	130	137	93	128	180	156	162
20	134	137	100	122	175	156	167
21	149	.....	110	120	175	151	164
22	150	.....	108	120	173	154	163
23	155	.....	108	139	171	154	169
24	166	.....	115	153	169	158	168
25	160	.....	116	171	173	159	164
26	169	.....	100	150	170	154	162
27	185	.....	138	149	177	147	167
28	130	.....	125	152	170	143	161
29	160	.....	126	145	172	142	157
30	129	.....	136	161	175	144	158
31	133	.....	151	.....	177	145	.....

NOTE.—Discharge estimated Oct. 9–21, Nov. 9, 10, 13–16, 19, and 20, by comparison of gage-height graphs for gages Nos. 1 and 2, in connection with gage No. 2, Forestport feeder, and from study of recorder graphs; recorder graph incomplete.

Monthly discharge, in second-feet, of Black River canal (flowing south) near Boonville, N. Y., for the year ending Sept. 30, 1921.

Month.	Maximum.	Minimum.	Mean.
October	185	124	144
November 1–20	176	123	144
May 16–31	151	89	115
June	171	120	146
July	183	140	166
August	168	142	156
September	169	148	158

MOOSE RIVER AT MOOSE RIVER, N. Y.

LOCATION.—In village 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, 1921.

GAGE.—Staff in two sections on left bank a short distance above cable; read by W. D. Rinkle. Gage datum was lowered 0.17 foot February 28, 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, 12.59 feet at 9.15 a. m. March 22 (discharge, 6,290 second-feet); minimum stage recorded, 5.05 feet at 5.15 a. m. June 19 and 9.30 a. m. August 10 (discharge, 58 second-feet).

1900–1921: 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 recorded, 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 a record from station "Middle Branch of Moose River at Old Forge."

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice. Rating curve well defined between 100 and 5,500 second-feet. Gage read to half-tenths once daily; occasionally twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for low stages when mean of two daily readings of gage may not indicate the correct mean gage height owing to fluctuations in stage.

Discharge measurements of Moose River at Moose River, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	Currier and Lamoureux	6 25	340	Mar. 11	S. M. Currier	10.58	3,950
13	do	6.20	341	11	do	10.46	3,810
Jan. 29	Harrington and Currier.	[a] 6.75	487	24	do	10.00	2,830
				Apr. 19	B. F. Howe	8.54	1,500
Feb. 27	S. M. Currier	[a] 5.82	135	May 17	Currier and Howe	5.98	286

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Moose River at Moose River, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	670	336	422	1,020	360	650	2,760	1,590	386	422	540	151
2	1,140	450	1,910	540	360	650	2,660	1,260	404	404	79	189
3	760	580	2,090	1,750	400	800	2,090	625	320	114	131	164
4	289	810	2,000	1,380	380	700	1,910	1,260	259	126	422	114
5	580	760	1,670	1,200	420	800	1,450	860	83	404	83	304
6	422	1,200	2,660	1,020	85	600	1,590	670	259	87	126	369
7	404	131	2,270	910	360	850	1,750	670	151	74	151	441
8	230	760	1,590	965	400	1,590	1,520	230	244	164	259	352
9	202	580	1,080	126	500	4,230	1,320	580	83	715	244	336
10	164	580	1,200	460	420	5,630	1,380	580	202	1,020	58	336
11	336	965	1,080	760	440	3,280	1,320	404	230	1,200	79	289
12	230	910	274	860	420	2,760	760	386	202	1,450	320	320
13	352	670	625	700	280	2,660	860	386	352	1,200	202	320
14	304	216	1,140	700	480	2,860	810	386	386	1,200	230	336
15	230	625	5,320	750	380	2,460	760	304	350	1,450	352	336
16	352	460	2,960	160	340	3,740	1,320	422	320	1,450	259	320
17	117	670	2,090	950	320	3,500	2,460	289	259	1,020	336	320
18	259	441	1,590	800	420	2,960	2,860	289	289	760	202	336
19	114	422	1,320	600	460	2,460	2,090	289	83	580	103	441
20	176	460	1,140	550	380	3,500	1,450	259	259	422	540	422
21	289	151	1,140	480	360	6,130	1,200	304	320	580	202	369
22	289	460	1,020	420	500	5,960	965	93	304	625	230	336
23	304	580	1,020	150	500	3,280	860	460	289	404	190	460
24	289	860	1,140	600	460	2,860	860	259	289	189	151	386
25	320	760	760	440	420	3,740	965	289	274	320	146	422
26	202	670	1,020	800	400	5,030	965	202	114	304	103	404
27	202	670	965	600	130	3,620	715	460	422	289	100	460
28	336	189	1,080	500	650	3,860	670	289	91	289	108	441
29	352	422	1,020	480	.....	3,170	625	126	422	138	114	386
30	352	404	1,200	100	.....	2,560	580	280	460	289	114	230
31	101	.....	910	480	.....	2,660	.....	441	.....	422	120	.....

NOTE.—Discharge, Jan. 13 to Mar. 7, determined from gage-heights corrected for ice effect from two discharge measurements, study of weather records, and comparison with records of flow of Black River near Boonville. Discharge estimated Nov. 2, Dec. 4, Apr. 14, 21, 29, May 30, June 15, July 11, Aug. 23, 27, and 31; no gage-height record.

Monthly discharge of Moose River at Moose River, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 370 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	1,140	101	334	0.903	1.04
November	1,200	131	573	1.55	1.73
December	5,320	274	1,470	3.97	4.58
January	1,750	100	686	1.85	2.13
February	650	85	394	1.06	1.10
March	6,130	600	2,890	7.81	9.00
April	2,860	580	1,380	3.73	4.16
May	1,590	93	482	1.30	1.50
June	460	83	270	.730	.81
July	1,450	74	584	1.58	1.82
August	540	58	203	.549	.63
September	460	114	336	.908	1.01
The year	6,130	58	806	2.18	29.51

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, 1921.

GAGE.—Vertical staff on left bank 300 feet below highway bridge; read by Jacob Edick and A. F. Risley.

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

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 stage recorded during year, 5.10 feet morning and afternoon March 23 (discharge, 862 second-feet); minimum stage recorded, 0.90 foot at 5 p. m. November 9 and 8 a. m. November 10 and 12 (discharge, 21 second-feet).

1911–1921: Maximum discharge recorded, that of March 23, 1921; minimum discharge, 16 second-feet October 18 to November 3, 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. Rating curve well defined from 20 to 400 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height weighted on days of changing gates from records of gate opening at dam. Records good, except those computed from gate openings at the dam and when backwater is present, which are fair.

Discharge measurements of Middle Branch of Moose River at Old Forge, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	Currier and Lamoureux	1.96	120	Jan. 28	Harrington and Currier.	1.47	64.7
12	.....do.....	1.96	121	May 18	Currier and Howe.....	1.29	44.0
Nov. 17	Lauterhahn and Currier	1.16	37.6	18	.....do.....	1.29	44.8
17	.....do.....	1.16	36.8	Sept. 2	A. W. Harrington.....	1.13	34.5

Daily discharge, in second-feet, of Middle Branch of Moose River at Old Forge, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	98	34	32	110	40	104	557	70	46	46	47	34
2	42	36	34	110	39	104	530	75	46	46	48	34
3	39	46	35	110	39	116	530	75	47	45	46	98
4	42	41	38	110	39	123	477	75	46	45	46	197
5	26	32	40	110	39	116	451	75	46	43	45	197
6	31	25	48	110	70	123	311	75	43	43	44	189
7	26	26	49	110	110	123	280	75	45	43	44	189
8	46	25	50	92	110	123	270	75	43	44	43	181
9	25	22	49	80	110	158	270	61	42	46	42	181
10	110	22	48	80	110	136	173	46	45	46	41	181
11	116	22	47	92	110	223	70	46	51	49	39	181
12	123	22	46	92	110	280	70	45	46	47	39	181
13	116	22	45	92	110	270	75	43	50	47	39	181
14	123	36	46	92	110	270	70	42	48	46	39	181
15	116	39	55	75	104	280	70	41	50	47	40	173
16	116	35	75	64	104	290	70	42	49	50	39	173
17	110	36	123	65	104	311	75	46	45	45	39	173
18	116	37	136	65	98	355	80	45	46	48	39	173
19	110	38	123	63	98	355	86	44	46	46	39	173
20	110	36	110	63	98	378	98	43	45	47	39	173
21	110	38	104	65	104	477	86	43	46	52	39	173
22	110	38	110	65	104	702	86	45	47	50	39	165
23	110	35	136	65	110	862	75	47	47	48	39	165
24	110	34	104	65	110	829	75	42	46	47	38	165
25	86	33	116	65	104	796	75	45	46	48	38	165
26	53	33	104	65	110	764	75	46	47	44	39	165
27	50	32	116	63	110	733	75	48	45	46	38	165
28	53	32	116	63	110	702	75	46	45	48	38	158
29	54	32	116	63	.....	672	70	44	52	46	38	158
30	43	32	116	62	.....	613	80	45	50	47	37	158
31	36	.....	110	50	.....	585	.....	44	.....	49	35	.....

NOTE.—Discharge, May 9 to Aug. 31, determined by indirect method on account of backwater, on basis of two discharge measurements.

Monthly discharge of Middle Branch of Moose River at Old Forge, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 51.5 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	123	25	79.2	1.54	1.78
November	46	22	32.4	.629	.70
December	136	32	79.9	1.55	1.79
January	110	50	79.9	1.55	1.79
February	110	39	93.4	1.81	1.88
March	862	104	386	7.50	8.65
April	557	70	180	3.50	3.90
May	75	41	52.7	1.02	1.19
June	52	42	46.5	.903	1.01
July	52	43	46.6	.905	1.04
August	48	35	40.5	.786	.91
September	197	34	163	3.17	3.54
The year	862	22	107	2.08	28.18

BEAVER RIVER AT STATE DAM, NEAR BEAVER RIVER, N. Y.

LOCATION.—At concrete storage dam at outlet of Beaver River flow, 7½ 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, 1921.

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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 foot bridge at the mouth of the 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 based on the Cornell experiments [1] 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, 19.0 feet at 8.40 a. m. March 21 and 7 a. m. March 22; minimum elevation recorded, 6.5 feet at 10 a. m. September 30.

1908–1921: Maximum elevation of water surface in reservoir, 19.46 feet March 29, 1913; minimum elevation, 2.9 feet September 29 and October 1, 1913.

EXTREMES OF DISCHARGE.—Maximum daily discharge during year, 2,600 second-feet March 22; minimum discharge, zero on October 4, when gates were closed.

1908–1921: Maximum discharge, 3,296 second-feet on May 2, 1911; minimum discharge, zero, during periods when gates were closed and there was no flow over spillway.

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. 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, 1921.

[Drainage area, 176 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	385	0	263	1.49	1.72
November	314	137	170	.966	1.08
December	874	86	412	2.34	2.70
January	330	99	210	1.19	1.37
February	340	316	324	1.84	1.92
March	2,600	316	1,330	7.56	8.72
April	1,540	143	511	2.90	3.24
May	320	178	214	1.22	1.41
June	295	44	179	1.02	1.14
July	378	7	143	.812	.94
August	320	156	259	1.47	1.70
September	293	175	231	1.31	1.46
The year	2,600	0	355	2.02	27.40

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

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

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

LOCATION.—Just below Eagle Falls plant of Beaver River Power Corporation, 2½ 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 to September 30, 1921.

GAGE.—Vertical staff on left bank about 500 feet below power house; read by A. V. Buckingham, 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 rocks. Control is at the head of rapids about 50 feet below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, August 21 to September 30, 1921, 2.45 feet at 8 a. m. August 22 (discharge, 390 second-feet); minimum stage recorded, 0.90 foot at 6 a. m. September 18 and 8 a. m. and 5 p. m. September 25 (discharge, 46 second-feet).

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. Rating curve fairly well defined between 10 and 3,500 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

No discharge measurements were made during the period.

Daily discharge, in second-feet, of Beaver River at Eagle Falls, near Number Four, N. Y., for the year ending Sept. 30, 1921.

Day.	Aug.	Sept	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1	.....	315	11	.....	.....	21	330	285
2	.....	330	12	.....	.....	22	375	235
3	.....	330	13	.....	.....	23	360	235
4	.....	330	14	.....	.....	24	345	210
5	.....	345	15	.....	.....	25	330	48
6	.....	345	16	.....	.....	26	345	260
7	.....	315	17	.....	285	27	330	235
8	.....	315	18	.....	93	28	345	235
9	.....	315	19	.....	315	29	345	235
10	.....	285	20	.....	315	30	345	138
						31	285	.....

NOTE.—Discharge, Sept. 11–16, estimated at 260 second-feet from comparison with records of West Branch of Oswegatchie River near Harrisville and of Beaver River near Beaver River, with allowance for storage; no gage-height record.

Monthly discharge of Beaver River at Eagle Falls, near Number Four, N. Y., for the period, Aug. 21 to Sept. 30, 1921.

[Drainage area, 230 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
August 21-31	375	285	340	1.48	0.61
September	345	48	263	1.14	1.27

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

RECORDS AVAILABLE.—October 6, 1912, to September 30, 1921.

GAGE.—Vertical staff on left bank 600 feet below lower dam; read by Henry Van Waldick. Datum lowered 1.0 foot on July 28, 1920.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 30 feet upstream from gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.70 feet at 7.30 a. m. and 5.30 p. m. March 24 and 5.25 p. m. March 25 (discharge, 1,930 second-feet); minimum stage reached nearly every Sunday during low-water period when paper mills shut down.

1912–1921: Maximum stage recorded, 6.1 feet 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 practically permanent; not affected by ice during year. Rating curve well defined between 20 and 1,200 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to the rating table. Records only fair as mean daily gage heights are obtained from only two readings a day and may be considerably in error on account of regulation.

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

Daily discharge, in second-feet, of East Branch of Oswegatchie River at Newton Falls, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug	Sept.
1	363	205	282	242	326	363	1,500	198	293	200	315	272
2	363	272	293	149	430	326	1,330	389	198	214	293	262
3	315	205	252	223	304	363	1,270	326	214	252	282	262
4	326	252	272	262	326	363	1,270	475	232	223	376	262
5	338	252	70	252	315	338	1,120	430	214	200	293	293
6	293	272	214	282	315	338	894	363	174	282	272	252
7	293	198	445	252	315	389	571	326	252	252	338	242
8	338	205	304	205	326	389	460	232	232	242	262	262
9	363	272	293	191	315	658	538	315	252	262	338	232
10	282	232	293	205	326	588	416	205	242	108	338	232
11	214	232	198	214	315	416	430	282	242	191	293	205
12	363	242	129	214	338	338	490	363	205	150	272	272
13	252	232	149	214	272	293	475	242	205	232	293	262
14	304	0	191	191	338	315	445	242	232	232	293	223
15	304	242	430	214	363	389	490	149	272	272	282	223
16	338	165	430	158	326	326	506	198	252	293	282	242
17	143	282	416	232	338	894	430	262	232	262	272	200
18	252	252	252	223	350	982	363	293	262	272	293	200
19	272	242	102	430	326	1,270	304	326	181	272	214	376
20	272	282	242	304	165	1,270	460	282	198	282	200	252
21	293	181	272	338	338	1,500	475	272	232	304	200	272
22	326	293	242	376	242	1,270	445	191	198	416	242	272
23	165	262	252	252	149	1,170	506	174	232	293	282	252
24	0	282	242	293	143	1,930	350	293	262	242	242	262
25	205	214	165	191	149	1,860	350	282	262	282	272	205
26	338	252	165	198	165	1,860	315	272	143	223	242	350
27	232	293	232	338	143	1,740	205	272	242	272	252	200
28	205	70	149	214	376	1,680	430	232	262	242	205	191
29	242	315	143	143	.....	1,620	272	252	242	293	252	150
30	205	242	143	158	.....	1,620	326	214	242	242	223	183
31	149	.....	158	490	.....	1,500	.....	223	.....	338	272	.....

NOTE.—Discharge Oct. 24 and Nov. 14 uncertain on account of insufficient gage-height data.

Monthly discharge of East Branch of Oswegatchie River at Newton Falls, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 166 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	363	0	269	1.62	1.87
November	315	0	231	1.39	1.55
December	445	70	239	1.44	1.66
January	490	143	247	1.49	1.72
February	430	143	290	1.75	1.82
March	1,930	293	915	5.51	6.35
April	1,500	205	581	3.50	3.90
May	475	149	277	1.67	1.92
June	293	143	230	1.39	1.55
July	416	108	253	1.52	1.75
August	376	200	274	1.65	1.90
September	376	150	245	1.48	1.65
The year	1,930	0	338	2.04	27.64

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, 1921.

GAGE.—Gurley 7-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 George Todd.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet below gage or by wading.

CHANNEL AND CONTROL.—Solid rock.

EXTREMES OF DISCHARGE.—Maximum stage during the year from water-stage recorder, 6.80 feet at 6 p. m. December 16 (discharge, 9,700 second-feet); minimum stage from water-stage recorder, 0.81 foot, 2 to 4 a. m. September 30 (discharge, 274 second-feet).

1916–1921: 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 occurred September 30, 1921.

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 in December and January. Rating curve well defined between 400 and 15,000 second-feet. Operation of water-stage recorder fairly satisfactory during the year. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph, or for days of considerable variation in stage, by averaging discharge for intervals of the day. Open-water records good; winter records fair.

The following discharge measurement was made by S. M. Currier:
January 24, 1921: Gage-height, 2.38 feet; discharge, 1,710 second-feet.

Daily discharge, in second-feet, of Oswegatchie River near Heuvelton, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,040	630	1,580	1,900	854	1,380	5,670	1,220	1,150	420	527	398
2	1,780	719	1,980	2,600	827	2,060	5,670	1,340	1,200	472	541	320
3	1,980	938	2,750	4,000	827	3,780	5,480	1,430	1,040	459	492	370
4	1,840	1,530	2,820	3,800	791	3,870	4,830	1,460	900	433	478	360
5	1,590	1,650	3,130	3,400	782	3,370	4,210	1,320	764	420	398	392
6	1,400	1,630	4,740	3,200	791	2,980	3,620	1,190	670	392	409	409
7	1,220	1,430	5,480	2,600	800	3,530	2,980	1,090	608	392	433	409
8	1,030	1,260	5,480	2,200	809	4,210	2,390	985	570	409	466	440
9	938	1,120	5,100	2,000	836	5,480	2,110	909	520	414	426	426
10	872	1,000	4,120	1,700	836	6,650	1,980	909	506	382	472	426
11	791	918	3,370	1,500	818	8,540	1,910	918	541	382	492	420
12	710	976	3,050	1,300	827	9,220	1,910	800	541	355	478	420
13	678	1,010	2,600	1,200	818	8,100	1,770	800	527	335	433	409
14	630	985	3,400	1,100	782	6,650	1,610	845	492	392	426	446
15	615	909	7,680	1,000	764	5,100	1,510	737	578	513	466	478
16	622	818	9,700	1,000	916	4,470	1,420	622	662	527	466	446
17	654	755	9,220	1,000	2,720	4,560	1,540	608	686	541	485	420
18	638	773	7,680	950	3,290	4,650	2,040	570	670	541	608	382
19	615	909	6,250	900	2,390	4,650	2,110	578	600	520	562	365
20	622	1,340	4,830	800	1,480	4,740	2,180	600	534	534	492	330
21	622	1,430	3,370	850	1,240	5,480	2,110	600	472	562	440	345
22	592	1,320	3,200	1,500	1,240	6,250	2,040	654	472	694	426	355
23	555	1,280	3,200	1,700	1,240	6,650	1,980	541	414	818	355	325
24	492	1,340	3,600	1,600	1,220	7,050	2,180	562	409	845	330	320
25	452	2,180	3,800	1,400	1,120	7,260	2,180	548	426	764	355	350
26	426	2,530	3,600	1,300	1,020	7,050	1,910	492	394	662	382	376
27	452	2,530	3,400	1,140	966	6,250	1,590	499	387	578	398	350
28	478	2,320	3,000	1,010	956	5,860	1,420	570	398	520	426	306
29	478	2,180	2,800	985	.....	5,860	1,220	570	409	452	433	279
30	555	1,770	2,400	947	.....	6,050	1,290	548	376	459	420	297
31	630	.....	2,200	938	.....	5,860	.....	728	.....	499	440	.....

NOTE.—Discharge, Dec. 22 to Jan. 26, determined from gage-heights corrected for ice effect from one discharge measurement and study of recorder graph and by comparison with records of other stations. Discharge partially estimated Oct. 10, 17, 31, Nov. 21, Feb. 6–8, 20–22, Apr. 17, 18, May 8, June 5, 19, 26, 27, July 3, 17, Aug. 12, and Sept. 3; recorder graph incomplete.

Monthly discharge of Oswegatchie River near Heuvelton, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 961 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	1,980	426	839	0.873	1.01
November	2,530	630	1,340	1.39	1.55
December	9,700	1,580	4,180	4.35	5.02
January	4,000	800	1,660	1.73	1.99
February	3,290	764	1,140	1.19	1.24
March	9,220	1,380	5,410	5.63	6.49
April	5,670	1,220	2,500	2.60	2.90
May	1,460	492	814	.847	.98
June	1,200	376	597	.621	.69
July	845	355	506	.527	.61
August	608	330	450	.468	.54
September	478	279	379	.394	.44
The year	9,700	279	1,660	1.73	23.46

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

LOCATION.—At highway bridge near Geers Corners, 2½ 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, 1921.

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 upstream from bridge or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.90 feet at 5 p. m. March 22 (discharge, 4,580 second-feet); minimum stage recorded, 0.90 foot at 7 a. m. September 18, 20–24 (discharge, about 33 second-feet).

1916–1921: 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, September 18 and 20–24, 1921.

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 practically permanent; only slightly affected by ice for short periods. Rating curve well defined between 50 and 4,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except those for low stages which may be subject to error owing to diurnal fluctuation.

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

Daily discharge, in second-feet, of West Branch of Oswegatchie River near Harrisville, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	320	182	440	750	275	460	1,490	460	520	106	106	58
2	600	335	650	1,100	220	520	1,490	480	388	91	91	85
3	650	480	800	1,100	220	750	1,420	480	290	91	85	79
4	422	650	970	1,000	195	970	1,210	388	232	79	91	79
5	335	600	1,090	900	220	910	970	335	182	77	85	79
6	275	560	1,490	800	220	700	850	305	195	79	77	91
7	208	460	2,130	700	220	1,090	750	245	170	79	66	91
8	195	388	1,880	600	245	1,490	650	275	146	70	58	70
9	182	370	1,560	480	232	3,090	560	232	98	66	58	63
10	98	370	1,280	440	195	4,220	700	245	106	68	49	58
11	146	370	1,030	380	220	3,860	650	220	106	170	49	51
12	124	335	850	340	220	2,990	560	232	170	275	74	43
13	106	305	700	300	208	2,220	480	220	335	220	91	48
14	79	275	800	280	208	1,880	440	208	335	220	106	46
15	91	275	2,130	280	220	1,640	440	195	260	208	124	42
16	91	245	2,490	280	232	1,640	440	195	220	195	170	46
17	91	305	1,880	280	560	2,040	560	195	208	170	146	43
18	98	440	1,640	280	560	1,960	800	170	170	124	115	38
19	91	520	1,350	280	560	1,490	910	146	146	158	106	46
20	79	480	1,030	280	520	1,720	910	146	124	305	106	41
21	85	405	750	300	440	2,990	750	146	115	440	91	40
22	79	440	700	340	405	4,460	750	146	85	352	74	38
23	79	560	850	320	352	3,860	750	124	85	290	77	36
24	79	1,090	1,090	380	335	2,490	700	146	85	232	74	37
25	70	1,090	1,000	300	305	1,800	700	146	74	170	48	36
26	74	1,030	900	280	305	1,490	560	170	106	124	48	42
27	77	850	800	280	305	1,420	480	170	91	106	54	49
28	124	750	750	275	305	1,490	440	146	115	106	60	56
29	182	560	700	275	.....	1,640	370	195	106	115	58	51
30	170	460	600	232	.....	1,640	370	480	91	135	56	49
31	124	.....	600	245	.....	1,490	.....	700	.....	124	51	.....

NOTE.—Discharge, Dec. 25 to Jan. 27, estimated on account of ice effect, from study of gage-heights and weather records.

Monthly discharge of West Branch of Oswegatchie River near Harrisville, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 245 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	650	70	175	0.715	0.82
November	1,090	182	506	2.06	2.30
December	2,490	440	1,130	4.61	5.32
January	1,100	232	454	1.85	2.13
February	560	195	304	1.24	1.29
March	4,460	460	1,950	7.96	9.18
April	1,490	370	738	3.01	3.36
May	700	124	256	1.04	1.20
June	520	74	178	.727	.81
July	440	66	163	.665	.77
August	170	48	82.1	.335	.39
September	91	36	54.4	.222	.25
The year	4,460	36	502	2.05	27.82

RAQUETTE RIVER AT PIERCEFIELD, N. Y.

LOCATION.—Half a mile below dam of International Paper Co. at Piercefield, St. Lawrence County, and three-fourths 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, 1921.

GAGE.—Stevens water-stage recorder installed October 22, 1912, in a galvanized sheet-iron house over a concrete well on left bank about half a mile below dam. Recorder inspected by employee of International Paper Co.

DISCHARGE MEASUREMENTS.—Made from a cable three-fourths 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, 11.49 feet 5 to 6 a. m., March 30 (discharge, 7,150 second-feet); minimum stage from water-stage recorder, 2.60 feet at 9 a. m. January 23 (discharge, 148 second-feet).

1908–1921: Maximum stage from water-stage recorder occurred March 30, 1921; 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 seldom freeze, and 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 about May 8 to September 30. Rating curve well defined between 50 and 7,000 second-feet. Daily discharge ascertained by use of discharge integrator. Mean daily discharge May 8 to September 30 estimated on account of backwater from logs. Records during open-water period good; for period of log effect, approximate only.

COOPERATION.—Water-stage recorder inspected by an employee of the International Paper Co.

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

Daily discharge, in second-feet, of Raquette River at Piercefield, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	562	394	1,050	1,460	934	848	6,900	2,140	1,100	440	700	500
2	580	530	1,160	1,480	935	858	6,640	2,320	1,100	440	750	550
3	281	530	1,330	1,870	806	838	6,250	2,320	1,100	400	650	460
4	519	530	1,460	1,740	852	904	5,990	2,240	1,000	400	650	320
5	615	530	959	1,810	760	885	5,730	.....	950	380	700	280
6	782	530	1,580	1,690	280	347	5,490	.....	900	400	650	220
7	828	305	1,860	1,700	723	866	5,250	.....	800	360	280	360
8	912	431	1,990	1,610	764	1,190	4,890	.....	800	380	440	550
9	1,000	598	2,030	1,070	722	1,020	4,650	.....	750	400	650	500
10	526	817	2,030	1,540	836	1,590	4,220	.....	700	420	650	500
11	700	847	1,830	1,490	888	1,840	4,170	.....	700	440	650	320
12	674	825	1,890	1,390	800	2,150	3,950	.....	700	460	650	280
13	740	896	2,070	1,400	284	2,300	3,730	.....	700	480	550	280
14	701	380	2,240	1,140	789	2,740	3,400	.....	700	500	320	440
15	650	728	2,410	1,150	780	2,900	3,290	.....	750	500	280	280
16	670	830	2,500	925	760	3,170	3,030	.....	700	550	650	280
17	401	795	2,590	1,370	770	3,410	2,820	.....	750	380	650	300
18	457	780	2,390	1,350	764	3,640	2,880	.....	700	550	700	280
19	507	892	2,680	.....	870	3,850	2,780	.....	650	500	650	320
20	530	898	2,590	.....	234	4,390	2,780	.....	650	500	600	380
21	545	479	2,590	.....	680	5,130	2,680	.....	650	550	360	280
22	570	766	2,500	.....	774	5,490	2,680	.....	600	600	280	280
23	615	947	1,980	505	.....	5,860	2,680	.....	550	600	550	360
24	330	971	1,950	900	.....	6,250	2,410	.....	500	460	500	500
25	388	972	1,500	1,080	.....	6,640	2,600	.....	480	600	550	280
26	500	992	2,000	1,070	.....	6,770	2,620	800	480	600	500	280
27	515	1,000	2,000	1,040	321	6,900	2,610	750	480	600	480	280
28	515	506	1,800	1,080	802	7,030	2,660	750	480	650	500	280
29	515	876	1,950	900	.....	7,030	2,590	800	460	650	280	300
30	530	1,180	1,910	455	.....	7,030	2,540	1,000	460	600	460	440
31	291	.....	1,870	773	.....	7,030	.....	1,100	.....	420	550	.....

NOTE.—Discharge, Jan. 19–22, estimated 1,200 second-feet; Feb. 23–26, 950 second-feet; and May 5–25, 1,700 second-feet; operation of recorder unsatisfactory. Discharge, May 26 to Sept. 30 determined from recorder graph corrected for backwater from logs on control. Discharge partly estimated Nov. 27, Dec. 24–28, and May 26.

Monthly discharge of Raquette River at Piercefield, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 723 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	1,000	281	579	0.801	0.92
November	1,180	305	725	1.00	1.12
December	2,680	959	1,960	2.71	3.12
January	1,870	455	1,250	1.73	1.99
February	.....	234	747	1.03	1.07
March	7,030	347	3,580	4.95	5.71
April	6,900	2,410	3,830	5.30	5.91
May	.....	750	1,610	2.23	2.57
June	1,100	466	711	.983	1.10
July	650	360	491	.679	.78
August	750	280	543	.751	.87
September	550	220	356	.492	.55
The year	7,030	220	1,370	1.89	25.71

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, 6¼ 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, 1921.

GAGES.—Gurley 7-day graph water-stage recorder installed August 14, 1920, on left bank about 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, 10.17 feet at 2 a. m. March 10 (discharge, 7,460 second-feet); minimum stage from water-stage recorder, 5.74 feet at noon August 8 (discharge, 146 second-feet).

1910–1921: Maximum stage recorded, 9.1 feet at 7 a. m. March 27, 1914 (discharge, 16,200 second-feet); minimum stage recorded, 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 December to March. Rating curve well defined between 200 and 6,000 second-feet. Daily discharge, except for period of ice effect, ascertained by applying mean daily gage height to rating table. Open-water records good; winter records fair.

Discharge measurements of St. Regis River at Brasher Center, N. Y., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 23	Currier and Harrington	a 7.31	1,340
Feb. 25	S. M. Currier	a 6.40	327
Aug. 30	Covert and Grover	5.88	198

a 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, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,580	548	655	1,300	420	600	2,920	990	735	254	237	206
2	2,100	745	1,000	3,000	480	650	2,660	978	665	248	248	202
3	1,960	1,090	1,520	2,600	500	1,700	2,260	1,060	510	237	242	202
4	1,480	1,420	1,660	2,000	500	900	2,100	954	685	215	220	206
5	1,120	1,440	1,900	1,800	600	650	1,700	705	483	215	188	174
6	942	1,150	2,260	1,500	600	1,200	1,580	645	420	226	188	232
7	810	822	2,180	1,300	600	2,000	1,490	645	474	226	184	232
8	735	705	1,970	1,300	600	2,000	1,550	705	312	215	158	210
9	567	675	1,790	1,100	600	5,000	1,490	420	305	259	179	202
10	501	858	1,700	900	600	6,310	1,520	548	404	412	174	210
11	465	918	1,700	800	600	4,860	1,550	388	340	625	174	206
12	429	894	1,600	650	600	3,920	1,420	715	348	725	242	220
13	404	755	1,700	600	550	3,620	1,180	447	653	558	242	220
14	396	655	2,400	600	550	3,080	990	447	1,080	340	248	210
15	420	596	5,000	600	500	2,830	1,060	438	1,030	305	298	197
16	396	548	3,800	600	700	3,720	1,060	438	894	380	312	215
17	388	483	3,000	650	3,000	3,820	1,180	438	695	558	298	226
18	372	881	2,600	650	850	3,440	1,180	412	605	510	291	215
19	364	799	2,200	650	750	2,830	1,590	372	501	388	259	220
20	364	766	1,600	650	700	3,350	1,520	380	356	333	305	226
21	312	1,780	1,700	950	600	4,440	1,520	380	348	364	348	232
22	326	966	2,600	1,800	550	5,400	1,650	364	312	429	298	226
23	340	675	2,600	1,400	460	4,640	1,760	356	277	372	298	202
24	340	510	2,800	1,000	380	3,620	1,590	348	259	326	270	202
25	356	665	2,800	600	320	3,170	1,690	340	259	277	438	202
26	356	715	2,600	550	320	3,080	1,460	364	248	284	291	188
27	404	755	2,200	550	280	3,000	1,280	356	242	270	248	192
28	483	715	2,000	550	320	3,170	1,210	348	259	298	220	210
29	529	685	1,700	600	.....	3,080	1,040	348	248	270	215	210
30	510	665	1,500	600	.....	2,660	990	483	259	270	210	210
31	492	.....	1,300	420	.....	2,660	.....	665	.....	259	206	.....

NOTE.—Discharge, Dec. 10 to Mar. 9, determined from gage-heights corrected for ice effect from two discharge measurements, study of weather records, and comparison with records of flow in adjacent drainage areas. No gage-height record Feb. 19–24.

Monthly discharge of St. Regis River at Brasher Center, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 621 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	2,100	312	653	1.05	1.21
November	1,780	483	829	1.33	1.48
December	5,000	655	2,130	3.43	3.95
January	3,000	420	1,040	1.67	1.92
February	3,000	280	626	1.01	1.05
March	6,310	600	3,080	4.96	5.72
April	2,920	990	1,540	2.48	2.77
May	1,060	340	532	.857	.99
June	1,080	242	474	.763	.85
July	725	215	343	.552	.64
August	438	158	249	.401	.46
September	232	174	210	.338	.38
The year	6,310	158	981	1.58	21.42

RICHELIEU RIVER AT FORT MONTGOMERY, ROUSES POINT, N. Y.

LOCATION.—Inside fort, three-eighths mile south of international boundary, half a mile above head of Richelieu River (outlet of Lake Champlain), and 1 mile north east 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, 1921.

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, 99.22 feet at 10 a. m. March 31; minimum elevation, 92.68 feet at 10 a. m. September 29.

1869–1921: Maximum elevation recorded, 103.28 feet April, 1869;[1] minimum elevation, 91.9 feet November 13, 1908.

COOPERATION.—Gage heights observed under direction of the United States Engineer Corps and reported monthly to the United States Geological Survey.

Daily gage height, in feet, for Richelieu River at Fort Montgomery, Rouses Point, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.50	1.40	1.73	4.15	2.90	2.27	6.05	4.53	2.35	1.45	1.00	0.53
2	1.82	1.75	1.75	4.17	2.85	2.45	6.58	4.50	2.47	1.42	.95	.50
3	2.02	1.47	2.07	4.05	2.83	2.42	6.13	4.45	2.50	1.40	.93	.48
4	2.05	1.50	2.15	4.05	2.77	2.40	6.05	4.37	2.30	1.38	.93	.47
5	1.90	1.47	2.25	4.03	2.75	2.47	5.95	4.30	2.28	1.33	.95	.53
6	1.96	1.46	2.53	3.95	2.68	2.58	5.92	4.18	2.30	1.40	1.05	.50
7	2.08	1.47	2.85	3.98	2.65	2.55	6.15	4.10	2.23	1.32	1.07	.47
8	2.02	1.48	2.97	3.93	2.60	2.68	5.90	4.08	2.19	1.25	.87	.53
9	2.05	1.75	3.25	3.90	2.62	2.97	5.58	3.95	2.17	1.23	.85	.42
10	1.92	1.50	3.32	3.87	2.56	3.30	5.50	3.90	2.15	1.17	.92	.50
11	1.95	1.48	3.33	3.82	2.52	3.53	5.48	3.87	2.18	1.25	.80	.41
12	1.92	1.55	3.35	3.75	2.50	3.73	5.45	3.90	1.90	1.30	.72	.55
13	1.90	1.50	3.40	3.70	2.48	3.98	5.42	3.73	2.15	1.27	.80	.40
14	1.88	1.47	3.48	3.72	2.45	4.15	5.20	3.60	1.83	1.30	.70	.37
15	1.85	1.43	4.00	3.60	2.43	4.38	5.40	3.48	1.80	1.17	.72	.40
16	1.81	1.40	4.47	3.57	2.42	4.50	5.02	3.35	1.85	1.20	.73	.35
17	1.78	1.43	4.63	3.55	2.40	4.75	4.75	3.28	1.88	1.20	.77	.43
18	1.75	1.42	4.70	3.52	2.35	4.83	4.98	3.20	1.80	1.22	.62	.32
19	1.73	1.50	4.77	3.45	2.33	5.13	5.00	3.17	1.73	1.30	.68	.25
20	1.74	1.38	4.68	3.46	2.30	4.95	5.02	3.25	1.75	1.18	.85	.27
21	1.75	1.35	4.52	3.38	2.30	5.22	4.93	3.18	1.75	1.13	.62	.58
22	1.58	1.53	4.60	3.32	2.35	5.25	4.92	3.10	1.70	1.17	.70	.32
23	1.63	1.50	4.77	3.25	2.35	5.75	5.05	2.75	1.68	1.18	.70	.20
24	1.73	1.63	4.70	3.18	2.28	5.90	5.00	2.95	1.60	1.20	.65	.28
25	1.60	1.65	4.35	3.15	2.25	5.97	4.87	2.97	1.55	1.23	.65	.65
26	1.67	1.65	4.48	3.14	2.22	5.93	4.80	2.78	1.50	1.12	.65	.20
27	1.80	1.70	4.57	3.12	2.20	6.20	4.85	2.72	1.50	1.17	.67	.25
28	1.50	1.67	4.30	3.08	2.20	6.07	4.75	2.65	1.52	1.05	.65	.30
29	1.45	1.68	4.25	3.05	.....	6.12	4.67	2.62	1.55	1.05	.63	.18
30	1.47	1.75	4.18	2.98	.....	6.55	4.65	2.55	1.47	1.03	.58	.22
31	1.45	.....	4.13	2.95	.....	6.72	.....	2.53	.....	1.07	.53	.....

[1] Hoyt, J. C., U. S. Geol. Survey Water-Supply Paper 97, p. 340.

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, 1921.

GAGES.—Gage showing elevation of water surface above intake to power plant is a Gurley 7-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 is a vertical staff spiked to timberwork 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.

DISCHARGE MEASUREMENTS.—Made from a cable at head of Indian Rapids, a quarter of a mile below dam or by wading. Gages and watt meters are read by powerhouse operators during measurements.

DISCHARGE RATING.—Records include flow over concrete spillway 171.25 feet in crest length, a rating for which has been prepared for use of coefficients [1] 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 measurement; 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, 4,900 second-feet March 22; minimum daily discharge, 140 second-feet September 11.

1908–1921: Maximum daily discharge recorded, 6,410 second-feet, April 20, 1914; minimum daily discharge, 90 second-feet, September 28, 1914.

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 the distribution of flow during the year.

ACCURACY.—Discharge over the spillway ascertained by applying to rating table mean gage height for six-hour periods. 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.

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[1] 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 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,080	640	600	860	440	700	2,100	1,020	540	390	480	380
2	1,180	520	1,180	820	480	680	1,950	1,000	520	380	280	380
3	760	700	1,020	1,060	560	940	1,950	900	560	300	320	360
4	740	640	1,200	920	540	1,100	1,800	900	500	390	290	340
5	560	640	1,180	1,000	560	840	1,750	940	500	430	340	500
6	640	680	1,500	980	560	940	1,700	820	520	260	360	380
7	700	560	1,300	800	600	1,950	1,600	800	520	370	340	410
8	720	660	1,300	900	580	1,800	1,500	760	540	360	440	330
9	700	520	1,140	820	500	2,800	1,400	480	500	680	370	520
10	580	720	1,220	760	520	4,100	1,400	660	470	330	360	320
11	620	720	1,300	820	600	3,700	980	660	560	390	380	140
12	420	720	1,200	780	520	3,500	1,180	640	540	440	420	420
13	500	560	1,200	700	480	3,200	1,140	640	500	430	380	300
14	480	380	1,450	720	560	2,700	1,100	640	540	390	600	560
15	440	660	2,250	820	390	2,250	1,040	600	540	390	500	270
16	500	480	2,100	740	440	2,900	1,080	620	600	450	350	390
17	620	640	1,800	620	660	2,900	1,300	620	620	340	240	225
18	390	620	1,600	370	860	2,600	1,200	560	580	390	380	195
19	540	700	1,450	640	760	2,000	1,300	560	400	420	360	215
20	620	660	1,120	620	740	2,500	1,350	500	500	370	560	230
21	620	370	1,080	720	660	4,800	1,240	540	340	450	420	300
22	620	580	1,000	640	680	4,900	1,450	520	410	380	480	370
23	640	570	1,120	780	640	3,600	1,600	540	360	320	370	290
24	620	480	1,300	740	680	2,900	1,550	500	360	260	360	360
25	540	560	820	620	600	2,700	1,550	450	350	410	350	260
26	480	780	660	580	580	2,800	1,450	490	310	330	290	450
27	620	720	800	580	520	2,450	1,250	350	420	330	280	260
28	640	500	880	600	600	2,250	1,220	370	410	350	330	380
29	640	680	840	620	.....	2,350	1,140	400	460	410	520	360
30	740	620	840	540	.....	2,250	1,080	330	450	440	290	340
31	360	.....	780	520	.....	2,000	.....	310	.....	380	370	.....

Monthly discharge of Saranac River near Plattsburg, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 607 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	1,180	360	623	1.03	1.19
November	780	370	609	1.00	1.12
December	2,250	600	1,200	1.98	2.28
January	1,060	370	732	1.21	1.40
February	860	390	582	.959	1.00
March	4,900	680	2,490	4.10	4.73
April	2,100	980	1,410	2.32	2.59
May	1,020	310	617	1.02	1.18
June	620	310	481	.792	.88
July	680	260	386	.636	.73
August	600	240	381	.628	.72
September	560	140	341	.562	.63
The year	4,900	140	824	1.36	18.45

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, 1921.

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 open-water stage recorded, 8.0 feet at 5 p. m. March 21 (discharge, 5,710 second-feet); minimum stage recorded, 2.02 feet at 6 p. m. April 25 (discharge, 12 second-feet).

1916–17 and 1919–1921: Maximum stage recorded March 21, 1921; minimum stage, 1.60 feet at 7.30 p. m. September 13, 1920 (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. 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 daily, 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, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan 21	Harrington and Currier.	[a] 3.00	80	Apr. 18	B. F. Howe.....	3.65	339
Feb. 23	S. M. Currier.....	[a] 3.11	82	Aug. 30	Covert and Grover.....	2.38	32.9
Mar. 9	.....do.....	[a] 6.80	1,230	Sept. 29	Covert and Shupe.....	2.72	49.1
23	.....do.....	4.54	725	30	.....do.....	2.45	34.9
Apr. 18	B. F. Howe.....	3.69	360				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of West Branch of Ausable River near Newman, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,320	94	90	130	48	80	732	258	72	45	60	34
2	700	208	73	179	60	90	485	224	66	45	53	33
3	353	763	395	353	60	180	417	194	83	34	43	36
4	333	313	275	275	46	130	374	179	92	34	45	39
5	208	275	439	240	60	140	353	142	83	34	51	33
6	313	208	975	208	55	180	462	153	80	47	53	33
7	153	208	534	130	70	480	462	124	76	34	51	33
8	105	208	374	179	70	850	417	113	60	36	34	33
9	130	142	208	130	70	1,400	534	124	53	47	34	33
10	109	395	208	130	55	1,100	374	117	56	47	39	36
11	94	240	153	90	55	830	294	128	60	103	39	33
12	90	179	179	73	55	586	258	80	153	153	56	30
13	82	166	179	73	44	670	208	96	153	88	88	33
14	70	130	179	90	42	534	208	124	224	60	88	33
15	82	120	1,850	208	26	485	258	124	128	60	96	33
16	73	94	1,140	170	65	2,210	417	113	124	56	66	36
17	90	90	439	130	260	1,140	534	92	66	47	53	34
18	82	109	395	90	200	700	374	88	66	43	51	39
19	73	109	353	80	200	485	333	80	47	68	80	34
20	82	73	313	80	160	1,100	333	72	51	80	62	34
21	70	73	313	80	120	5,710	275	56	51	83	96	43
22	61	73	240	100	100	2,090	395	62	56	88	62	43
23	61	109	275	120	85	796	166	83	51	51	53	47
24	61	120	240	95	65	586	333	72	53	47	58	39
25	58	130	179	60	40	1,630	275	68	51	53	47	39
26	61	109	179	40	30	1,140	560	72	34	53	45	113
27	70	90	130	38	65	1,060	240	72	34	47	39	60
28	353	90	130	38	80	865	208	66	39	47	34	56
29	240	90	130	75	.....	975	179	62	39	88	34	56
30	100	90	153	60	.....	586	224	60	68	142	39	44
31	90	.....	179	48	.....	462	.....	60	.....	113	34	.....

NOTE.—Discharge, Nov. 24, estimated from hydrograph, as gage was not read. Discharge, Jan. 16 to Mar. 10, 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, 1921.

[Drainage area, 116 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	1,320	58	186	1.60	1.84
November	763	73	170	1.47	1.64
December	1,850	73	352	3.03	3.49
January	353	38	122	1.05	1.21
February	260	26	81.6	.703	.73
March	5,710	80	944	8.14	9.38
April	732	166	356	3.07	3.42
May	258	56	108	.931	1.07
June	224	34	75.6	.652	.73
July	153	34	63.6	.548	.63
August	96	34	54.1	.466	.54
September	113	30	40.7	.351	.39
The year	5,710	26	215	1.85	25.07

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, 1921.

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 1½ miles below gage or by wading either near the cable or a short distance above the 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, 8.6 feet at 7 a. m. March 21 (discharge, 13,800 second-feet); minimum stage, 3.32 feet at 5 p. m. September 18 (discharge, 78 second-feet).

1910–1921: Maximum stage recorded, 10.2 feet in the evening of March 27, 1913 (discharge, roughly 25,000 second-feet); minimum stage recorded, 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 practically permanent during the year except as affected by ice. Rating curve fairly well defined between 175 and 3,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good; winter records fair.

Discharge measurements of Ausable River at Ausable Forks, N. Y., during year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 20	Currier and Harrington	[a] 4.41	288
Sept. 30	Covert and Shupe	3.55	189

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Ausable River at Ausable Forks, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,210	354	446	1,000	280	336	1,940	929	202	137	183	115
2	1,830	446	1,440	1,100	320	436	1,620	851	196	137	142	115
3	838	1,620	1,620	1,200	320	929	1,440	739	202	126	126	106
4	800	1,070	1,530	800	300	955	998	955	214	137	126	102
5	494	800	1,620	700	280	515	970	536	221	126	110	90
6	407	588	3,320	600	340	764	1,230	426	214	115	110	90
7	379	578	3,320	650	400	1,260	1,440	426	202	102	106	106
8	345	567	3,190	750	380	3,440	1,260	371	177	90	94	110
9	287	567	3,070	700	371	8,400	1,150	345	164	90	86	98
10	227	984	2,950	650	294	4,480	998	336	137	82	86	110
11	242	851	2,840	600	264	2,950	929	328	132	234	90	94
12	234	588	929	600	257	1,940	739	336	214	311	86	90
13	208	526	1,200	600	264	2,950	656	362	319	302	90	90
14	208	536	2,050	600	257	2,720	656	371	800	345	126	82
15	214	567	4,750	650	257	3,070	751	311	484	311	153	82
16	227	567	2,490	550	280	6,800	776	272	388	257	142	90
7	202	494	1,530	440	1,730	5,310	1,180	294	319	264	142	90
18	202	465	1,230	340	1,150	2,270	1,070	257	234	250	164	82
19	202	494	984	260	903	2,160	1,040	214	189	227	183	94
20	227	446	877	280	838	2,720	1,030	221	170	214	189	86
21	183	446	813	320	578	12,500	1,040	214	157	234	170	90
22	153	446	851	360	546	5,310	1,620	202	164	214	153	94
23	196	379	942	380	436	4,210	1,440	202	157	208	137	115
24	177	371	1,100	340	319	4,210	1,620	196	164	177	126	110
25	208	426	1,100	300	319	5,600	929	183	148	153	126	110
26	202	426	1,100	280	336	3,190	916	214	148	132	121	94
27	214	407	950	300	336	2,600	851	221	132	102	115	86
28	287	398	800	360	345	3,950	800	183	132	106	126	82
29	465	426	700	420	.....	2,600	588	214	132	148	126	90
30	371	398	800	380	.....	1,530	588	221	132	208	115	102
31	398	.....	900	320	.....	1,830	.....	202	.....	183	115	.....

NOTE.—Discharge, Dec. 24 to Feb. 8, determined from gage-heights corrected for ice effect from one discharge measurement and study of weather records and observer's notes.

Monthly discharge of Ausable River at Ausable Forks, N. Y., for the year ending Sept. 30, 1921.

[Drainage area, 444 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	4,210	153	479	1.08	1.24
November	1,620	354	574	1.29	1.44
December	4,750	446	1,660	3.74	4.31
January	1,200	260	543	1.22	1.41
February	1,730	257	454	1.02	1.06
March	12,500	336	3,290	7.41	8.54
April	1,940	588	1,080	2.43	2.71
May	955	183	359	.809	.93
June	800	132	221	.498	.56
July	345	90	185	.417	.48
August	189	86	128	.288	.33
September	115	82	96.5	.217	.24
The year	12,500	82	761	1.71	23.25

LAKE GEORGE AT ROGERS ROCK, N. Y.

LOCATION.—At boathouse in small bay on north side of steamboat landing at Rogers Rock, Essex County.

RECORDS AVAILABLE.—July 10, 1913, to September 30, 1921.

GAGE.—Vertical staff fastened to a pile in the back end of the boathouse. Datum 3.15 feet below the crest of dam at outlet of lake; read once daily by employee of International Paper Co.

EXTREMES OF STAGE.—Maximum stage recorded during year, 4.2 feet on March 30 and 31; minimum stage recorded, 1.6 feet on November 21.

1913–1921: Maximum stage recorded, 4.98 feet on May 2, 1914; minimum stage recorded, 1.2 feet on November 21 and December 22, 1916.

REGULATION.—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 International Paper Co.

Daily gage height, in feet, of Lake George at Rogers Rock, N. Y., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.2	1.75	2.0	3.38	2.95	2.78	4.1	4.05	3.42	3.22	3.8	3.34
2	2.22	1.8	2.2	3.4	2.95	2.8	4.15	4.0	3.5	3.18	3.75	3.36
3	2.18	1.9	2.3	3 38	2.92	2.75	4.1	4.02	3.52	3.18	3.7	3.36
4	2.15	1.88	2.28	3.35	2.9	2.78	4.1	4.0	3.4	3.15	3.68	3.26
5	2.1	1.85	2.3	3.32	2.88	2.8	4.05	4.02	3.45	3.15	.....	3.31
6	2.1	1.8	2.6	3.3	2.9	2.78	4.05	3.98	3.4	3.18	.....	3.28
7	2.15	1.8	2.58	3.25	2.92	2.8	4.05	3.92	3.4	3.15	.....	3.26
8	2.1	1.78	2.55	3.38	2.9	2.85	4.02	4.0	3.38	3.12	3.76	3.21
9	2.08	1.78	2.5	3.3	2.9	2.95	4.0	4.02	3.35	3.12	3.71	3.18
10	2.02	1.75	2.55	3.28	2.88	3.1	3.9	3.85	3.4	3.15	3.74	3.16
11	2.0	1.72	2.52	3.3	2.85	3.18	3.85	3 9	3.35	3.85	3.66	3.16
12	1.95	1.75	2 5	3.25	2.88	3.25	3.92	3.88	3.35	3.9	3.71	3.21
13	2.0	1.75	2.55	3.2	2 9	3.28	3.9	3.85	3.42	3.95	3.71	3.14
14	1 95	1.72	2.6	3.15	2.88	3.3	3.88	3.88	3.35	3.98	3.71	3.11
15	1.98	1.7	3.15	3.2	2.9	3.38	3.82	3.88	3.3	3.9	3.68	3.08
16	1.95	1.62	3.25	3.28	2.85	3.45	3.82	3.78	3.25	3.88	3.66	3.06
17	1.98	1.7	3.28	3.25	2.8	3.5	3.98	3·82	3.28	3.95	3.61	3.01
18	1.95	1.75	3.3	3.2	2.8	3.5	4.05	3.75	3.2	3.98	3.66	2.98
19	1.9	1.7	3.32	3.15	2.8	3.55	4.0	3.75	3.18	3.98	3.61	3.01
20	1.92	1.65	3.35	3.2	2.8	3.58	4.05	3.78	3.2	3.95	3.66	2.94
21	1.9	1.6	3.32	3.1	2.8	3.68	4.02	3.75	3.22	3.95	3.61	3.01
22	1.88	1.68	3.3	2.98	2.8	3.7	4.0	3.7	3.18	3.98	3.56	3.04
23	1.85	1.78	3.4	3.1	2.8	3.72	4.02	3.6	3.15	3.95	3.56	2.94
24	1.82	1.85	3.38	2.98	2.8	3.78	4.05	3.65	3.08	3.98	3.54	2.91
25	1.8	1.92	3.38	3.1	2.8	3.9	4.0	3.62	3.1	3.95	3.51	2.88
26	1.8	2.0	3.42	2.98	2.8	3.95	4.0	3.6	3.1	3.92	3.51	2.86
27	1.9	2.0	3.5	3.1	2.8	4.05	4.05	3.6	3.12	3.92	3.46	2.86
28	1.85	1.95	3.42	3.05	2.85	4.0	4.0	3.58	3.15	3.95	3.46	2.84
29	1.82	1.92	3.4	3.0	.....	4.08	3.98	3.55	3.2	3.82	3.44	2.9
30	1.8	1.95	3.38	3.0	.....	4.2	4.0	3.52	3.18	3.9	3.41	2.8
31	1.78	.....	3.3	2.98	.....	4.2	.....	3.5	.....	3.88	3.31	.....

NOTE.—Gage-heights partly estimated Feb. 12–25; observed record inaccurate. No record Aug. 5–7; gage destroyed.

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, 1921.

GAGE.—Vertical cast iron staff gage, reading from 6.0 to 10.0 feet fastened to 2 by 8 inch oak plank. From November 15 to March 31, a vertical staff attached to dock at Bolton Landing. Gage read twice daily to quarter-tenths by Jay Taylor, ranger.

EXTREMES OF STAGE.—Maximum stage recorded during year, 8.95 feet April 1 and 2; minimum stage, 6.5 feet November 15–17.

1919–1921: Maximum stage recorded, 9.25 feet on April 23, 24, and 29, 1920; minimum stage, 6.45 feet March 1–6, 1920.

REGULATION.—Elevation of lake surface is regulated by 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, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	6.9	.....	7.8	.....	8.95	8.9	8.35	8.0	8.7	8.3
2	.....	.....	7.0	.....	7.8	.....	8.95	8.85	8.3	8.0	8.65	8.25
3	7.0	.....	7.05	8.15	7.8	.....	.....	8.85	8.3	8.0	8.65	8.25
4	7.0	.....	7.1	8.15	7.8	.....	.....	8.85	8.3	7.95	8.6	8.25
5	7.0	.....	7.1	8.15	7.8	.....	.....	8.8	8.3	7.95	8.55	8.2
6	7.0	.....	7.2	8.15	7.8	.....	.....	8.8	8.25	7.95	8.55	8.2
7	6.95	.....	7.3	8.1	7.8	7.7	8.85	8.8	8.25	7.95	8.5	8.2
8	6.95	.....	7.4	8.1	7.75	7.75	8.85	8.75	8.25	7.95	8.6	8.15
9	6.95	.....	7.4	.....	7.75	7.75	8.8	8.75	8.25	7.95	8.6	8.15
10	6.9	.....	7.45	.....	7.75	7.8	8.8	8.75	8.25	7.95	8.55	8.15
11	6.9	.....	7.5	.....	7.7	7.8	8.8	8.75	8.2	8.7	8.5	8.15
12	6.85	.....	7.55	8.05	7.7	7.9	8.8	8.75	8.2	8.75	8.65	8.1
13	6.85	.....	7.55	8.05	7.7	7.95	8.75	8.75	8.2	8.75	8.6	8.05
14	6.85	.....	7.65	8.0	7.7	8.0	8.75	8.7	8.1	8.8	8.6	8.05
15	6.8	6.5	8.0	8.05	7.75	8.05	8.75	8.7	8.1	8.9	8.55	8.05
16	6.8	6.5	8.05	.....	7.75	8.1	8.85	8.7	8.1	8.8	8.55	8.0
17	6.8	6.5	8.05	.....	7.75	8.2	8.85	8.65	8.0	8.85	8.5	8.0
18	6.8	6.55	8.1	.....	7.7	8.25	8.85	8.6	8.0	8.85	8.55	8.0
19	6.8	6.55	8.1	.....	7.7	8.25	8.8	8.6	8.0	8.85	8.55	7.95
20	6.8	6.6	8.1	.....	7.7	8.3	8.75	8.6	8.0	8.85	8.55	7.9
21	6.75	6.6	8.15	.....	7.7	8.4	8.75	8.55	8.0	8.85	8.55	7.9
22	6.7	6.65	8.15	.....	7.7	8.45	8.85	8.55	8.0	8.8	8.5	7.85
23	6.7	6.75	8.15	7.9	7.75	8.5	8.9	8.5	8.0	8.8	8.45	7.85
24	6.7	6.75	8.15	7.9	7.75	8.5	8.9	8.45	8.0	8.8	8.45	7.85
25	6.7	6.8	8.2	7.9	7.75	8.5	8.9	8.45	8.0	8.8	8.45	7.8
26	6.7	6.8	8.2	7.9	7.75	8.5	8.85	8.45	8.0	8.8	8.4	7.8
27	6.75	6.8	8.25	7.85	.....	8.6	8.85	8.45	8.0	8.8	8.4	7.75
28	6.75	6.8	8.2	7.85	.....	8.7	8.85	8.4	8.0	8.75	8.35	7.75
29	6.75	6.8	8.2	7.8	.....	8.75	8.85	8.4	8.1	8.75	8.35	7.75
30	6.75	6.8	8.2	7.8	.....	8.8	8.9	8.4	8.1	8.7	8.35	7.7
31	.....	.....	8.15	7.8	.....	8.9	.....	8.35	.....	8.7	8.3	.....

NOTE.—Gage not read Oct. 1, 2, 31, Nov. 1–14, Jan. 1, 2, 9–11, 16–22, Feb. 27, 28, Mar. 1–6, and Apr. 3–6. A temporary staff at Bolton Landing was read Nov. 15 to Mar. 31; readings reduced to datum of Glen Island gage.

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, 1921.

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 STAGE.—Maximum stage recorded during year, 6.36 feet on March 29, 30, and April 2; minimum stage, 0.26 foot, September 26–30.

1907–1921: Maximum stage recorded, 8.20 feet on April 7, 1913; minimum stage recorded,—0.25 foot on December 4, 1908.

ICE.—Wider parts of Lake Champlain not usually frozen over until the latter part of January. Occasionally closure does not occur until February, and in some years it lasts only for a few days. The northern end of the lake above the outlet is usually covered with ice from the middle of December to the middle of April.

ACCURACY.—Gage read to hundredths once a day at irregular intervals. Gage readings made when the lake is rough subject to inaccuracies due to wave action.

COÖPERATION.—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, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.78	1.62	.....	.....	3.14	2.52	6.30	.....	2.70	1.68	.....	0.76
2	2.08	.....	.....	.....	.....	2.52	6.36	4.78	2.67	1.65	1.18	.72
3	.....	.....	.....	4.30	3.05	2.64	.....	4.72	.....	.....	1.18	.....
4	2.32	1.70	.....	4.30	3.02	2.77	6.35	4.64	2.60	1.58	1.10	.....
5	2.40	.....	.....	4.32	.....	2.80	6.30	4.60	2.56	1.55	.....	.72
6	2.40	1.76	.....	4.32	.....	.....	6.18	4.50	2.50	.....	.....	.64
7	2.38	.....	.....	4.25	2.90	2.90	6.10	4.32	2.44	1.52	.....	.64
8	2.34	1.74	3.48	4.18	.....	2.92	5.95	.....	.....	1.50	.96	.62
9	.....	.....	3.58	.....	.....	3.17	5.92	4.25	2.34	1.46	.96	.60
10	.....	1.72	3.56	4.07	2.82	3.70	5.84	4.16	2.28	1.42	.....	.....
11	2.28	.....	3.64	4.00	.....	4.12	5.82	4.07	.....	1.50	.....	.58
12	2.24	.....	.....	3.97	2.78	4.32	5.70	.....	2.24	.....	.92	.....
13	.....	.....	3.64	3.92	.....	.....	5.60	3.87	.....	.....	.....	.56
14	2.14	.....	3.64	3.87	2.73	4.58	5.51	3.85	2.20	.....	.....	.56
15	2.10	1.66	4.05	3.82	.....	4.75	5.35	.....	.....	1.50	.95	.54
16	2.06	1.64	4.55	.....	.....	4.79	5.30	3.70	2.16	1.50	.....	.54
17	.....	1.66	4.73	.....	2.66	5.02	.....	3.60	2.10	.....	.88	.....
18	2.00	.....	4.80	3.72	.....	5.20	5.33	3.53	2.14	.....	.....	.....
19	1.98	1.74	.....	.....	2.64	5.20	5.30	3.46	.....	1.35	.....	.48
20	.....	1.76	4.78	.....	.....	.....	5.24	3.44	.....	1.40	.....	.50
21	.....	.....	4.75	3.60	2.66	5.28	5.20	3.30	.....	.....	.....	.....
22	.....	1.82	4.70	3.58	.....	5.68	5.25	.....	1.88	1.42	.90	.....
23	1.84	1.86	.....	.....	.....	5.87	5.20	.....	.....	1.40	.....	.....
24	.....	2.00	4.70	3.56	2.58	.....	.....	3.17	1.84	1.35	.....	.35
25	1.76	.....	.....	.....	2.52	5.90	5.12	.....	1.78	1.32	.....	.....
26	.....	1.98	.....	3.40	2.50	6.04	5.12	3.02	.....	.....	.84	.26
27	.....	.....	.....	.....	.....	.....	5.10	2.95	1.72	1.30	.80	.....
28	1.62	.....	4.55	3.34	.....	6.15	5.00	2.92	1.72	1.30	.....	.26
29	1.70	1.98	4.52	3.28	.....	6.36	.....	2.86	1.72	1.32	.78	.26
30	1.64	1.98	.....	.....	.....	6.36	4.92	2.78	1.70	.....	.76	.26
31	.....	.....	4.42	3.22	.....	.....	.....	2.76	.....	.....	.....	.....

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 1¼ miles below mouth of Worcester Branch.

DRAINAGE AREA.—420 square miles.

RECORDS AVAILABLE.—May 19, 1909, to September 30, 1921.

GAGE.—Gurley 7-day water-stage recorder on right bank, installed July 4, 1914; gage heights 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, 13.7 feet at 11 a. m. October 1 (discharge from extension of rating curve, 13,000 second-feet); minimum stage during year from water-stage recorder, 2.58 feet at 7 a. m. September 30 (discharge from extension of rating curve, 6 second-feet).

1909–1921: Maximum stage determined by leveling from flood marks preserved on building near present gage, 17.31 feet, April 7, 1912 (discharge not determined); minimum stage from water-stage recorder, September 30, 1921.

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 5,000 second-feet. Operation of water-stage recorder satisfactory except for short periods indicated by footnote to daily-discharge table. Daily discharge October 1 to March 31 ascertained by applying mean daily gage height to rating table with corrections for effect of ice during the winter; daily discharge April 1 to September 30 ascertained by use of discharge integrator.

Discharge measurements of Winooski River at Montpelier, Vt., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 4	J. L. Lamson	4.54	667
Feb. 25	do	[a] 4.20	312
Mar. 16	do	10.19	7,070

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7,500	560	420	584	290	510	2,200	560	186	118	164	95
2	1,880	566	1,200	590	285	560	1,480	445	182	106	124	72
3	1,070	1,140	900	846	285	1,040	1,260	410	156	74	114	72
4	811	664	685	620	290	1,260	1,120	400	172	75	90	37
5	685	494	1,550	560	290	760	1,060	350	176	100	80	43
6	542	440	2,530	584	310	720	1,000	325	184	98	76	81
7	476	345	1,380	572	320	1,380	900	285	140	86	58	61
8	430	360	1,070	512	300	1,260	820	265	120	82	152	52
9	420	380	888	566	300	3,350	870	275	110	93	198	47
10	365	602	839	518	300	4,710	900	275	110	95	134	53
11	340	435	804	476	300	2,530	710	250	112	144	110	21
12	312	370	762	450	300	2,380	630	235	230	164	245	71
13	308	300	678	385	300	3,050	580	225	250	126	300	55
14	296	296	1,730	482	320	2,480	560	280	350	116	175	58
15	296	300	4,320	578	325	2,380	550	265	290	97	215	62
16	320	280	1,880	578	325	5,230	690	265	210	124	168	64
17	310	395	1,300	460	475	3,590	1,120	220	150	140	126	60
18	300	650	1,100	370	570	2,230	1,160	205	138	146	320	27
19	290	500	930	360	440	1,500	910	225	84	155	465	91
20	280	400	804	350	375	2,640	670	184	130	510	220	73
21	260	300	748	415	370	6,770	570	170	126	200	250	51
22	250	500	632	430	340	4,190	820	146	100	154	220	97
23	240	550	650	445	325	2,230	760	280	112	96	164	58
24	210	600	720	420	320	1,830	1,440	210	110	75	132	42
25	231	500	720	380	285	3,530	1,220	180	100	104	106	30
26	210	345	720	355	290	2,700	830	192	90	83	96	84
27	250	370	680	345	265	2,130	700	192	180	65	85	53
28	500	300	680	330	325	2,580	600	144	200	116	50	75
29	400	450	650	320	.....	2,380	530	126	160	300	86	68
30	300	500	620	310	.....	1,460	500	140	155	305	77	50
31	250	.....	590	305	.....	1,460	.....	162	.....	156	81	.....

NOTE.—Stage-discharge relation affected by ice Dec. 25-31 and Jan. 19 to Mar. 9; discharge based on gage heights corrected for effect of ice by means of one discharge measurement, observer's notes, and weather records. Operation of water-stage recorder unsatisfactory Oct. 17-23, 27-31, Nov. 20-30, Dec. 1-3, 24-28, Feb. 15, and June 24-29.

Monthly discharge of Winooski River at Montpelier, Vt., for the year ending Sept. 30, 1921.

[Drainage area, 420 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	7,500	210	656	1.56	1.80
November	1,140	280	463	1.10	1.23
December	4,320	420	1,070	2.55	2.94
January	846	305	468	1.11	1.28
February	570	265	329	.783	.82
March	6,770	510	2,410	5.74	6.62
April	2,200	500	905	2.15	2.40
May	560	126	254	.605	.70
June	350	84	160	.381	.43
July	510	65	139	.331	.38
August	465	50	157	.374	.43
September	97	21	60.1	.143	.16
The year	7,500	21	594	1.41	19.19

MOLLYS BROOK NEAR MARSHFIELD, VT.

LOCATION.—At head of Mollys Falls, one-fourth mile above confluence with Winooski River, 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, 1921.

GAGE.—Inclined staff on right bank, and vertical high-water section on left bank; read by Dorothy Badger and 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 period of records, 5.3 feet at 5 p. m. March 21 (discharge by extension of rating curve, 500 second-feet); 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 the gage, and on rocks at the control; stage-discharge relation somewhat affected.

REGULATION.—Storage in Peachem 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 1920–21.

Date.	Made by—	Gage height	Discharge.	Date.	Made by—	Gage height.	Discharge.
1920.		*Feet.*	*Sec.-ft.*	1921.		*Feet.*	*Sec.-ft.*
Aug. 12	Lamson and Pierce	1.99	37.2	Mar. 15	J. L. Lamson	2.81	102
Sept. 5	C. H. Pierce	1.61	17.5	15	do	2.91	110
16	M. R. Stackpole	2.36	63	17	do	3.70	221
Oct. 16	J. L. Lamson	1.92	30.3	May 26	do	1.68	17.6
Dec. 24	do	2.10	41.9	26	do	1.68	17.5
				June 25	do	1.37	6.1
1921.							
Feb. 24	do	[a] 1.75	18.6				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Mollys Brook near Marshfield, Vt., for the years ending Sept. 30, 1920 and 1921.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1920.			1920.			1920.		
1		39	11	49	57	21	24	47
2		36	12	38	38	22	25	41
3		20	13	22	401	23	51	35
4		15	14	35	250	24	30	34
5		16	15	92	79	25	23	29
6		14	16	269	65	26	20	26
7		53	17	76	67	27	19	25
8		36	18	45	54	28	16	33
9		47	19	31	98	29	16	54
10		51	20	24	57	30	24	76
						31	20	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1920–21.												
1	467	51	35	26	19	22	169	35	13	15	15	5.9
2	148	43	70	42	20	20	108	32	14	12	7.4	4.9
3	90	69	48	49	21	28	92	30	12	10	6.3	4.5
4	70	41	32	41	22	25	82	29	19	8.6	4.9	4.0
5	62	34	107	36	19	24	78	27	14	19	4.3	3.4
6	55	30	118	35	19	28	74	25	14	20	3.7	3.0
7	49	31	81	35	21	38	67	23	12	18	3.3	2.9
8	43	31	59	32	19	64	63	22	10	16	25	2.6
9	41	34	55	29	18	122	70	23	9.2	21	8.0	2.4
10	36	54	51	28	18	229	65	24	8.6	16	4.7	2.4
11	35	30	61	29	17	129	59	21	15	25	4.2	2.6
12	32	26	49	28	17	110	51	20	32	19	36	3.3
13	30	24	53	28	17	93	47	19	22	5.4	18	3.4
14	30	21	88	29	17	114	43	23	28	4.5	12	2.6
15	36	20	256	40	16	112	45	21	19	17	13	2.6
16	31	19	121	36	18	307	52	19	12	7.7	8.0	4.2
17	30	41	78	29	28	194	72	17	10	4.5	5.9	3.1
18	28	38	65	23	20	121	72	16	8.3	4.5	24	3.3
19	28	28	70	23	18	104	60	16	8.0	4.7	22	3.0
20	26	25	55	22	17	142	47	17	7.4	14	12	2.8
21	26	28	48	24	17	418	42	14	6.8	10	17	3.1
22	25	29	53	24	18	283	63	18	6.8	4.7	9.2	4.3
23	24	29	49	23	17	161	51	27	6.6	4.2	6.8	3.4
24	19	26	42	22	16	134	104	18	6.3	3.4	6.3	3.0
25	21	24	38	21	17	229	72	18	6.1	3.3	5.2	3.6
26	21	24	26	23	16	203	53	18	5.9	6.8	4.5	6.3
27	22	24	29	23	17	173	45	15	19	5.9	4.2	4.2
28	32	24	26	22	16	200	42	14	25	8.6	3.9	2.9
29	34	25	29	21	.....	191	41	13	20	21	3.6	2.8
30	26	35	28	22	.....	135	38	15	17	12	3.3	2.6
31	26	.....	26	18	.....	112	.....	12	.....	10	3.3	.....

NOTE.—Discharge, Dec. 27 to Jan. 3, Jan. 15, and Jan. 19 to Mar. 7 determined from gage heights corrected for effect of ice.

Monthly discharge of Mollys Brook near Marshfield, Vt., for years ending Sept. 30, 1920 and 1921.

[Drainage area, 24 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1920.					
August 11-31	269	16	45.2	1.88	1.47
September	401	14	63.1	2.63	2.93
1920-21.					
October	467	19	53.0	2.21	2.55
November	69	19	31.9	1.33	1.48
December	256	26	62.8	2.62	3.02
January	49	18	28.5	1.19	1.37
February	28	16	18.4	.767	.80
March	418	20	138	5.75	6.63
April	169	38	65.6	2.73	3.05
May	35	12	20.7	.862	.99
June	32	5.9	13.6	.567	.63
July	25	3.3	11.3	.471	.54
August	36	3.3	9.84	.410	.47
September	6.3	2.4	3.44	.143	.16
The year	467	2.4	38.3	1.60	21.69

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, 1921.

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 period of records, 7.9 feet at 7 a. m. October 1 (discharge, by extension of rating curve, 1,260 second-feet); minimum stage, 2.45 feet at 7 a. m. and 4 p. m. September 11, 1921 (discharge, by extension of rating curve, 0.5 second-foot).

ICE.—Ice forms at the gage, and on rocks at the control; stage-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 1920–21.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1920.		*Feet.*	*Sec.-ft.*	1921.		*Feet.*	*Sec.-ft.*
Aug. 14	J. L. Lamson	2.91	8.0	Feb. 23	J. L. Lamson	[a] 3.20	13.7
19	do	2.72	4.2	Mar. 16	do	6.55	859
Sept. 5	C. H. Pierce	2.70	3.0	16	do	6.63	873
16	M. R. Stackpole	3.10	15.0	June 25	do	2.60	1.3
Oct. 16	J. L. Lamson	3.02	11.8				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Jail Brook at East Barre, Vt., for the years ending Sept. 30, 1920 and 1921.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1920.			1920.			1920.		
1		3.0	11		31	21	2.7	17
2		2.7	12		30	22	2.8	11
3		2.6	13		134	23	7.4	12
4		2.8	14	8.0	77	24	4.4	8.6
5		3.4	15	12	29	25	2.8	7.4
6		2.4	16	30	21	26	2.1	6.5
7		13	17	7.4	28	27	2.0	7.4
8		20	18	4.6	13	28	2.0	6.5
9		13	19	4.2	91	29	2.1	13
10		10	20	3.0	33	30	2.0	28
						31	4.0	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1920–21.												
1	855	41	50	47	10	105	385	74	11	4.0	6.5	1.3
2	127	45	310	60	10	90	162	50	10	3.4	6.5	1.2
3	53	89	138	80	10	394	150	41	5.6	3.4	2.7	1.0
4	37	57	92	60	10	660	123	41	9.5	1.6	2.1	1.0
5	42	30	250	35	10	200	116	30	8.0	1.6	1.3	1.0
6	28	28	424	33	10	150	110	20	5.0	1.3	2.1	1.2
7	25	20	212	25	9	635	103	18	5.6	1.2	1.2	1.2
8	22	25	116	23	9	295	89	18	4.0	1.0	3.4	1.0
9	18	33	77	23	9	825	116	20	3.0	1.2	4.6	.7
10	17	71	71	20	9	765	116	15	3.0	1.0	4.0	.7
11	17	28	77	20	9	370	81	14	4.6	3.0	2.1	.5
12	16	25	77	20	8	340	74	12	8.6	3.0	103	1.0
13	15	21	71	20	8	515	67	19	8.0	2.1	23	1.2
14	13	19	225	47	8	340	67	25	15	1.3	12	1.0
15	20	23	650	125	8	400	89	25	13	20	9.5	1.3
16	17	20	225	75	8	795	106	20	6.5	8.6	5.6	2.1
17	16	41	145	35	90	430	187	15	4.6	4.0	3.4	2.1
18	19	67	116	20	65	295	170	14	4.0	3.0	16	2.1
19	15	45	71	17	23	116	123	11	4.0	26	47	1.3
20	11	41	63	15	18	475	81	11	3.0	98	35	2.7
21	14	45	57	15	16	870	67	10	4.0	18	35	1.6
22	15	86	67	17	14	465	98	8.6	2.1	9.5	14	2.1
23	12	127	67	15	14	280	81	28	1.6	5.0	10	1.6
24	8	188	60	15	14	250	355	13	1.3	3.0	8.0	1.3
25	14	127	60	15	11	705	138	9.5	1.6	2.1	3.0	1.3
26	13	71	60	13	11	415	86	23	1.2	2.1	2.7	2.7
27	13	47	53	13	11	355	71	13	1.2	1.6	2.1	3.0
28	53	30	53	11	13	530	54	9.5	6.5	2.1	2.1	1.6
29	28	37	53	11	.....	310	54	8.6	6.5	54	1.3	1.3
30	24	110	47	11	.....	205	74	8.0	5.6	35	1.3	4.0
31	13	.....	47	11	.....	195	.....	6.5	.....	9.5	1.3	.....

NOTE.—Discharge, Dec. 20 to Mar. 2, determined from gage heights corrected for effect of ice.

Monthly discharge, in second-feet, of Jail Brook at East Barre, Vt., for the years ending Sept. 30, 1920 and 1921.

Month.	Maximum.	Minimum.	Mean.
1920			
August 14–31	30	2.0	5.75
September	134	2.4	22.6
1920–21.			
October	855	8	51.3
November	188	19	54.6
December	650	47	132
January	125	11	30.5
February	90	8	15.9
March	870	90	412
April	385	54	120
May	74	6.5	20.3
June	15	1.2	5.59
July	98	1.0	10.7
August	103	1.3	12.0
September	2.7	.5	1.54
The year	870	.5	72.9

LAMOILLE RIVER AT CADYS FALLS, VT.

LOCATION.—One-fourth mile below power house of Morrisville municipal electric plant, at point formerly known as Cadys Falls, 2 miles downstream from Morrisville, Lamoille County.

DRAINAGE AREA.—280 square miles.

RECORDS AVAILABLE.—September 4, 1913, to September 30, 1921.

GAGES.—Friez water-stage recorder in gage house on right bank, one-fourth mile below highway bridge at Cadys Falls. Gage heights are referred to gage datum by means of a hook gage inside well; an outside staff gage is used for auxiliary readings. Recorder inspected by N. E. Cobleigh.

DISCHARGE MEASUREMENTS.—Made from a 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, 11.63 feet at 7.30 a. m. October 1 (discharge from extension of rating curve, 8,730 second-feet); minimum stage from water-stage recorder, 1.48 feet at 6 a. m. September 15, 16, and 18 when water was held back by dam (discharge from extension of rating curve, 9 second-feet).

1913–1921: Maximum stage recorded October 1, 1920; minimum stage, 1.39 feet. August 6, 1919 (discharge from extension of rating curve, 5 second-feet; water held back by dam).

ICE.—River freezes over during extremely cold weather; stage-discharge relation probably not seriously affected by ice during winter of 1920–21.

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.

Daily discharge, in second-feet, of Lamoille River at Cadys Falls, Vt., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5,750	475	230	350	325	148	1,760	310	255	90	100	140
2	1,520	530	990	405	300	305	1,120	280	200	68	96	154
3	740	1,120	700	600	255	425	900	265	160	62	82	136
4	630	770	530	510	225	520	810	260	235	62	92	87
5	500	580	1,220	440	200	420	730	235	162	73	106	130
6	420	510	2,180	425	170	390	650	225	160	66	100	158
7	355	420	1,140	410	290	600	620	220	152	57	58	102
8	315	410	780	395	285	680	560	146	128	62	85	106
9	255	420	630	350	205	2,000	560	162	128	56	92	100
10	230	560	540	350	154	2,500	600	250	114	40	100	118
11	245	460	530	355	132	1,560	480	156	142	102	89	54
12	210	390	510	340	122	1,560	425	118	225	116	122	93
13	220	350	450	340	138	2,000	380	136	210	87	152	102
14	182	305	1,130	340	146	1,600	380	126	190	86	100	114
15	192	320	2,940	395	136	1,520	360	71	180	80	88	73
16	210	280	1,360	435	130	3,300	420	104	152	92	126	80
17	180	410	910	360	205	2,300	730	110	132	65	122	100
18	220	520	720	330	315	1,500	760	120	126	82	104	48
19	198	420	610	355	265	980	710	140	80	82	104	110
20	176	365	550	345	215	1,900	530	126	116	68	166	104
21	182	300	500	330	210	4,450	440	130	114	118	110	112
22	225	330	385	360	166	3,350	850	110	102	100	150	78
23	205	320	465	370	166	1,720	800	280	96	95	106	82
24	142	325	455	350	160	1,340	1,400	195	94	70	88	80
25	205	290	355	365	168	2,550	900	168	104	86	94	48
26	190	283	275	350	150	2,350	660	162	72	82	140	130
27	182	272	315	320	110	1,750	530	180	72	86	130	138
28	305	244	330	305	150	2,200	435	156	64	68	42	136
29	405	265	415	305	.....	1,940	395	116	64	120	120	128
30	355	255	370	245	.....	1,260	340	114	78	110	108	112
31	285	.....	380	305	.....	1,120	.....	130	.....	61	126	.....

NOTE.—Discharge, Jan. 26–28, determined from gage heights corrected for effect of ice. Water-stage recorder not in operation Nov. 26–30, Apr. 23–25, and Sept. 24–26; discharge estimated by comparison with records of flow of other rivers.

Monthly discharge of Lamoille River at Cadys Falls, Vt., for the year ending Sept. 30, 1921.

[Drainage area, 280 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	5,750	142	498	1.78	2.05
November	1,120	244	417	1.49	1.66
December	2,940	230	739	2.64	3.04
January	600	245	369	1.32	1.52
February	325	110	196	.700	.73
March	4,450	148	1,620	5.79	6.68
April	1,760	340	674	2.41	2.69
May	310	71	171	.611	.70
June	255	64	137	.489	.55
July	120	40	80.4	.287	.33
August	166	42	106	.379	.44
September	154	48	105	.375	.42
The year	5,750	40	429	1.53	20.81

GREEN RIVER AT GARFIELD, VT.

LOCATION.—At site of old dam above highway bridge at Garfield village, town of Hyde Park, Lamoille County. Green River is tributary to Lamoille River, 4 miles east of Morrisville.

DRAINAGE AREA.—20 square miles (roughly approximate).

RECORDS AVAILABLE.—January 3, 1915, to March 16, 1921.

GAGE.—Inclined staff on left bank in pool back of weir; read by P. M. Trescott.

DISCHARGE MEASUREMENTS.—Standard sharp-crested weir of compound section; length of crest at gage height 0.00 is 9.0 feet; at gage height 0.83 foot, length of crest is increased 11.17 feet. Current-meter measurements made at footbridge about half a mile downstream from weir and at old bridge about half a mile above weir.

CHANNEL AND CONTROL.—A pool of considerable size is formed in the old mill pond back of the weir; at ordinary stages the velocity of approach to the weir is very small. Some water leaks around the weir in the old tailrace on left bank.

EXTREMES OF DISCHARGE.—Maximum stage recorded, October 1, 1920, to March 16, 1921, 2.19 feet at 9 a. m. October 2 (discharge, 162 second-feet); minimum stage, 0.40 foot at 9 a. m. and 5 p. m. February 15, and 9 a. m. February 16 (discharge, 7.7 second-feet).

1915–1921: Maximum stage determined from high-water marks, 4.63 feet on April 12, 1919 (discharge from extension of rating curve, 710 second-feet); minimum stage recorded, 0.20 foot August 8 and 9, 1920 (discharge, 2.7 second-feet).

ICE.—Weir and weir crest kept clear of ice during winter; stage-discharge relation not affected by ice.

REGULATION.—An old timber dam about 2 miles upstream affects flow to some extent. The dam leaks by an amount somewhat greater than the low-water flow. During prolonged low stages the surface of water in pond (103 acres) falls below crest of dam; subsequent increased flow into pond is retained until water again flows over crest, when the increased flow is apparent at gaging station.

ACCURACY.—Weir destroyed by logs March 17, 1921; before that date stage-discharge relation was practically permanent. Rating curve based on weir formula, $Q=3.33\ LH^{3/2}$, with corrections determined from current-meter measurements, and with logarithmic extension above gage height 1.90 feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 130 second-feet; at the higher stages the weir is flooded and results are somewhat uncertain.

Discharge measurements of Green River at Garfield, Vt., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 25	J. L. Lamson [a]	0.39	16.0
25	.....do. [b]	.39	18.0

[a] Made at old bridge about half a mile above gage.
[b] Made at footbridge half a mile below gage.

NOTE.—Weir damaged by ice and logs on Mar. 17.

Daily discharge, in second-feet, of Green River at Garfield, Vt., for the period Oct. 1, 1920, to Mar. 16, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	112	26	16	15	9.0	12	16	9.0	18	92	14	8.0	128
2	155	30	37	16	9.0	12	17	9.0	21	84	13	9.7	.....
3	110	47	40	18	8.7	13	18	8.7	24	68.	13	10	.....
4	79	51	37	18	8.7	11	19	8.4	23	53	12	10	.....
5	60	47	44	18	8.7	10	20	8.4	22	46	12	10	.....
6	38	41	73	18	8.7	12	21	9.7	20	40	12	9.7	.....
7	30	35	92	18	8.4	12	22	10	18	33	13	9.7	.....
8	23	30	82	17	8.4	16	23	9.0	17	30	12	9.3	.....
9	19	29	78	16	8.4	27	24	9.0	17	27	12	9.3	.....
10	15	31	54	15	8.0	40	25	8.4	16	22	12	9.3	.....
11	12	31	42	13	8.0	51	26	8.4	16	19	12	9.0	.....
12	10	28	36	12	8.0	74	27	12	16	18	11	9.0	.....
13	9.0	25	30	12	8.0	86	28	18	15	17	11	9.0	.....
14	8.4	22	40	12	8.0	86	29	19	15	16	10	.....	.....
15	9.0	19	68	14	7.7	93	30	19	14	16	10	.....	.....
							31	18	.....	16	9.3	.....	.....

Monthly discharge, in second-feet, of Green River at Garfield, Vt., for the period Oct. 1, 1920, to Mar. 16, 1921.

Month.	Maximum.	Minimum.	Mean.
October	155	8.4	28.2
November	51	14	25.5
December	92	16	44.1
January	18	9.3	13.6
February	10	7.7	8.85
March 1–16	128	10	42.7

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, 1921.

GAGE.—Gurley water-stage recorder on left bank, about 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, 11.13 feet at noon, October 1 (discharge, 8,170 second-feet); minimum stage from water-stage recorder, 1.89 feet at 4.15 p. m. September 14 (discharge, 15 second-feet; water held back by dams).

1911–1921: Maximum discharge about 10,200 second-feet on March 26, 1913; minimum discharge, about 8 second-feet on July 14, 1911, when water was 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 fairly well defined below 6,000 second-feet. Gage house wrecked by ice March 8, 1921, and rebuilt June 14; operation of water-stage recorder satisfactory during remainder of the year. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph, with corrections for effect of ice during winter. Records good for open-water periods, and fair for winter.

Discharge measurements of Missisquoi River near Richford, Vt., during the year ending Sept. 30, 1921.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft*
Jan. 7	J. L. Lamson	[a] 5.02	687	Sept. 9	W. E. Armstrong	1.94	20.4
June 14	do	3.04	284	9	do	1.90	15.9

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6,480	575	560	800	480	350	.....	.....	.....	132	60	58
2	6,240	830	2,740	1,050	460	380	.....	.....	.....	125	58	58
3	2,690	1,970	1,970	1,650	420	860	.....	.....	.....	84	58	58
4	1,240	2,200	1,280	1,400	460	960	.....	.....	.....	92	58	58
5	860	1,560	3,060	1,150	500	920	.....	.....	.....	90	54	50
6	770	1,170	5,160	960	500	960	.....	.....	.....	82	50	52
7	662	925	3,720	740	460	1,050	.....	.....	.....	80	42	55
8	575	800	2,020	650	440	1,300	.....	.....	.....	66	53	45
9	500	860	1,520	600	420	.....	.....	.....	.....	58	47	50
10	451	1,320	1,100	550	400	.....	.....	.....	.....	66	45	52
11	351	1,030	860	500	380	.....	.....	.....	.....	82	37	42
12	307	674	995	500	380	.....	.....	.....	.....	80	60	50
13	314	650	1,030	580	400	.....	.....	.....	.....	55	61	55
14	307	615	2,440	650	420	.....	.....	.....	265	75	63	58
15	300	585	5,400	770	380	.....	.....	.....	240	125	165	45
16	300	541	4,270	680	350	.....	.....	.....	209	107	145	66
17	279	770	2,340	600	500	.....	.....	.....	157	86	157	61
18	268	1,280	1,640	530	700	.....	.....	.....	140	130	132	63
19	251	960	1,280	530	600	.....	.....	.....	135	110	145	56
20	244	770	1,060	530	500	.....	.....	.....	132	152	170	64
21	272	605	925	550	440	.....	.....	.....	107	233	165	60
22	289	550	710	600	380	.....	.....	.....	100	206	160	53
23	289	600	995	680	340	.....	.....	.....	115	152	110	48
24	331	630	995	650	320	.....	.....	.....	97	90	90	61
25	296	595	960	600	300	.....	.....	.....	92	105	84	61
26	237	550	880	550	280	.....	.....	.....	84	95	70	63
27	331	541	920	530	260	.....	.....	.....	79	56	58	60
28	575	527	1,000	530	300	.....	.....	.....	79	55	64	88
29	555	500	1,050	530	.....	.....	.....	.....	70	55	66	68
30	505	487	1,000	500	.....	.....	.....	.....	160	55	63	68
31	442	.....	920	500	.....	.....	.....	.....	.....	55	61	.....

NOTE.—Discharge, Dec. 25 to Mar. 8, determined from gage heights corrected for effect of ice.

Monthly discharge of Missisquoi River near Richford, Vt., for the year ending Sept. 30, 1921.

[Drainage area, 445 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	6,480	237	887	1.99	2.29
November	2,200	487	856	1.92	2.14
December	5,400	560	1,770	3.98	4.59
January	1,650	590	698	1.57	1.81
February	700	260	420	.944	.98
March 1-8	1,300	350	848	1.91	.57
June 14-30	265	70	133	.299	.19
July	233	55	97.9	.220	.25
August	170	37	85.5	.192	.22
September	88	42	57.5	.129	.14

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, 1921.

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, 3.67 feet at 12.40 a. m. March 30 (discharge, 1,250 second-feet); minimum stage from water-stage recorder, 1.12 feet at 1 a. m. September 28 (discharge practically nil; water held back by dams).

1909–1921: 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 stage 1.12 feet at 1 a. m. September 28, 1921 (discharge practically nil; water held back by dams).

ICE.—River usually remains open at control; stage-discharge relation seldom affected.

REGULATION.—Flow at ordinary stages fully controlled by two dams at West Derby, but power plant is so operated that fluctuations in stage are not great. 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 practically permanent; not affected by ice during winter of 1920–21. Individual current-meter measurements occasionally plot erratically, probably because of rough measuring section. Rating curve fairly well defined. Operation of water-stage recorder satisfactory throughout the year except for days indicated in footnote to daily-discharge table. Daily discharge ascertained by applying mean daily gage heights to rating table. Records good.

Discharge measurements of Clyde River at West Derby (Newport), Vt., during the year ending Sept. 30, 1921.

[Made by J. L. Lamson.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Jan. 7	2.60	280
June 17	2.24	130

Daily discharge, in second-feet, of Clyde River at West Derby (Newport), Vt., for the year ending Sept. 30, 1921.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	248	145	175	286	171	141	1,040	360	93	62	61	59
2	498	200	156	286	167	152	930	322	93	64	59	61
3	653	196	164	298	145	152	890	286	102	51	60	60
4	670	227	152	304	91	110	790	264	131	55	60	60
5	632	243	156	304	69	83	720	248	160	74	60	61
6	532	269	160	298	59	91	646	232	145	61	50	61
7	430	322	204	292	110	182	613	222	141	59	43	60
8	380	328	360	275	149	218	548	218	152	58	53	61
9	340	328	507	204	156	248	532	212	152	59	54	62
10	328	334	540	196	156	540	507	196	152	55	55	59
11	264	322	498	218	156	820	474	196	145	62	55	52
12	238	310	460	227	164	870	452	191	134	62	57	71
13	204	298	415	218	160	890	422	182	123	62	58	64
14	196	218	430	182	128	770	394	182	145	60	53	64
15	196	269	565	149	85	690	374	178	107	61	62	64
16	200	259	613	134	83	720	367	175	116	59	60	64
17	209	269	632	156	126	710	415	167	126	54	60	61
18	196	298	639	160	160	690	430	164	123	62	64	54
19	191	298	613	164	160	639	467	164	116	61	62	71
20	191	304	532	167	149	646	490	160	107	58	57	76
21	191	204	474	175	107	770	490	160	113	57	50	71
22	204	269	422	156	91	890	515	160	128	57	59	64
23	167	222	387	152	91	1,050	515	167	131	57	61	62
24	152	286	353	145	119	1,120	532	171	102	50	60	60
25	145	119	340	164	156	1,050	507	171	102	58	67	53
26	196	187	292	164	116	980	507	171	76	58	60	55
27	200	232	269	160	58	1,060	482	175	76	59	60	43
28	191	204	292	160	152	1,150	452	178	74	60	49	33
29	196	275	286	160	.....	1,180	422	141	79	58	58	25
30	204	196	292	156	.....	1,180	387	128	71	56	59	35
31	145	.....	280	164	.....	1,120	.....	110	.....	50	60	.....

NOTE.—Water-stage recorder not in operation Dec. 5, 6, May 8, and 9; discharge estimated.

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Monthly discharge of Clyde River at West Derby (Newport), Vt., for the year ending Sept. 30, 1921.

[Drainage area, 150 square miles]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
October	670	145	283	1.89	2.18
November	334	119	254	1.69	1.89
December	639	152	376	2.51	2.89
January	304	134	202	1.35	1.56
February	171	58	126	.840	.87
March	1,180	83	675	4.50	5.19
April	1,040	367	544	3.63	4.05
May	360	110	195	1.30	1.50
June	160	71	117	.780	.87
July	74	50	58.7	.391	.45
August	67	43	57.6	.384	.44
September	76	25	58.2	.388	.43
The year	1,180	25	247	1.65	22.32

MISCELLANEOUS MEASUREMENTS.

Miscellaneous discharge measurements in St. Lawrence River drainage basin during the year ending Sept. 30, 1921.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1921.				*Feet.*	*Sec.-ft.*
Jan. 5	Canadaway Creek	Lake Ontario	Laona, N. Y.	0.58	111
5	do	do	do	.60	114
23	do	do	do	.68	124
23	do	do	do	.65	125
Feb. 23	do	do	do	.19	26.4
Mar. 3	do	do	do	.50	90
3	do	do	do	.48	87
Mar. 6	do	do	do	1.04	310
7	do	do	do	.90	221
7	do	do	do	.78	180
7	do	do	do	.75	173
1920.					
Oct. 4	Barge Canal	do	South Greece, N. Y.	2.745	840
21	do	do	do	2.695	749
Nov. 3	do	do	do	2.755	944
22	do	do	do	2.673	666
Dec. 9	do	do	do	2.628	747
1921.					
May 27	do	do	do	2.684	693
1920.					
Sept. 5	Beaver River	Black River	Tiss Bridge near Croghan, N. Y.	1.68	143
Oct. 14	do	do	do	2.88	585
Nov. 20	do	do	do	2.30	362
1921.					
Jan. 27	do	do	do	[a] 3.22	484
May 14	do	do	do	2.01	268
July 9	do	do	do	2.43	423
10	do	do	do	1.32	99
Sept. 19	Grass River	St. Lawrence River	New Bridge, N. Y.	−3.96	43.9

[a] Stage-discharge relation affected by ice.

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