DEPARTMENT OF THE INTERIOR
HUBERT WORK, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 504

SURFACE WATER SUPPLY OF THE UNITED STATES

1919-1920

PART IV. ST. LAWRENCE RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
W. G. HOYT, C. C. COVERT, and C. H. PIERCE
District Engineers

Prepared in cooperation with the
STATES OF WISCONSIN, NEW YORK, AND VERMONT

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Box 3106, Capitol Sta
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SURFACE WATER SUPPLY OF ST. LAWRENCE RIVER BASIN, 1919-1920.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the years ending September 30, 1919 and 1920.

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 1886 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, 1895-1921.

1895	$12,500.00
1896	21,000.00
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

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

Measurements of stream flow have been made at about 5,000 points in the United States and also at many points in Alaska and

the Hawaiian Islands. In July, 1920, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

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 of inches.

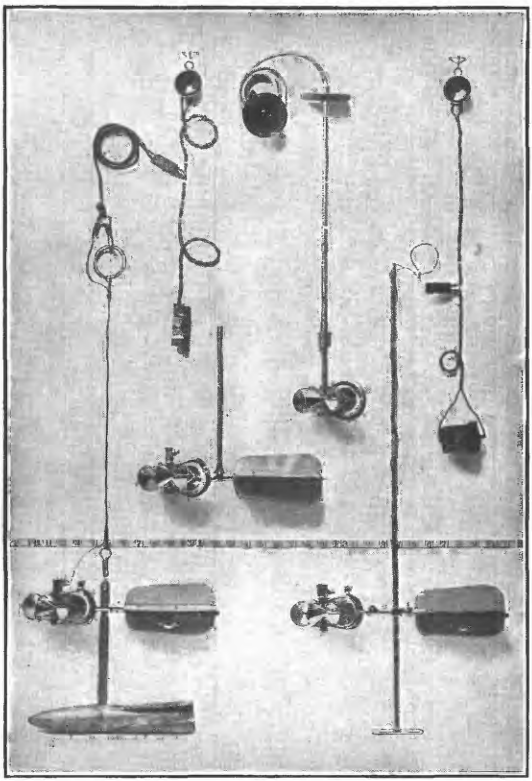
An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

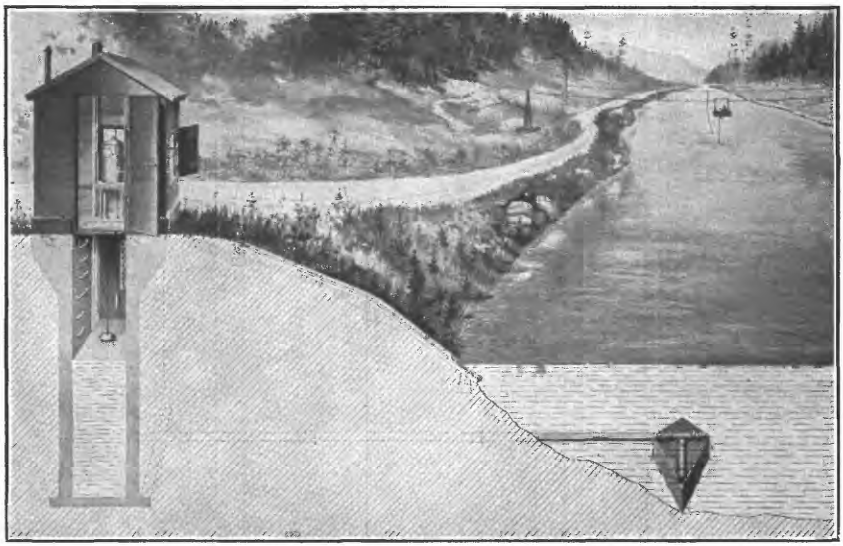
"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

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

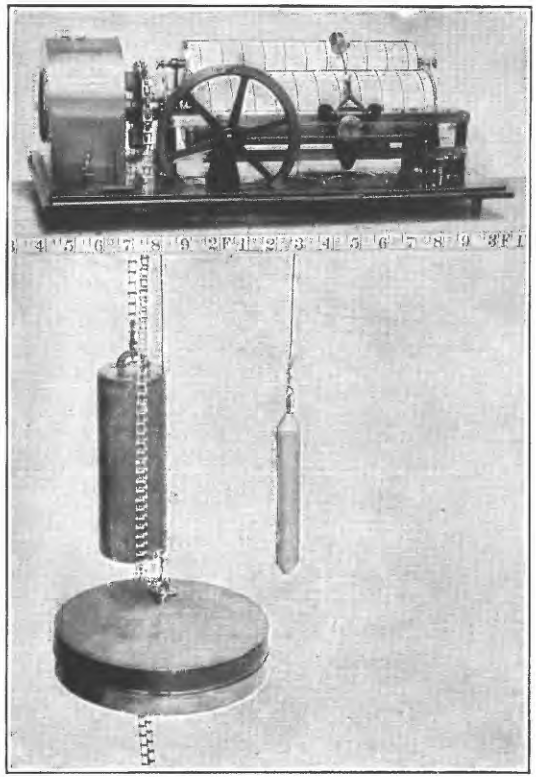
The "point of zero flow" for a given gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.



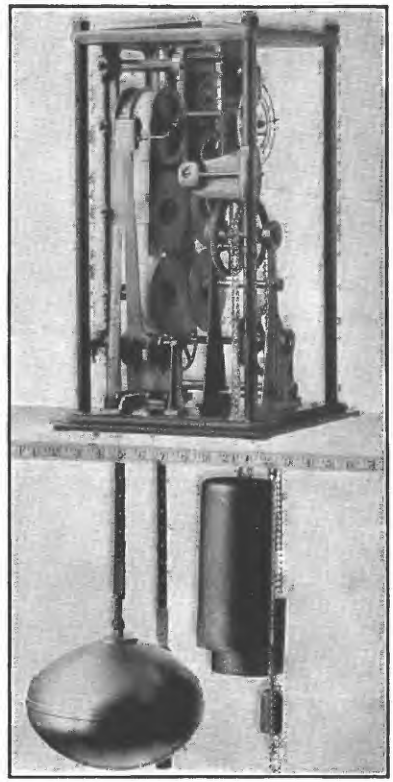
A. PRICE CURRENT METERS.



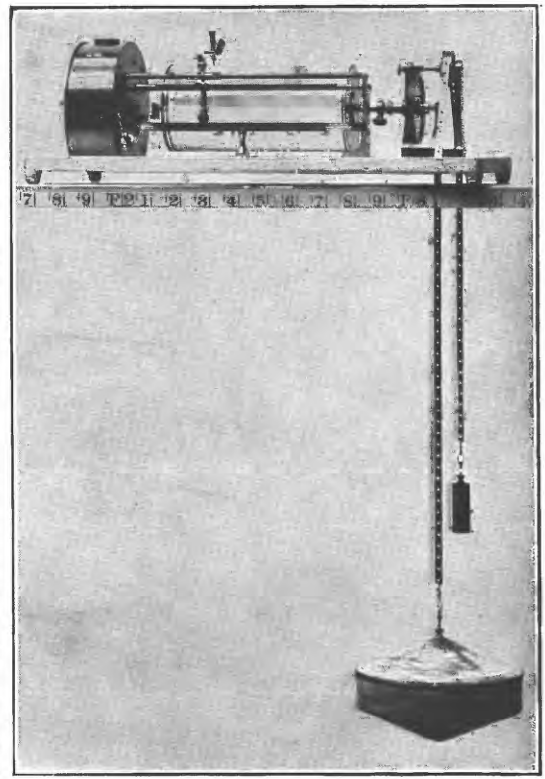
B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

EXPLANATION OF DATA.

The data presented in this report cover the two-year period beginning October 1, 1918, and ending September 30, 1920. 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, and these rating tables, when applied to gage heights, give the discharge from which the daily, monthly, and yearly mean discharge is determined.

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

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

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

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

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

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

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

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

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

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

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off 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" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

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

COOPERATION.

The work in Wisconsin during the years ending September 30, 1919 and 1920, was done in cooperation with the Railroad Commission of Wisconsin, C. M. Larson, chief engineer, and at certain stations 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 Army Engineer Corps (Fox River at Berlin and at Rapide Croche dam and Wolf River at New London).

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

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

Work in the State of New York has been conducted under cooperative agreements with the State engineer and surveyor and since July 1, 1911, with the division of inland waters of the State Conservation Commission, as provided by an act of the State legislature.

The stations on Genesee River at Rochester, N. Y., and Conesus Creek near Lakeville, N. Y., were maintained in cooperation with

the city of Rochester; the Rochester Gas & Electric Co. also cooperated in maintaining the station at Rochester.

The Black River regulating district assisted in obtaining gage readings on Black River and on Beaver River, also gage readings on Forestport feeder and Black River canal.

The water-stage recorder on Raquette River at Piercefield, N. Y., was inspected by an employee of the International Paper Co.

The work in Vermont has been carried on in cooperation with the State of Vermont, Percival W. Clement, governor, and Herbert M. McIntosh, State engineer, and at certain stations in cooperation with the following organizations and individuals: Vermont Marble Co, (Otter Creek at Middlebury); Charles T. Middlebrook (Green River at Garfield); 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 and Illinois were collected and prepared for publication under the direction of W. G. Hoyt, district engineer, assisted by S. B. Soulé, H. C. Beckman, H. J. Dean, Roy S. Huffman, and J. W. Harris.

Data for stations in the St. Lawrence River drainage basin in New York were collected and prepared for publication under the direction of C. C. Covert, district engineer, assisted by O. W. Hartwell, B. J. Peterson, E. D. Burchard, A. W. Harrington, J. W. Moulton, A. H. Davison, B. F. Howe, E. B. Shupe, Otto Lauterhahn, S. M. Currier, and V. B. Lamoureux.

Data for stations in Vermont were collected and prepared for publication under the direction of C. H. Pierce, district engineer, assisted by H. W. Fear, R. H. Suttie, M. R. Stackpole, J. W. Moulton, B. L. Bigwood, Hope Hearn, and Lillian H. McCarthy.

The manuscript was reviewed by B. J. Peterson.

GAGING-STATION RECORDS.

STREAMS TRIBUTARY TO LAKE SUPERIOR.

BAD RIVER NEAR ODANAH, WIS.

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

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

RECORDS AVAILABLE.—July 31, 1914, to September 30, 1920.

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 about 700 feet upstream from the gage or by wading.

CHANNEL AND CONTROL.—Bed is 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 the year ending September 30, 1919, 5.01 feet at 2 p. m. April 10 (discharge, 6,680 second-feet); minimum discharge occurred during the winter and is not known.

Maximum stage recorded during the year ending September 30, 1920, 5.5 feet about March 24 (discharge, 8,230 second-feet); minimum stage, 0.87 foot about 3 p. m. September 8 (discharge, 108 second-feet).

1914-1920: Maximum stage recorded, 6.66 feet at 1 a. m. April 22, 1916 (discharge, 12,200 second-feet); minimum open-water stage of 0.82 foot August 27, 1918 (discharge, about 88 second-feet). The minimum discharge may have been slightly less than 88 second-feet during January and February, 1918.

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

REGULATION.—A number of small reservoirs are operated during the early spring and summer as an aid to 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 except during winter. Daily discharge for the year ending September 30, 1919, obtained by discharge integrator except for periods indicated in footnote to daily-discharge table. Daily discharge for the year ending September 30, 1920, ascertained by applying to the rating table the mean daily gage height obtained by inspection of recorder graph or for days of considerable fluctuation in stage by averaging the discharge for intervals of the day. Discharge for periods of ice effect, December 1, 1918, to March 14, 1919, and November 27, 1919, to March 18, 1920, determined from discharge measurements and comparison with records of flow in adjacent drainage basins. Open-water records good. Records for winter roughly approximate.

Discharge measurements of Bad River near Odanah, Wis., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 15	R. S. Huffman	[a] 1.77	156	Jan. 13	J. W. Harris	[a] 2.07	168
Mar. 11	do	[a] 1.92	165	Feb. 12	do	[a] 2.07	168
May 31	W. G. Hoyt	1.14	235				

[a] Complete ice cover at control and at measuring section

Daily discharge, in second-feet, of Bad River near Odanah, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	134	425					1,050	936	232	412	692	203
2	129	404					1,400	934	400	370	586	186
3	129	345					1,740	893	490	296	472	187
4	134	348					1,830	821	383	556	416	172
5	144	294	220				2,070	780	354	1,600	372	170
6	158	390					2,390	699	579	1,490	335	170
7	167	718					2,420	777	1,030	1,120	351	160
8	188	858				160	2,590	836	837	849	362	148
9	188	856					2,660	763	728	700	329	137
10	198	740					4,220	687	674	639	298	144
11	193	592					5,680	568	811	468	260	140
12	188	528					4,840	532	731	405	230	130
13	193	424					3,320	452	580	336	219	127
14	183	391					2,350		504	321	320	139
15		359			120	950	2,080		1,300	342	458	141
16		349		140		2,000	1,700		1,890	380	448	145
17		318				2,000	1,470		1,600		394	150
18		370				1,510	1,260		1,550		360	140
19		954				1,450	1,100		2,040		358	136
20	160	1,610				2,620	1,740		1,730		332	130
21		1,420	165			2,300	1,980	300	1,120		331	150
22		1,140				1,960	1,740		783	400	534	150
23		704				1,900	1,460		632		531	161
24		757				1,720	1,300		2,180		432	158
25		651				1,980	1,190		2,160		345	147
26	162	393				2,950	1,030		1,680		283	139
27	179	414				2,900	1,000		1,280		240	137
28	285	450				2,300	1,230		968	1,160	212	139
29	528	412			.....	1,990	1,170	275	727	850	212	140
30	498	300			.....	1,720	990	270	557	640	198	157
31	472	.....			.....	1,290	.....	242	.....	730	198	.....
1919–20.												
1	183	730					2,520	1,300	470	3,360	230	129
2	230	649					2,600	1,120	870	2,490	209	134
3	335	559					1,920	1,010	860	1,700	203	129
4	311	526					1,950	900	703	1,290	193	120
5	281	518				180	1,780	820	577	920	209	120
6	305	510					1,610	730	494	730	214	120
7	323	470					1,440	712	442	712	203	120
8	287	435	260				1,270	640	414	703	188	116
9	239	470					1,100	613	374	595	287	112
10	247	1,630					930	577	354	502	380	112
11	219	3,220					1,060	542	518	442	335	144
12	214	2,550					1,530	502	631	387	299	209
13	209	1,780					1,360	478	595	380	253	214
14	209	1,420					1,220	449	586	394	225	214
15	203	1,030				1,150	1,170	400	526	387	183	209
16	198	1,030		170	160		1,070	374	559	380	163	193
17	177	930					1,040	342	594	317	153	172
18	183	830					1,010	342	550	287	134	117
19	188	622				2,680	1,060	354	463	281	134	112
20	177	640				2,680	1,140	456	394	264	134	112
21	183	667				2,330	1,210	559	335	253	139	120
22	188	595				1,860	1,300	534	299	230	144	158
23	203	550				3,650	1,760	780	281	236	139	203
24	230	534	170			6,960	2,130	1,080	264	287	134	230
25	293	518				6,650	1,920	1,030	236	335	129	209
26	428	486				4,450	1,660	930	236	311	129	172
27	442					2,950	1,630	712	1,020	293	129	139
28	414	435				4,300	1,800	613	5,710	258	129	134
29	374					4,670	1,780	510	6,660	247	129	129
30	400				.....	3,730	1,490	435	4,880	281	125	125
31	435	.....			.....	2,770	.....	407	.....	247	125	.....

NOTE.—Recording gage not in operation Oct. 15–25, 1918, May 14–28, July 17–27, 1919; discharge based on records of flow in adjacent drainage basin. Braced figures show mean discharge for period included.

Monthly discharge of Bad River near Odanah, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 607 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	.....	.....	200	0.329	0.38
November	1,610	294	597	.984	1.10
December	.....	.....	183	.301	.35
January	.....	.....	140	.231	.27
February	.....	.....	120	.198	.21
March	2,950	.....	1,150	1.89	2.18
April	5,080	990	2,030	3.34	3.73
May	936	.....	483	.796	.92
June	2,180	232	1,020	1.68	1.87
July	1,600	.....	583	.960	1.11
August	692	198	358	.590	.68
September	203	127	151	.249	.28
The year	5,680	.....	585	.964	13.08
1919–20.					
October	442	177	269	.443	.51
November	3,220	.....	855	1.41	1.57
December	.....	.....	214	.353	.41
January	.....	.....	170	.280	.32
February	.....	.....	160	.264	.28
March	6,960	.....	1,960	3.23	3.72
April	2,600	930	1,520	2.50	2.79
May	1,300	342	653	1.08	1.25
June	6,660	236	1,030	1.70	1.90
July	3,360	230	592	.975	1.12
August	380	125	186	.306	.35
September	230	112	151	.249	.28
The year	6,960	112	643	1.06	14.50

Days of deficiency in discharge of Bad River near Odanah, Wis., for the years ending Sept. 30, 1915–1920.

Discharge in second-feet.	Days of deficient discharge.							
	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	Oct. 1, 1915, to Sept. 30, 1920.	
							Days.	Per cent of time.
80	.....	.....	.....	.....	.....	.....	.....	.....
90	.....	.....	28	.....	.....	.....	28	1.3
100	.....	.....	81	45	.....	.....	126	5.7
110	42	.....	83	78	.....	.....	203	9.3
120	42	1	86	89	28	6	252	11.5
130	52	8	105	103	33	22	323	14.7
150	79	15	108	130	84	33	449	20.5
175	105	24	110	154	140	114	647	29.5
200	122	33	134	186	152	144	771	35.2
225	129	66	145	192	166	161	859	39.2
250	149	107	179	200	170	173	978	44.6
275	180	118	225	216	174	194	1,107	50.5
300	202	126	239	220	195	206	1,188	54.2
350	220	192	246	237	208	217	1,320	60.2
400	235	204	269	246	234	229	1,417	64.6
500	248	228	285	258	252	254	1,545	70.5
600	276	249	291	264	265	278	1,623	74.0
800	297	277	309	281	286	295	1,745	79.6
1,000	311	293	322	308	302	304	1,840	83.9
1,200	320	314	330	323	312	319	1,918	87.5
1,500	323	325	340	337	324	329	1,979	90.3
2,500	358	344	352	358	356	347	2,125	97.0
3,000	364	350	364	361	361	354	2,154	98.3
4,500	365	353	365	363	363	360	2,169	99.0
12,000	365	366	365	365	365	366	2,192	100.0
Discharge (sec.-ft.):								
Mean	539	796	444	519	585	646	.....	.....
Maximum	[a] 3,220	11,300	3,340	6,960	5,680	6,960	.....	.....
Minimum	[a] 105	120	[a] 90	[a] 100	[a] 120	112	.....	.....

[a] Estimated.

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, 1920.

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

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 the river below the gage prevent overflow at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year ending September 30, 1919, 3.15 feet at 8.30 a. m. April 12 (discharge, 610 second-feet); minimum stage recorded 0.70 foot 1.30 p. m. November 4 (discharge, about 2.8 second-feet).

Maximum stage recorded during the year ending September 30, 1920, 3.8 feet June 30 (discharge, 910 second-feet); minimum stage recorded, 0.84 foot September 13 (discharge, 4.7 second-feet).

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

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

Discharge measurements of Montreal River at Ironwood, Mich., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1920.			
Nov. 22	S. B. Soulé	[a] 1.77	111	Jan. 11	J. W. Harris	[d] 1.10	9.0
1919.				Feb. 13	do	1.00	12.3
Feb. 17	R. S. Huffman	[b] 1.00	6.8	June 11	S. B. Soulé	1.44	47
Mar. 12	do	1.11	14.4				
12	do	1.11	11.4				
Apr. 11	S. B. Soulé	3.18	594				
May 30	W. G. Hoyt	1.56	55				
Dec. 10	J. W. Harris	[c] 1.48	27.3				

[a] Made from bridge to which gage is attached; section very rough; results of measurement not used in determination of daily discharge.
[b] Made from bridge at regular section 1,300 feet upstream from gage; partial ice cover at control.
[c] Complete ice cover at control and measuring section.
[d] Velocity at measuring section too low to obtain accurate results.

Daily discharge, in second-feet, of Montreal River, at Ironwood, Mich., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	4.0	78	24	16	11	7	72	126	8.0	145	32	9.5
2	6.6	30	22	14	11	7	78	145	14	30	72	7.5
3	6.4	28	21	14	10	7	92	126	14	26	4.7	9.0
4	7.8	2.8	20	14	9	7	102	96	6.1	325	4.7	9.5
5	16	18	20	13	9	7	126	83	9.5	515	4.7	8.6
6	6.4	48	19	12	9	8	165	85	49	325	10	10
7	7.8	117	18	12	9	8	165	72	92	230	15	10
8	16	122	17	11	9	8	189	75	111	158	14	9.5
9	19	109	18	10	9	8	237	92	75	113	10	8.0
10	18	51	17	9.0	8	9	305	68	82	67	13	8.0
11	17	3.3	18	9.0	7	13	515	57	94	75	32	7.5
12	16	3.0	18	8.0	7	14	610	46	78	54	3.0	6.4
13	18	10	18	7.8	7	16	385	36	56	54	6.4	6.9
14	13	4.5	20	8.0	7	16	145	23	54	54	265	6.9
15	18	5.8	18	9.5	7	16	281	28	230	59	51	7.5
16	6.9	43	15	9.5	7	21	265	62	251	54	38	7.5
17	10	36	15	10	7	65	186	65	83	34	38	6.9
18	8.6	54	14	9.0	7	58	213	12	75	28	56	7.5
19	8.0	152	14	9.0	7	285	230	43	140	25	3.3	6.9
20	8.2	140	17	9.5	7	365	265	21	152	23	82	4.9
21	8.3	104	43	9.9	7	297	365	13	72	5.3	51	5.8
22	8.6	89	48	10	7	209	273	25	6.9	43	46	6.9
23	6.1	72	73	11	7	155	237	41	23	34	23	5.6
24	8.0	62	70	13	7	140	223	20	265	24	4.7	6.4
25	36	48	56	13	7	230	162	32	305	6.9	8.0	9.5
26	140	32	44	12	6	248	78	59	244	51	18	9.5
27	16	30	36	13	6	165	78	8	325	21	16	6.6
28	40	26	32	13	6	140	85	18	106	4.4	14	8.0
29	48	25	30	12	.....	152	96	18	85	12	14	7.8
30	5.6	24	24	12	.....	117	135	12	54	4.4	15	13
31	89	.....	18	11	.....	59	.....	6	.....	9.5	16	.....
1919-20.												
1	11.2	122	30	15	8	10	305	131	109	810	13	10.4
2	26	96	30	15	8	10	365	112	85	560	8.0	8.6
3	26	109	25	15	6	10	223	92	62	345	5.8	6.9
4	24	85	25	15	8	10	273	109	44	248	5.8	7.8
5	26	72	25	5	8	10	165	104	33	150	7.5	7.9
6	43	68	25	15	9	10	155	68	50	72	9.5	8.0
7	28	68	25	15	10	8.6	140	65	68	265	9.5	8.0
8	20	54	25	15	10	8.3	96	62	43	89	17	7.8
9	20	87	25	10	10	11.2	92	62	36	65	26	7.2
10	20	470	25	10	10	12.1	82	62	30	51	43	6.4
11	18	515	25	15	10	13	87	56	32	50	22	10.4
12	18	365	25	15	10	13	100	51	42	48	20	7.6
13	9.5	230	20	10	10	34	82	48	39	365	20	4.7
14	8.6	183	20	10	10	18	85	48	36	345	31	8.0
15	14	202	20	15	10	46	85	9.5	34	140	24	5.1
16	15	131	20	10	10	48	78	23	32	59	18	7.8
17	14	104	15	10	10	59	78	36	28	62	13	9.5
18	13	145	15	10	8	68	18	28	46	58	11.2	10.4
19	13	12.1	15	10	10	75	91	28	36	55	9.5	9.5
20	14	75	20	10	10	78	117	51	36	40	9.5	8.6
21	265	62	15	10	8	62	140	48	36	22	7.5	11.2
22	12.1	68	15	10	8	140	131	59	41	20	7.6	14
23	17	65	15	10	10	405	345	120	43	24	7.8	16
24	5.1	54	100	10	10	560	345	180	36	34	6.4	13
25	62	46	15	5	10	425	264	109	26	28	5.6	22
26	96	41	15	20	8	425	183	89	28	21	5.4	16.2
27	92	38	15	20	8	345	165	78	272	13	15	10.4
28	48	36	15	135	8	492	165	75	515	15	11.2	5.1
29	9.5	28	15	10	8	345	128	75	710	26	10.6	8.0
30	48	25	15	10	.....	305	135	46	910	48	9.9	10.4
31	100	.....	15	10	.....	448	.....	18	.....	18	12.1	.....

NOTE.—Stage-discharge relation affected by ice Nov. 28 to Dec. 8, 1918, Jan. 1-12, Feb. 3 to Mar. 11, 1919, and Nov. 30, 1919, to Mar. 6, 1920. Gage not read Oct. 20, 1918, May 11, 30, Nov. 27, 1919, Apr. 25, May 2, 9, 16, 23, 30, June 6, 13, 20, 27, July 4, 11, 18, 25, Aug. 1, 8, 15, 22, 29, Sept. 5, 12, 19, and 26, 1920; discharge interpolated.

Monthly discharge of Montreal River at Ironwood, Mich., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 73 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	140	4.0	20.6	0.282	0.33
November	152	2.8	52.2	.715	.80
December	73	14	27.0	.370	.43
January	16	7.8	11.1	.152	.18
February	11	6	7.75	.106	.11
March	365	7	92.2	1.26	1.45
April	610	72	212	2.90	3.24
May	145	6.4	52.0	.712	.82
June	325	6.1	105	1.44	1.61
July	515	4.4	84.2	1.15	1.33
August	265	3.0	31.6	.433	.50
September	13	4.9	7.92	.108	.12
The year	610	2.8	58.7	.804	10.92
1919–20.					
October	265	5.1	36.6	.501	.58
November	515	12.1	122	1.67	1.86
December	100	15	22.7	.311	.36
January	135	5	16.0	.219	.25
February	10	8	9.07	.124	.13
March	560	8.3	145	1.99	2.28
April	365	18	157	2.15	2.40
May	180	9.5	69.1	.947	1.09
June	910	26	118	1.62	1.81
July	810	13	134	1.84	2.12
August	43	5.4	13.6	.186	.21
September	22	4.7	9.56	.131	.15
The year	910	4.7	71.1	.974	13.24

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 junction of East and West branches.

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, 1920.

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.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year ending September 30, 1919, 6.1 feet April 12 (discharge, 710 second-feet); minimum stage, 1.5 feet September 19 and 20 (discharge, 4.0 second-feet).

Maximum stage recorded during the year ending September 30, 1920, 6.2 feet March 25–27 (discharge, 780 second-feet); minimum stage recorded 1.50 feet September 6 and 7 (discharge, 4.0 second-feet).

1918–1920: Maximum recorded discharge, that of March 25–27, 1920; minimum stage 1.32 feet July 23, 1918 (discharge, about 2.4 second-feet).

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent, except when affected by ice. Rating curve used fairly well defined below 710 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table. Records good except for days when gage was not read, and for periods of ice effect.

Discharge measurements of West Branch of Montreal River at Gile, Wis., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 22	S. B. Soule	4.19	161	May 30	W. G. Hoyt	2.47	33.5
				Dec. 10	J. W. Harris	[a] 2.45	32.6
1919.				1920.			
Jan. 18	Roy S. Huffman	[a] 2.13	18.2				
Feb. 17	do	[a] 2.00	11.1	Jan. 10	do	[a] 2.1	14.3
Mar. 12	do	1.95	14.5	Feb. 13	do	[a] 1.92	10.1
12	do	1.95	12.5	June 11	S. B. Soule	3.24	66.
Apr. 12	S. B. Soule	6.1	712				

[a] Partial ice cover at control; complete ice cover at measuring section.

Daily discharge, in second-feet, of West Branch of Montreal River at Gile, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	20	59	41	35	19	10	136	184	34	56	36	18
2	15	51	38	32	18	10	136	184	38	46	34	22
3	14	50	38	31	18	10	146	184	34	38	32	18
4	14	48	36	30	18	10	146	171	30	144	30	14
5	15	69	36	28	18	10	136	158	30	250	28	12
6	18	90	34	25	16	10	184	136	72	270	26	11
7	20	146	34	24	15	10	232	136	158	290	32	10
8	28	146	33	23	15	11	250	136	158	250	30	9.4
9	34	146	32	21	14	12	250	136	158	198	26	9.4
10	34	125	32	21	14	12	250	112	126	126	22	8.3
11	32	104	32	21	14	13	490	101	112	90	21	6.3
12	28	86	31	20	13	14	710	90	99	82	24	6.3
13	25	68	30	20	13	15	548	82	126	75	32	5.0
14	22	56	32	20	12	15	385	68	136	68	46	5.0
15	20	48	31	19	12	16	385	62	175	78	68	5.0
16	19	48	30	19	11	32	335	78	214	65	62	5.0
17	16	52	30	19	11	48	290	104	214	51	58	5,0
18	16	56	30	19	11	56	252	97	184	41	54	5.0
19	15	136	29	19	11	75	214	90	136	34	46	4.0
20	15	184	30	19	11	170	274	72	117	33	45	4.0
21	15	184	56	19	10	184	335	59	90	32	44	5.2
22	14	158	78	20	10	214	335	54	70	68	82	6.3
23	15	126	99	20	10	214	310	62	51	82	90	9.4
24	14	104	99	20	10	214	290	68	104	62	68	12
25	14	82	84	20	10	232	290	64	158	46	46	11
26	15	59	68	20	10	250	232	59	184	38	32	11
27	30	56	59	20	10	250	223	54	184	41	26	7.2
28	46	52	51	21	10	250	214	44	136	44	21	7.2
29	75	48	46	20	.....	250	232	36	104	38	20	7.2
30	78	44	41	21	.....	193	214	33	72	36	12	9.4
31	68	.....	38	20	.....	136	.....	30	.....	36	15	.....

Daily discharge, in second-feet, of West Branch of Montreal River at Gile, Wis., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	12	136	46	15	10	10	335	198	131	450	25	15
2	26	131	46	15	10	10	284	178	136	385	21	18
3	34	126	44	15	10	10	232	158	122	335	18	15
4	32	104	41	15	10	10	232	141	94	285	15	12
5	36	99	44	15	10	10	232	136	72	234	12	8
6	41	94	46	15	10	10	232	136	58	184	16	4
7	36	86	39	15	10	10	170	122	44	170	32	4
8	34	86	32	15	10	10	158	117	44	158	34	4
9	28	128	32	15	10	10	146	108	46	136	36	4
10	26	170	30	15	10	10	131	99	46	112	32	5
11	26	170	28	15	10	10	134	94	65	112	36	5
12	24	170	28	12	10	20	136	86	78	112	36	6
13	22	158	28	12	10	28	136	75	75	146	32	6
14	21	158	28	12	10	36	131	65	72	214	28	7
15	20	146	28	12	10	44	136	59	78	232	25	7
16	20	152	26	12	10	290	136	54	72	170	21	8
17	20	158	24	12	10	108	136	48	75	117	18	8
18	18	158	22	12	10	72	147	48	65	93	15	8
19	18	131	22	12	10	72	158	51	46	68	12	9
20	18	104	20	12	10	72	170	68	39	56	12	9
21	18	108	20	12	10	104	184	82	32	46	12	10
22	20	104	20	12	10	136	198	82	30	41	10.7	11
23	21	97	20	12	10	250	250	133	26	46	9.4	12
24	26	90	20	12	10	640	290	184	24	41	9.4	14
25	43	90	20	10	10	780	270	212	21	41	7.2	15
26	61	82	20	10	10	780	250	198	21	41	7.2	15
27	94	74	20	10	10	780	250	158	69	38	5.4	14
28	78	65	20	10	10	690	250	136	117	32	5.4	14
29	11	54	20	10	10	600	232	122	580	41	7.4	14
30	78	50	20	10	.....	510	232	120	610	38	9.4	14
31	104	.....	20	10	.....	420	.....	117	.....	28	12	.....

NOTE.—Stage-discharge relation affected by ice Feb. 6 to Mar. 11, 1919, and Dec. 20, 1919, to Mar. 12, 1920, Gage not read on Sundays and also Nov. 5, 8, 28, and Dec. 25, 1918; Jan. 1, Feb. 10, Apr. 18, May 30, June 24, July 4, Aug. 20, Sept. 1, 13–18, Oct. 25, Nov. 27, and Dec. 25, 1919; Jan. 1, Mar. 4, 29–31, Apr. 2, June 24. July 5, Sept. 8, 9, and 11–29, 1920; discharge interpolated except Sept. 11–29, 1920, which was estimated by comparison with Montreal River at Ironwood, Mich.

Monthly discharge of West Branch of Montreal River at Gile, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 70 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	78	14	25.9	0.370	0.43
November	184	44	89.4	1.28	1.43
December	99	29	44.5	.636	.73
January	35	19	22.1	.316	.36
February	19	10	13.0	.186	.19
March	250	10	95.0	1.36	1.57
April	710	136	281	4.01	4.47
May	184	30	95.0	1.36	1.57
June	214	30	117	1.67	1.86
July	290	32	90.6	1.29	1.49
August	90	12	39.0	.557	.64
September	22	4.0	8.95	.128	.14
The year	710	4.0	76.8	1.10	14.88

Monthly discharge of West Branch of Montreal River at Gile, Wis., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919-20.					
October	104	11	34.4	0.491	0.57
November	170	50	116	1.66	1.85
December	46	20	28.2	.403	.46
January	15	10	12.6	.180	.21
February	10	10	10	.143	.15
March	780	10	211	3.01	3.47
April	335	131	199	2.84	3.17
May	198	48	116	1.66	1.91
June	610	21	100	1.43	1.59
July	450	28	136	1.94	2.24
August	36	5.4	18.4	.263	.30
September	18	4	9.83	.140	.16
The year	780	4	82.7	1.18	16.08

STREAMS TRIBUTARY TO LAKE MICHIGAN.

MENOMINEE RIVER AT TWIN FALLS, NEAR IRON MOUNTAIN, MICH.

LOCATION.—In sec. 12, T. 40 N., R. 31 W., at power plant of Peninsular Power Co., 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 State map compiled by U. S. Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1920.

GAGE.—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, the water passing over the spillway, through the gates, down the log sluice, and leakage.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge recorded during the year ending September 30, 1919, 7,080 second-feet, April 13; minimum mean daily discharge, 274 second-feet, August 10.

Maximum mean daily discharge recorded during the year ending September 30, 1920, 7,920 second-feet March 28; minimum daily discharge, 640 second-feet, August 8.

1914–1920: Maximum mean daily discharge recorded 16,700 feet April 23 and 24, 1916; minimum mean daily discharge, 274 second-feet, August 10, 1919.

REGULATION.—During the summer of 1919 there was placed in operation another power plant operated by the same company and located about 5 miles upstream. Owing to variations in demand the daily discharge will bear no relation to the natural flow, the monthly mean discharge should, however, correspond closely to the natural flow.

ACCURACY.—During May and September, 1919, a series of four current-meter measurements were made by the United States Geological Survey at a point about 1 mile downstream from the plant. The results of these measurements ranged from 7 to 13 per cent larger than the discharge computed from the records of power output of the plant. The increase in the measured discharge may be due to more leak-

age at the plant than is accounted for, smaller efficiencies of the water wheels and generator equipment, and inflow between the power plant and the measuring section. On the basis of the current-meter measurements it was assumed that the discharge computed by the power company was about 10 per cent too small and the discharge published in the following tables was obtained by increasing the power-plant records 10 per cent.

COOPERATION.—Records furnished by Mead & Seastone, consulting engineers, Madison, Wis. Computation of monthly discharge made by engineers of the Geological Survey.

Daily discharge, in second-feet, of Menominee River at Twin Falls, near Iron Mountain, Mich., for the years ending Sept. 30, 1914–1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914.												
1	.....	.....	.....	928	827	700	459	14,300	2,110	3,070	1,810	1,400
2	.....	.....	.....	988	918	464	466	12,100	1,720	2,480	1,440	1,290
3	.....	.....	.....	1,000	843	484	456	9,910	1,880	2,530	1,490	1,550
4	.....	.....	.....	904	834	644	464	8,820	1,570	2,370	1,410	1,700
5	.....	.....	.....	1,000	833	801	373	7,970	1,480	1,920	1,310	1,910
6	.....	.....	.....	1,060	802	650	449	7,180	1,630	1,480	1,300	1,750
7	.....	.....	.....	1,060	897	649	472	6,900	1,950	1,320	1,250	1,520
8	.....	.....	.....	1,070	800	610	993	6,670	855	1,470	1,000	1,670
9	.....	.....	.....	1,070	840	681	844	5,560	1,060	1,510	1,310	1,460
10	.....	.....	.....	940	733	640	1,080	4,710	1,670	1,290	1,260	1,140
11	.....	.....	.....	833	657	633	1,090	4,750	462	1,530	1,170	1,230
12	.....	.....	.....	806	713	635	1,020	4,640	990	2,150	1,240	1,620
13	.....	.....	.....	515	769	689	1,070	4,290	1,220	3,350	1,390	1,400
14	.....	.....	.....	631	768	676	1,090	3,580	1,200	3,140	1,270	1,570
15	.....	.....	.....	749	669	661	1,470	3,080	1,040	2,630	1,180	1,640
16	.....	.....	.....	806	707	792	1,980	2,760	766	2,030	1,290	2,340
17	.....	.....	.....	805	709	818	2,640	2,400	1,990	2,020	1,290	2,220
18	.....	.....	.....	1,090	642	756	3,270	2,130	1,160	1,760	1,330	2,180
19	.....	.....	.....	1,090	704	756	3,900	2,840	1,080	1,600	1,340	1,970
20	.....	.....	.....	943	772	751	6,110	1,520	1,190	1,930	1,440	1,450
21	.....	.....	.....	948	714	749	6,450	2,090	1,140	1,430	1,480	1,430
22	.....	.....	.....	941	688	613	6,030	2,370	1,610	1,170	1,480	1,660
23	.....	.....	.....	946	630	610	5,610	2,600	1,270	1,830	1,610	1,600
24	.....	.....	.....	943	666	610	5,420	2,760	1,980	1,980	2,000	1,320
25	.....	.....	.....	840	670	616	5,940	2,470	1,990	1,960	2,020	1,370
26	.....	.....	.....	923	739	735	6,350	2,110	1,530	1,800	1,920	1,400
27	.....	.....	.....	981	892	745	6,630	2,180	1,970	1,890	1,750	1,230
28	.....	.....	.....	986	958	801	8,100	2,550	2,420	2,280	1,660	1,240
29	.....	.....	.....	977	.....	790	11,100	2,190	3,580	2,710	1,520	991
30	.....	.....	.....	813	.....	839	14,000	1,950	3,080	2,200	1,390	963
31	.....	.....	.....	932	.....	850	.....	2,000	.....	2,000	1,370	.....

Daily discharge, in second-feet, of Menominee River at Twin Falls, near Iron Mountain, Mich., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	996	870	1,440	896	862	968	950	3,520	1,550	3,240	1,300	970
2	966	1,000	1,550	914	885	977	952	3,430	2,600	3,060	1,600	1,040
3	1,440	972	1,510	899	892	834	992	3,260	1,750	2,890	1,400	1,080
4	841	1,310	1,500	939	902	893	1,220	3,220	1,600	2,560	1,810	1,240
5	1,130	984	1,460	940	860	976	1,240	3,370	1,180	2,730	2,680	555
6	888	1,260	1,360	1,010	815	983	1,360	3,360	1,250	2,790	2,820	1,130
7	952	1,240	1,320	983	783	926	1,500	3,410	2,660	2,680	2,580	793
8	1,380	960	1,210	933	940	971	1,990	3,920	3,760	2,560	2,160	711
9	1,210	1,120	1,080	1,030	979	974	2,310	3,930	3,630	2,130	2,680	1,000
10	1,420	929	984	955	806	872	2,790	3,920	3,510	2,200	2,280	1,230
11	551	929	973	1,010	831	951	3,320	4,290	3,330	2,460	1,710	1,350
12	1,000	993	885	1,020	936	1,040	4,070	3,670	3,060	2,580	1,440	532
13	1,020	1,020	790	972	942	1,010	3,750	3,240	3,480	3,140	1,090	1,140
14	1,030	881	881	951	1,110	960	3,190	4,120	3,180	2,570	1,330	1,860
15	1,100	1,200	774	957	1,090	1,110	3,240	4,180	3,130	2,760	1,320	3,280
16	964	1,170	797	993	938	1,040	3,370	4,020	2,740	2,440	1,380	3,840
17	1,090	1,000	843	994	932	938	4,020	3,670	2,560	2,550	1,120	3,540
18	1,040	673	881	1,020	917	948	3,980	3,530	2,180	2,540	1,230	2,800
19	1,080	1,000	1,030	1,020	960	1,000	3,820	3,340	2,620	2,260	1,500	3,000
20	897	1,030	876	1,090	1,150	1,040	3,360	2,920	2,520	1,700	1,390	2,240
21	744	985	920	1,010	964	925	3,350	3,300	2,680	1,660	1,360	2,000
22	770	1,110	952	851	1,020	971	3,670	3,070	2,420	1,700	1,100	2,070
23	870	1,050	953	960	1,030	984	3,720	3,710	2,320	1,400	1,410	1,950
24	919	1,010	949	890	953	975	3,300	3,800	2,460	1,610	918	1,600
25	836	1,250	828	843	872	984	3,540	3,330	1,980	1,380	913	1,530
26	910	1,210	995	870	981	1,000	3,350	3,180	2,160	1,510	1,180	2,310
27	838	1,180	975	886	987	972	3,270	2,820	1,860	1,370	1,090	3,130
28	1,040	1,130	865	904	919	935	3,760	2,290	1,940	1,220	1,030	2,980
29	1,020	1,240	861	899	.....	1,040	3,440	3,590	3,090	1,520	943	2,940
30	825	1,370	994	820	.....	908	3,490	2,080	3,360	1,470	1,110	2,460
31	1,230	.....	983	812	.....	895	.....	2,280	.....	1,360	982	.....
1915–16.												
1	2,330	2,010	2,770	1,890	1,430	1,080	2,650	8,740	2,650	5,520	1,280	1,140
2	2,040	2,060	2,610	1,850	1,320	1,120	3,120	8,430	4,660	4,980	1,290	1,140
3	1,980	1,910	2,810	1,740	1,510	1,130	3,360	7,750	7,710	3,960	1,980	707
4	1,960	1,740	2,650	1,840	1,440	1,160	3,410	7,410	8,580	3,530	1,810	1,320
5	1,880	1,890	2,910	2,150	1,570	987	3,340	8,290	8,290	2,860	1,770	2,770
6	2,440	1,910	2,260	1,470	1,340	1,110	3,280	6,180	6,940	2,640	1,730	3,220
7	2,280	1,890	2,250	1,370	1,260	962	3,270	5,990	6,600	2,580	2,270	4,360
8	2,120	2,330	2,570	1,410	1,270	952	3,230	6,050	6,320	2,450	2,300	6,910
9	2,160	2,530	2,240	1,320	1,090	1,050	3,220	5,940	6,130	2,250	2,460	6,180
10	2,220	2,080	1,810	1,480	1,030	1,100	3,450	5,930	5,910	2,180	2,120	5,160
11	2,340	3,490	1,840	1,350	1,200	1,140	4,480	5,350	4,940	1,730	2,300	3,890
12	2,400	5,400	2,120	1,240	1,200	1,290	5,750	5,150	4,200	2,300	1,750	3,080
13	3,020	5,740	2,160	1,470	1,040	1,320	6,610	5,160	4,260	1,700	1,620	3,160
14	3,440	5,290	1,880	1,340	1,110	1,220	6,900	4,820	4,620	2,010	1,780	2,600
15	3,630	4,100	1,780	1,370	1,130	1,070	7,910	4,560	4,700	1,970	1,310	2,810
16	2,870	3,540	1,960	1,270	1,060	1,030	9,130	5,110	4,890	1,980	1,160	2,790
17	3,080	2,730	2,060	1,100	1,330	1,220	9,740	4,480	4,920	1,670	1,390	2,500
18	3,560	3,490	2,030	1,220	1,270	1,190	10,400	4,660	5,160	1,730	1,470	2,070
19	4,860	3,540	1,990	1,270	1,300	1,120	10,600	5,140	5,040	1,880	1,460	2,350
20	5,230	3,140	1,790	1,400	1,180	1,070	11,200	3,940	4,450	1,720	1,810	1,730
21	4,710	2,730	1,830	1,570	988	1,260	13,300	3,880	4,010	1,730	1,770	2,150
22	4,330	2,400	1,860	1,590	1,270	960	15,800	3,370	3,240	1,970	1,240	2,070
23	3,980	2,300	1,920	1,360	1,200	1,140	16,700	3,550	3,600	2,140	1,140	2,280
24	3,120	3,030	1,950	1,410	1,280	1,200	16,700	3,110	3,940	1,610	1,380	2,280
25	3,090	2,960	2,070	1,570	1,330	1,240	14,400	3,170	4,620	1,730	1,150	2,340
26	2,650	2,840	1,800	1,370	1,380	1,170	12,300	3,200	4,310	1,790	1,160	2,170
27	2,740	3,540	1,830	1,420	1,130	1,330	12,100	3,760	4,290	2,320	1,360	2,460
28	2,280	4,090	1,810	1,470	1,050	1,490	10,200	4,310	3,600	1,830	1,130	2,880
29	2,260	4,140	1,660	1,540	1,070	1,500	9,580	2,490	3,830	2,200	1,180	3,440
30	2,210	3,380	1,760	1,410	.....	1,880	8,640	3,050	4,640	1,490	1,150	3,440
31	2,160	.....	1,810	1,580	.....	2,120	.....	2,500	.....	1,830	1,140	.....

Daily discharge, in second-feet, of Menominee River at Twin Falls, near Iron Mountain, Mich., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916 17.												
1	3,180	3,930	2,070	1,280	956	832	1,750	6,550	2,680	2,840	1,170	1,170
2	2,560	4,050	2,080	1,230	952	1,030	1,630	6,380	2,740	2,440	1,270	917
3	2,460	3,790	2,160	1,480	1,170	1,050	1,610	4,560	2,290	2,270	1,250	1,130
4	2,310	3,890	2,240	1,300	791	800	1,850	6,470	2,840	2,040	1,260	1,210
5	2,320	3,460	2,080	1,200	998	917	1,960	5,950	3,270	1,580	1,540	1,200
6	1,890	3,280	1,820	1,220	990	869	1,740	5,910	3,300	1,780	1,220	1,170
7	2,120	3,170	2,090	835	1,030	803	2,100	5,060	4,320	2,890	1,480	1,220
8	2,020	3,440	2,270	1,120	867	876	2,140	5,270	4,990	1,830	1,590	1,240
9	1,750	4,430	1,950	1,190	1,010	1,020	2,020	5,320	2,990	1,800	1,780	774
10	1,870	4,620	1,020	1,200	1,150	1,010	2,180	5,150	4,630	1,860	1,740	990
11	2,080	4,630	1,680	1,210	777	820	2,720	5,080	3,140	2,050	1,630	1,060
12	1,820	4,430	1,780	1,220	900	884	3,290	4,930	3,620	1,580	1,410	1,050
13	2,180	3,800	1,660	1,220	942	978	3,430	4,940	3,160	2,280	1,570	1,240
14	2,870	3,060	1,330	873	908	972	2,820	4,840	3,200	2,220	1,240	1,240
15	2,510	2,520	1,200	1,110	910	955	2,690	4,730	2,670	2,140	1,240	1,260
16	2,720	2,190	1,310	1,180	1,040	974	1,980	4,760	3,010	1,560	1,310	1,810
17	2,530	2,870	1,190	889	939	1,110	2,480	4,700	2,320	1,790	1,200	1,670
18	3,280	2,630	1,140	1,020	790	782	3,490	4,520	2,500	1,500	1,220	1,530
19	3,150	2,670	1,180	944	759	1,030	5,120	4,880	2,520	1,670	1,050	1,460
20	2,880	2,720	1,390	1,000	838	1,020	5,830	5,030	3,400	1,320	1,270	1,460
21	3,200	2,290	1,350	782	850	1,040	7,500	4,510	3,550	1,510	1,440	1,390
22	2,900	2,560	1,210	982	928	1,050	8,740	4,360	3,830	1,270	1,270	1,240
23	2,690	2,730	1,210	1,040	1,040	1,210	8,320	3,910	3,760	1,170	1,270	928
24	2,440	2,180	1,260	1,050	1,060	1,250	7,560	3,630	3,650	1,250	1,240	1,130
25	2,870	1,700	1,270	1,030	850	981	7,170	3,020	3,120	1,180	1,180	1,220
26	3,240	1,350	1,310	1,120	813	1,320	6,470	2,480	3,860	1,170	1,160	1,230
27	3,350	2,450	1,470	1,170	872	1,280	5,990	2,820	4,000	1,270	1,250	1,210
28	3,360	2,620	1,210	829	873	1,670	5,650	2,480	3,760	1,380	1,180	1,220
29	3,480	2,480	1,210	1,070	.....	1,340	6,230	2,470	3,320	1,240	1,180	1,220
30	3,620	2,250	1,180	1,050	.....	1,180	6,220	2,340	3,220	1,220	1,210	747
31	3,980	.....	1,270	1,050	.....	1,290	.....	2,350	.....	1,220	1,180	.....
1917-18.												
1	962	1,680	1,300	832	795	926	2,100	2,730	4,880	1,770	1,210	700
2	1,100	1,620	915	889	936	975	2,870	2,320	5,230	1,810	1,100	968
3	1,090	1,620	1,160	854	790	788	2,240	2,200	4,800	2,040	1,050	1,190
4	1,130	1,470	1,230	869	713	1,120	2,630	2,090	4,290	1,950	684	1,220
5	1,090	1,710	1,230	992	816	979	2,120	2,320	3,740	1,540	911	1,220
6	1,240	1,360	1,050	817	792	785	2,270	2,140	4,210	1,720	1,110	1,240
7	755	1,550	1,010	919	810	883	2,030	2,300	3,480	2,060	1,200	1,280
8	1,120	1,520	1,030	965	812	805	2,160	2,330	3,600	1,260	1,260	687
9	1,270	1,450	859	819	863	1,010	2,210	2,350	3,310	1,390	1,520	1,110
10	1,210	1,460	741	957	792	793	2,030	2,590	2,620	1,290	2,140	1,260
11	1,240	1,130	762	917	741	922	1,540	2,900	3,370	1,290	1,130	1,290
12	1,240	1,430	738	1,000	756	992	1,920	2,410	2,400	1,210	1,570	903
13	1,220	1,470	711	766	882	810	1,750	2,520	2,340	1,220	1,260	1,190
14	784	1,530	757	896	930	948	1,860	2,350	2,300	991	1,220	1,270
15	1,240	1,480	913	975	723	926	1,820	2,140	2,060	1,220	1,200	676
16	1,350	1,480	812	817	814	983	1,970	2,320	1,990	1,210	1,210	1,080
17	1,360	1,460	773	962	807	806	1,890	2,140	1,590	1,220	1,210	1,240
18	1,670	1,600	994	808	735	919	2,300	2,780	1,610	1,310	680	1,280
19	2,560	1,360	882	922	811	1,220	1,970	3,540	1,470	1,400	1,090	1,360
20	2,990	1,240	1,020	805	690	1,280	1,980	3,610	1,290	1,280	1,070	1,500
21	2,590	1,240	1,050	664	781	2,390	2,270	3,400	1,660	913	1,080	2,210
22	2,240	1,740	1,050	789	786	2,250	2,240	3,220	1,290	1,210	1,030	2,240
23	2,210	1,560	794	788	925	2,960	2,200	3,110	757	1,220	1,020	1,540
24	2,260	1,260	902	753	819	2,480	2,010	2,610	1,190	1,180	992	2,080
25	2,120	786	787	784	865	2,600	1,880	3,120	1,290	1,240	660	1,700
26	2,020	1,150	1,060	926	840	2,470	1,870	3,930	1,240	1,280	899	1,660
27	2,080	1,250	978	772	949	2,320	2,320	4,700	1,170	1,230	936	1,380
28	1,920	1,230	910	858	952	2,250	1,750	4,760	1,210	772	943	1,360
29	1,850	918	947	957	.....	2,510	2,350	4,900	1,300	1,140	1,090	1,220
30	1,920	1,160	815	784	.....	2,330	2,3 0	4,220	909	1,220	1,260	1,160
31	1,550	.....	848	776	.....	4,430	.....	4,450	.....	1,220	1,230	.....

Daily discharge, in second-feet, of Menominee River at Twin Falls, near Iron Mountain, Mich., for the years ending Sept. 30, 1914–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1,230	2,950	1,280	1,330	1,090	903	2,060	3,390	1,420	1,320	799	414
2	1,260	1,910	1,400	1,270	959	955	1,970	3,550	1,850	1,280	801	1,020
3	1,230	1,560	1,490	1,360	1,280	820	2,560	3,080	1,390	1,300	759	1,070
4	1,280	1,590	1,820	1,370	1,110	868	2,630	3,100	1,460	949	830	1,250
5	1,330	1,710	1,540	912	1,120	883	2,700	2,880	1,920	622	801	890
6	1,080	2,000	1,660	1,250	1,010	860	2,580	3,420	1,770	1,600	813	852
7	1,600	2.030	1,450	1,310	988	905	3,420	3,000	2,050	1,440	701	583
8	1,640	2,760	1,270	1,210	940	1,010	3,890	3,410	2,370	1,840	724	922
9	2,070	2,730	1,480	1,150	934	856	3,950	3,390	2,270	1,700	732	864
10	1,760	1,970	1,690	1,140	887	887	4,030	3,310	2,520	1,460	274	901
11	1,960	2,370	1,600	1,120	975	991	5,580	2,880	1,810	1,430	444	846
12	1,920	2,300	1,620	957	966	962	6,940	2,590	2,520	1,340	349	922
13	1,470	1,770	1,720	1,060	982	987	7,080	2,690	2,620	840	605	659
14	1,440	1,677	1,520	1,110	980	990	5,820	2,830	2,250	1,190	597	597
15	1,580	1,700	1,370	1,150	949	1,330	5,080	2,660	2,660	1,280	684	804
16	1,650	1,690	1,390	1,200	909	844	5,120	2,670	1,430	1,290	983	707
17	1,650	1,980	1,410	1,370	987	1,250	5,140	2,810	1,920	1,300	755	864
18	1,510	1,980	1,420	1,360	1,080	1,360	4,420	2,780	2,220	1,320	1,030	790
19	1,500	1,860	1,730	952	1,090	1,370	4,890	2,520	1,750	1,750	881	758
20	1,040	2,690	1,430	1,310	976	2,260	4,800	2,080	1,730	908	868	615
21	1,340	1,990	1,650	1,400	1,000	2,300	5,420	2,500	1,990	1,240	827	620
22	1,270	1,970	1,560	1,250	969	2,480	5,530	2,100	1,040	1,370	823	668
23	1,260	2,010	1,670	1,120	944	2,540	5,900	2,200	1,900	1,130	824	849
24	1,280	1,930	2,130	1,130	917	2,380	5,280	3,000	1,400	944	478	695
25	984	1,900	1,400	1,130	1,100	2,570	4,570	2,550	1,630	742	833	835
26	1,290	1,750	1,330	944	1,000	2,820	4,170	2,680	2,060	730	815	771
27	790	1,580	1,550	1,270	957	2,760	3,860	2,360	1,490	454	889	852
28	2,310	1,870	1,760	1,370	939	2,630	3,530	2,370	1,370	729	879	636
29	2,130	1,370	1,250	1,180	.....	3,160	3,670	2,840	1,380	818	959	1,280
30	2,900	1,550	1,440	1,100	.....	2,590	3,940	2,070	1,280	801	961	1,220
31	2,720	.....	1,420	1,130	.....	2,870	.....	1,610	.....	792	541	.....
1919–20.												
1	1,280	2,370	1,320	1,110	788	966	5,360	3,460	1,470	3,080	862	1,030
2	1,590	1,750	1,260	1,110	897	849	5,940	3,720	1,680	3,210	1,220	954
3	1,530	2,590	1,220	1,120	906	848	5,990	3,580	1,480	2,620	1,210	938
4	1,940	2,100	1,240	876	1,000	839	5,530	3,100	1,300	3,310	1,170	996
5	1,540	2,470	1,320	954	881	845	5,440	2,900	1,350	2,720	1,080	696
6	1,680	2,590	1,500	1,100	945	815	4,480	2,990	862	1,900	1,060	647
7	1,710	2,250	1,240	954	917	739	4,770	2,960	1,370	1,790	1,110	903
8	1,510	2,280	1,230	1,160	802	840	3,430	3,160	1,290	2,410	640	942
9	1,210	1,910	1,200	1,030	963	847	3,240	1,950	2,070	2,110	1,600	912
10	1,400	2,160	1,210	1,090	925	865	3,320	2,820	1,360	2,200	1,620	970
11	1,310	3,610	1,280	1,030	876	904	2,810	2,810	1,600	1,300	1,460	956
12	1,140	4,490	1,230	1,060	895	921	3,120	1,880	2,020	1,830	1,720	719
13	1,050	3,800	1,490	1,020	957	878	2,640	2,970	2,400	1,620	1,470	908
14	969	3,130	977	1,040	953	659	2,890	2,750	2,450	1,720	1,840	944
15	954	2,870	1,140	1,060	784	968	2,780	2,620	2,440	2,430	1,760	1,070
16	1,080	2,080	1,150	1,030	926	945	3,060	2,010	2,260	2,630	1,700	989
17	808	3,220	1,150	1,060	911	991	2,980	2,650	2,190	1,520	1,440	945
18	1,030	2,840	1,200	860	899	1,060	2,450	2,130	2,270	1,590	1,180	922
19	902	2,500	1,090	941	894	1,100	2,580	2,180	2,300	1,630	1,150	826
20	976	2,000	1,170	945	909	1,060	2,590	2,290	1,660	1,450	1,120	900
21	1,020	2,230	1,000	892	887	1,200	2,970	2,380	1,570	1,470	1,190	895
22	1,020	2,280	1,090	916	825	1,440	3,160	2,530	1,500	1,560	677	961
23	936	1,900	991	879	912	1,730	3,290	2,760	1,710	1,520	1,150	911
24	1,170	1,860	926	791	894	2,780	3,850	2,660	1,490	1,490	1,130	999
25	1,270	1,650	904	876	872	3,160	4,960	2,710	1,460	1,350	1,120	972
26	1,470	1,460	1,140	914	869	6,200	4,500	2,600	1,580	1,380	1,120	725
27	1,620	1,010	1,110	870	862	6,930	3,730	1,970	735	1,240	1,030	910
28	1,780	1,220	1,030	906	875	7,920	4,250	1,720	1,760	1,240	950	812
29	1,380	1,240	1,100	855	750	7,640	3,520	1,810	2,920	1,330	651	716
30	1,370	1,670	1,140	848	.....	7,010	2,590	1,980	2,640	2,490	888	673
31	1,940	.....	1,190	854	.....	6,140	.....	1,690	.....	1,570	967	.....

Monthly discharge of Menominee River at Twin Falls, near Iron Mountain, Mich., for the years ending Sept. 30, 1914–1920.

[Drainage area, 1,790 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1914.					
January	1,090	515	920	0.514	0.59
February	958	630	764	.427	.44
March	850	464	692	.387	.45
April	14,000	373	3,510	1.96	2.19
May	14,300	1,520	4,560	2.55	2.94
June	3,580	462	1,590	.888	.99
July	3,350	1,170	2,030	1.13	1.30
August	2,020	1,000	1,440	.804	.93
September	2,340	963	1,540	.860	.96
1914–15.					
October	1,440	551	1,000	.559	.64
November	1,370	673	1,070	.598	.67
December	1,550	774	1,050	.587	.68
January	1,090	812	944	.527	.61
February	1,150	783	938	.524	.55
March	1,110	834	968	.541	.62
April	4,070	950	2,880	1.61	1.80
May	4,290	2,080	3,410	1.91	2.20
June	3,760	1,180	2,550	1.42	1.58
July	3,240	1,220	2,190	1.22	1.41
August	2,820	913	1,510	.844	.97
September	3,840	532	1,880	1.05	1.17
The year	4,290	532	1,700	.950	12.90
1915–16.					
October	5,230	1,880	2,880	1.61	1.86
November	5,740	1,740	3,070	1.72	1.92
December	2,910	1,660	2,090	1.17	1.35
January	2,150	1,100	1,480	.827	.95
February	1,570	988	1,230	.687	.74
March	2,120	952	1,210	.676	.78
April	16,700	2,650	8,160	4.56	5.09
May	8,740	2,490	5,020	2.80	3.23
June	8,580	2,650	5,040	2.82	3.15
July	5,520	1,490	2,330	1.30	1.50
August	2,460	1,130	1,580	.883	1.02
September	6,910	707	2,850	1.59	1.77
The year	16,700	707	3,080	1.72	23.36
1916–17.					
October	3,980	1,750	2,700	1.51	1.74
November	4,630	1,350	3,070	1.72	1.92
December	2,270	1,020	1,540	.860	.99
January	1,480	782	1,090	.609	.70
February	1,170	759	929	.519	.54
March	1,670	782	1,050	.587	.68
April	8,740	1,610	4,090	2.28	2.54
May	6,550	2,340	4,500	2.51	2.89
June	4,990	2,290	3,320	1.85	2.06
July	2,890	1,170	1,730	.966	1.11
August	1,780	1,050	1,320	.737	.85
September	1,810	747	1,210	.676	.75
The year	8,740	747	2,220	1.24	16.77
1917–18.					
October	2,990	755	1,590	.888	1.02
November	1,740	786	1,400	.782	.87
December	1,300	711	936	.523	.60
January	1,000	664	859	.480	.55
February	952	690	819	.458	.48
March	4,430	785	1,550	.866	1.00
April	2,870	1,540	2,100	1.17	1.30
May	4,900	2,090	2,980	1.66	1.91
June	5,230	757	2,420	1.35	1.51
July	2,060	772	1,350	.754	.87
August	2,140	660	1,130	.631	.73
September	2,240	676	1,310	.732	.82
The year	5,230	660	1,540	.860	11.66

Monthly discharge of Menominee River at Twin Falls, near Iron Mountain, Mich., for the years ending Sept. 30, 1914–1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	2,900	790	1,560	0.872	1.01
November	2,950	1,370	1,970	1.10	1.23
December	2,130	1,250	1,530	.855	.99
January	1,400	912	1,190	.665	.77
February	1,280	887	1,000	.559	.58
March	3,160	820	1,630	.911	1.05
April	7,080	1,970	4,350	2.43	2.71
May	3,550	1,610	2,720	1.52	1.75
June	2,660	1,040	1,850	1.03	1.15
July	1,840	454	1,140	.637	.73
August	1,030	274	750	.419	.48
September	1,280	414	825	.461	.51
The year	7,080	274	1,710	.955	12.96
1919–20.					
October	1,940	808	1,310	.732	.84
November	4,490	1,010	2,320	1.29	1.44
December	1,500	904	1,170	.654	.75
January	1,160	791	973	.544	.63
February	1,000	750	889	.497	.54
March	7,920	659	2,260	1.26	1.45
April	5,990	2,450	3,740	2.09	2.33
May	3,720	1,690	2,570	1.44	1.66
June	2,920	735	1,770	.989	1.10
July	3,310	1,240	1,930	1.08	1.24
August	1,840	640	1,200	.670	.77
September	1,070	647	891	.498	.56
The period	7,920	640	1,750	.978	13.31

Days of deficiency in discharge of Menominee River at Twin Falls, near Iron Mountain, Mich., for the years ending Sept. 30, 1915–1920.

Discharge in sec.-ft.	Days of deficient discharge.							
	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	Oct. 1, 1915, to Sept. 30, 1920.	
							Days.	Per cent of time.
270								
500					6		6	0.3
600	3				10		13	.6
700	4			0	19	7	30	1.4
800	12	1	9	43	34	16	115	5.2
900	50	1	27	75	69	57	279	12.7
1,000	136	6	48	119	107	109	425	19.4
1,100	171	20	73	141	121	136	662	30.2
1,200	187	46	103	158	136	163	793	36.2
1,300	203	63	152	224	164	184	990	45.2
1,400	220	84	164	237	193	197	1,095	50.0
1,500	230	99	172	246	211	212	1,171	53.4
1,600	239	106	180	258	223	225	1,232	56.2
1,700	243	111	190	264	238	237	1,283	58.5
1,800	245	130	199	272	248	249	1,333	60.8
2,000	253	162	210	289	271	262	1,447	66.0
2,500	273	215	251	338	296	292	1,665	76.0
3,000	302	240	280	352	332	324	1,830	83.5
3,500	337	270	307	356	341	342	1,953	89.1
4,000	360	286	323	359	348	349	2,025	92.4
6,000	365	332	354	365	363	360	2,139	97.6
10,000		355	365		365	366	2,181	99.5
12,000		359					2,185	99.7
17,000		366					2,192	100.0
25,000								
Discharge (sec.-ft.):								
Mean	1,700	3,080	2,220	1,540	1,710	1,750		
Maximum	4,290	16,700	8,740	5,230	7,080	7,920		
Minimum	532	707	747	660	274	640		

MENOMINEE RIVER BELOW KOSS, MICH.

LOCATION.—In sec. 9, T. 34 N., R. 27 W., at the power plant of the Menominee & Marinette Light & Traction Co., 4 miles below Koss, Menominee County, Mich., and 3 miles west of Ingalls. 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, 1920.

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

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during the year ending September 30, 1919, 14,100 second-feet, April 14; minimum mean daily discharge 1,170 second-feet, September 21.

Maximum mean daily discharge during the year ending September 30, 1920, 21,800 second-feet, March 29; minimum mean daily discharge, 1,200 second-feet March 7.

1913–1920: Maximum daily discharge recorded, 23,200 second-feet, April 23 and 25, 1916; minimum daily discharge recorded, 1,000 second- feet, June 14, 1914.

REGULATION.—Above the station are the following power plants, Sturgeon Falls, owned by Penn Iron Mining Co., 50 miles; Little Quinnesec, owned by Kimberly Clark Co., 62 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 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.—During the months of May and September, 1919, seven current-meter measurements were made at the highway bridge about 4 miles downstream from the plant. Complete records were collected relative to the kilowatt-hours generated, head on dam and flow through the gates. Based on the results of these measurements it was found that the discharge computed from records of operation of the power plant was about 12 per cent too small for discharge around 5,000 second-feet and about 10 per cent too large for discharge around 1,700 second-feet. The errors in discharge computed from records of operation of the power plant has increased materially since 1914, when current-meter measurements of flow at Koss, Mich., showed close agreement with daily discharge computed from power-plant records. (See footnote to table of discharge measurements of Menominee River at Koss, Mich., Water-Supply Paper 384, p. 29.) Certain revisions in the tables used by the power company were put into effect November 1, 1919, and it is believed that records after that date represent more closely the actual flow.

COOPERATION.—Daily discharge records furnished monthly by Edward Daniell, general manager of the Menominee & Marinette Light & Traction Co. The monthly computations have been made by the United States Geological Survey.

Discharge measurements of Menominee River below Koss, Mich., during the year ending Sept. 30, 1919.

Date.	Made by—	[a] Gage height.	Discharge.	Date.	Made by—	[a] Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 21	W. G. Hoyt	19.25	5,480	Sept. 15	S. B. Soulé	21.37	1,900
24	do	19.22	5,390	16	do	21.56	1,720
24	do	19.29	5,310	16	do	21.68	1,610
Sept. 14	S. B. Soulé	21.71	1,520				

[a] Distance from reference point to water surface; reference point is top of downstream handrail at first vertical member from left end of bridge.

NOTE.—Measurements made from highway bridge about 4 miles downstream from power plant.

Daily discharge, in second-feet, of Menominee River below Koss, Mich., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	2,440	6,760	2,320	3,740	2,460	1,830	6,530	6,680	3,260	3,100	1,250	1,780
2	2,460	6,670	2,580	2,840	2,460	1,990	5,860	7,180	2,990	3,060	1,620	1,660
3	2,570	5,900	2,630	2,840	1,980	1,930	4,720	6,830	3,580	3,010	1,570	1,460
4	2,590	4,480	3,090	2,790	2,350	1,670	4,630	6,940	3,720	2,920	1,630	1,420
5	2,450	4,170	3,240	2,740	2,440	2,040	5,780	7,200	3,560	2,510	1,470	1,760
6	2,890	4,330	3,480	2,770	2,260	1,810	5,910	6,690	3,320	2,520	1,910	1,610
7	3,020	4,580	3,720	2,540	2,130	1,740	6,520	7,130	3,540	1,720	1,990	1,740
8	2,680	4,160	3,900	2,790	2,110	1,750	6,110	5,900	3,990	2,570	1,640	1,740
9	3,640	5,590	3,800	2,850	2,060	1,920	8,860	6,940	4,380	3,730	1,570	1,560
10	3,840	6,310	3,620	2,760	1,820	1,740	9,550	6,520	5,140	3,300	1,570	1,410
11	5,950	5,590	3,820	2,940	1,810	1,740	10,700	6,810	5,170	2,740	1,640	1,280
12	4,390	5,620	3,970	2,720	2,080	1,740	11,800	5,880	4,900	3,030	1,370	1,630
13	4,240	4,990	3,840	2,410	1,520	2,040	13,200	5,380	4,530	2,680	1,380	1,560
14	3,800	4,620	3,960	2,420	2,000	2,120	14,100	5,150	5,040	2,040	1,420	1,540
15	3,160	4,200	3,510	2,500	1,970	2,230	14,000	5,040	4,740	1,850	1,640	1,880
16	2,880	4,040	3,500	2,320	2,030	2,850	14,000	5,130	4,470	2,280	1,200	1,470
17	3,310	4,070	3,280	2,350	1,770	4,390	13,200	5,240	4,290	2,400	1,250	1,470
18	3,290	4,470	3,520	2,540	1,890	4,320	13,000	5,350	3,250	2,220	1,770	1,180
19	3,170	4,650	3,260	2,560	2,040	5,000	13,500	5,760	5,680	2,740	1,320	1,520
20	3,170	4,430	3,330	2,640	2,080	5,510	10,400	5,510	3,740	2,260	1,490	1,630
21	3,090	4,500	3,820	2,590	2,150	6,120	9,550	4,900	3,420	1,840	2,070	1,170
22	2,980	4,790	4,210	2,560	2,150	6,850	9,880	4,460	3,210	1,680	1,920	1,720
23	2,540	4,260	4,470	2,700	2,120	7,500	10,200	4,410	3,160	2,030	1,820	1,420
24	2,790	4,040	4,200	2,660	1,720	8,510	10,200	4,330	3,360	2,140	1,810	1,470
25	2,780	3,950	3,990	2,520	1,820	8,500	10,200	4,920	3,650	1,960	1,900	1,820
26	2,740	3,920	4,380	2,600	2,040	8,160	9,580	5,380	3,730	1,710	1,420	1,790
27	3,170	3,660	3,760	2,450	2,000	7,330	8,090	4,990	3,870	1,550	1,400	1,770
28	3,990	3,400	3,650	2,320	1,940	8,030	6,690	5,010	3,920	1,820	1,720	1,480
29	5,080	2,720	3,320	2,600	.....	7,800	6,990	4,210	3,280	1,790	1,780	1,850
30	6,610	2,780	3,890	2,660	.....	7,720	6,410	3,850	3,170	1,790	1,630	1,620
31	7,200	.....	3,170	2,510	.....	7,040	.....	3,480	.....	1,530	1,270	.....

Daily discharge, in second-feet, of Menominee River below Koss, Mich., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	1,830	4,660	2,770	1,980	1,280	1,260	18,800	7,860	3,250	5,970	2,350	1,480
2	2,120	5,440	2,410	1,760	1,570	1,480	16,900	8,040	3,220	6,520	2,140	1,760
3	2,300	5,790	2,330	1,840	1,620	1,500	15,700	6,080	3,180	7,350	2,150	2,050
4	2,650	6,120	2,230	1,770	1,450	1,530	15,600	6,840	3,220	7,160	2,300	2,130
5	2,940	5,730	2,180	1,670	1,540	1,520	14,200	6,240	3,180	6,990	2,360	2,000
6	3,360	5,980	2,320	1,680	1,370	1,470	12,900	5,780	2,780	6,630	2,220	2,200
7	2,650	5,640	2,410	1,630	1,550	1,200	10,900	5,540	2,080	5,100	2,560	1,630
8	2,530	5,870	2,450	1,750	1,520	1,480	9,710	5,390	2,360	3,970	2,680	1,760
9	2,510	5,310	2,200	1,700	1,460	1,200	9,420	5,680	3,880	4,500	2,450	1,760
10	1,890	5,120	2,070	1,670	1,680	1,380	8,610	4,930	3,070	4,630	2,820	1,630
11	2,250	5,870	2,130	1,760	1,720	1,470	8,670	4,200	3,040	4,460	3,100	1,630
12	2,230	7,220	2,190	1,680	1,710	1,540	7,320	4,700	3,990	3,510	3,100	1,860
13	2,450	8,840	2,090	1,670	1,620	1,460	6,980	4,700	5,470	3,290	2,990	1,980
14	1,820	8,640	2,200	1,770	1,570	1,270	6,620	5,210	5,540	3,850	3,560	1,850
15	2,010	6,550	2,080	1,850	1,710	1,710	6,010	4,680	6,410	3,760	2,900	2,340
16	1,920	5,590	2,060	1,750	1,830	1,610	5,940	6,420	5,000	3,750	2,840	2,620
17	1,770	5,940	1,970	1,700	1,540	1,540	6,030	5,540	6,040	4,600	2,960	2,440
18	1,720	5,730	1,810	1,840	1,540	1,760	6,240	4,540	4,980	4,990	2,950	2,400
19	1,780	5,660	1,850	1,610	1,630	1,780	5,430	4,620	5,160	2,420	2,570	2,570
20	1,780	5,260	1,960	1,760	1,680	2,220	5,940	4,400	5,050	2,960	2,060	2,030
21	1,430	4,340	1,880	1,520	1,610	2,160	6,000	4,580	3,990	2,960	2,030	1,930
22	1,990	3,760	1,850	1,670	1,280	2,160	5,740	4,550	3,700	3,000	2,220	2,030
23	2,070	3,940	1,980	1,600	1,600	2,760	6,860	4,240	3,620	2,720	1,570	2,030
24	2,070	3,920	2,180	1,540	1,440	3,590	8,000	5,660	3,660	4,110	1,630	1,740
25	2,220	3,780	1,870	1,440	1,520	5,510	8,800	6,340	4,110	3,440	1,970	1,940
26	2,370	1,850	1,610	1,630	1,590	7,400	11,300	5,890	3,330	2,590	1,880	1,970
27	2,860	1,680	1,690	1,720	1,550	12,800	11,200	5,600	3,020	3,040	1,740	1,600
28	3,290	2,140	1,960	1,560	1,570	19,000	10,100	5,170	2,500	2,960	2,260	1,680
29	3,480	2,210	1,910	1,380	1,330	21,800	10,200	4,430	2,950	2,710	1,970	1,740
30	3,520	2,370	2,050	1,520	.....	18,100	9,300	3,440	4,970	2,410	1,900	1,850
31	3,780	.....	1,910	1,550	.....	16,500	.....	3,470	.....	2,460	1,640	.....

Monthly discharge of Menominee River below Koss, Mich., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 3,790 square miles.]

Month.	Discharge in second-feet.				Run-off in inches
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	7,200	2,440	3,510	0.926	1.07
November	6,760	2,720	4,590	1.21	1.35
December	4,470	2,320	3,590	.947	1.09
January	3,740	2,320	2,650	.699	.81
February	2,460	1,520	2,040	.538	.56
March	8,510	1,670	4,320	1.14	1.31
April	14,100	4,630	9,340	2.46	2.74
May	7,200	3,480	5,590	1.47	1.70
June	5,170	2,990	3,940	1.04	1.16
July	3,730	1,530	2,340	.617	.71
August	2,070	1,200	1,590	.420	.48
September	1,880	1,170	1,580	.417	.47
The year	14,100	1,170	3,760	.992	13.45
1919–20.					
October	3,780	1,430	2,370	.625	.72
November	8,840	1,680	5,030	1.33	1.48
December	2,770	1,610	2,080	.549	.63
January	1,980	1,380	1,680	.443	.51
February	1,830	1,280	1,550	.409	.44
March	21,800	1,200	4,600	1.21	1.40
April	18,800	5,430	9,510	2.51	2.80
May	8,040	3,440	5,320	1.40	1.61
June	6,410	2,080	3,890	1.03	1.15
July	7,350	2,410	4,160	1.10	1.27
August	3,560	1,570	2,380	.628	.73
September	2,620	1,480	1,950	.515	.58
The year	21,800	1,200	3,710	.979	13.32

Days of deficiency in discharge of Menominee River below Koss, Mich., for the years ending Sept. 30, 1914–1920.

Discharge in sec.-ft.	Days of deficient discharge.								
	1913–14	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	Oct. 1, 1913 to Sept. 30, 1920.	
								Days.	Per cent of time.
1,200	2	1	.....	.....	2	3	.....	8	0.3
1,300	6	7	.....	.....	6	7	5	31	1.2
1,400	26	20	1	.....	26	11	9	93	3.6
1,500	36	32	1	.....	36	23	20	148	5.7
1,600	45	49	3	4	45	33	43	222	8.6
1,800	75	91	27	26	75	67	97	458	17.8
2,000	96	123	65	65	96	93	130	648	25.2
2,200	108	143	84	82	108	110	158	791	30.8
2,400	119	175	103	103	119	121	179	919	35.8
2,600	139	214	108	132	139	147	196	1,075	41.8
2,800	162	227	129	145	162	167	205	1,197	46.6
3,000	192	233	151	162	192	180	217	1,327	51.6
3,300	233	242	172	179	233	202	230	1,491	58.0
3,600	250	253	190	197	250	217	241	1,608	62.6
3,900	263	260	208	210	263	229	251	1,684	65.5
4,300	289	271	217	223	289	249	260	1,798	70.0
4,800	308	285	228	238	308	272	275	1,914	74.5
5,500	318	300	246	268	318	290	292	2,034	79.1
6,500	329	330	267	291	329	319	326	2,191	85.2
8,000	342	360	302	334	342	342	340	2,362	91.9
10,000	354	365	324	343	354	352	350	2,442	95.0
13,000	358	.....	336	362	358	359	357	2,495	97.1
16,000	361	.....	350	365	361	365	360	2,527	98.3
20,000	363	.....	360	.....	363	.....	365	2,546	99.1
25,000	365	.....	366	.....	365	.....	366	2,557	100.0
Discharge (sec.-ft.):									
Mean	3,550	3,230	5,260	4,320	3,170	3,760	3,710	.....	.....
Maximum	20,800	8,650	23,200	13,800	15,000	14,100	21,800	.....	.....
Minimum	1,000	1,170	1,390	1,550	1,160	1,170	1,200	.....	.....

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, 1920.

GAGE.—Chain gage fastened to guard rail on upstream side of bridge; read by William and Clayton 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 the year ending September 30, 1919, 5.17 feet during discharge measurement made April 13 (discharge, 1,530 second-feet); minimum discharge 144 second-feet, September 12 and 13.

Maximum discharge recorded during the year ending September 30, 1920, 2,480 second-feet March 28; minimum discharge estimated because of ice, 180 second-feet, February 23 to March 1.

1914–1920: Maximum recorded stage, 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.—River not used for log driving during 1919 and 1920. Gates of a dam below remained open throughout the period.

ACCURACY.—Stage-discharge relation changed during winter of 1919; rating curve used October 1, 1918, to March 29, 1919, fairly well defined between 292 and 1,840 second-feet; extension of curve below 292 and above 1,840 second-feet may be subject to considerable error. Curve used March 30, 1919, to September 30, 1920, fairly well defined throughout. Gage read once daily to half-tenths. 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 from results 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Jan. 14	S. B. Soulé	[a] 3.08	255	Dec. 12	S. B. Soulé	[c] 3.51	304
Feb. 12	do	[b] 2.86	198				
Mar. 8	do	[c] 3.38	203	1920.			
Apr. 13	do	5.17	1,530	Jan. 18	do	[c] 2.99	239
May 27	W. G. Hoyt	3.18	671	Feb. 13	do	[c] 3.37	220
Sept. 19	S. B. Soulé	1.47	176	June 14	do	4.38	1,180

[a] Measurement made from complete ice cover. Because of frazil ice at bridge section, discharge at gage was obtained by measuring flow of Pine River (128 second-feet) above mouth of Popple River and flow of Popple (127 second-feet) above mouth, and adding the results of the two measurements.

[b] Discharge determined as in previous measurement; Pine River above Popple, 100 second-feet; Popple above mouth, 98 second-feet.

[c] Complete ice cover at control and measuring section.

Daily discharge, in second-feet, of Pine River near Florence, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	346	785	475	305	160	170	900	780	476	610	215	162
2	318	820	475	275	160	170	878	746	444	610	204	162
3	318	820	475	255	155	185	855	746	444	610	204	162
4	346	855	475	225	150	185	835	746	476	610	204	172
5	374	855	475	210	150	185	815	746	542	542	193	172
6	405	890	475	200	155	190	855	780	576	508	193	172
7	405	890	473	200	155	195	990	815	746	508	182	162
8	422	930	473	200	155	205	1,120	815	712	467	182	162
9	439	970	464	210	170	210	1,360	855	678	444	182	162
10	439	930	456	225	180	215	1,410	815	678	412	182	153
11	439	930	448	225	190	225	1,460	780	678	382	182	153
12	456	890	439	240	200	230	1,510	746	644	382	182	144
13	439	855	439	240	200	240	1,460	746	644	352	172	144
14	422	820	439	255	190	250	1,460	746	610	324	162	153
15	405	785	439	250	185	260	1,410	712	610	311	162	153
16	422	715	430	245	180	270	1,360	712	644	298	162	153
17	374	715	425	240	180	275	1,310	746	678	298	162	162
18	374	680	420	235	170	290	1,220	746	746	274	162	162
19	360	680	410	230	170	305	1,170	746	746	250	162	162
20	374	645	405	225	170	335	1,120	712	746	250	162	172
21	390	645	400	220	170	405	1,080	712	712	250	172	182
22	405	610	390	210	170	440	1,040	746	678	250	172	182
23	405	590	385	200	170	540	990	746	644	250	182	204
24	422	575	380	190	165	645	945	780	610	250	182	250
25	422	560	370	180	165	750	900	746	610	262	182	274
26	439	540	360	170	165	890	900	610	678	274	182	382
27	473	525	350	170	165	970	900	678	712	250	172	412
28	524	505	335	165	170	970	900	610	712	238	172	204
29	575	490	330	165	.....	930	855	576	678	226	162	226
30	645	490	325	160	.....	990	815	542	644	226	162	274
31	750	.....	320	160	.....	945	.....	476	.....	226	162	.....

Daily discharge, in second-feet, of Pine River near Florence, Wis., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	324	900	410	240	225	180	1,460	746	382	1,360	382	274
2	382	900	395	240	225	195	1,380	746	382	1,260	476	262
3	444	900	380	250	225	205	1,310	712	397	1,170	542	250
4	542	815	365	240	225	215	1,100	678	367	990	576	250
5	576	780	350	230	225	225	900	678	352	990	576	238
6	576	746	350	225	215	225	858	542	382	990	610	250
7	542	746	340	225	205	225	815	444	352	900	610	262
8	508	678	325	225	230	225	746	412	298	900	678	250
9	508	644	325	225	250	225	678	412	311	855	746	274
10	476	900	310	225	230	240	661	428	324	815	746	286
11	476	1,260	310	210	205	250	644	412	780	678	746	274
12	476	1,360	305	195	210	275	576	382	1,080	576	712	274
13	476	1,410	300	200	220	285	610	367	1,120	542	712	298
14	508	1,360	300	205	220	325	542	352	1,080	508	678	324
15	508	1,280	300	210	210	350	508	338	990	444	610	338
16	542	1,120	305	220	210	410	476	367	1,120	412	542	298
17	542	1,120	310	230	205	445	508	382	1,080	324	542	324
18	542	1,030	290	240	205	490	542	428	990	298	508	352
19	508	945	275	240	205	540	576	444	855	382	476	367
20	508	835	275	240	205	575	644	508	900	397	412	352
21	476	780	275	245	200	645	780	576	815	412	352	338
22	476	680	260	250	190	710	815	746	900	476	367	324
23	444	610	250	255	180	780	990	746	855	444	352	338
24	476	560	240	260	180	900	1,170	712	815	428	338	352
25	542	510	225	260	180	1,040	1,120	610	780	412	352	352
26	576	490	215	260	180	1,410	1,080	576	712	397	324	298
27	610	475	205	255	180	1,960	1,080	542	900	382	298	274
28	644	445	285	250	180	2,480	990	476	990	412	298	262
29	678	445	260	255	180	1,970	900	444	1,360	412	324	250
30	746	430	240	260	.....	1,460	780	412	1,460	397	298	238
31	780	.....	225	245	.....	1,460	.....	397	.....	352	286	.....

NOTE.—Stage-discharge relation affected by ice Nov. 22 to Dec. 6, 1918, Dec. 16, 1918, to Mar. 29, 1919, and Nov. 14, 1919, to Mar. 27, 1920. Gage not read Dec. 9, 11, 13, 1918, Apr. 2, 4, 1919, Mar. 29, 31, Apr. 2, 4, 6, 8, and 10, 1920; discharge interpolated.

Monthly discharge of Pine River near Florence, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 488 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	750	318	430	0.881	1.02
November	970	490	733	1.50	1.67
December	475	320	418	.857	.99
January	305	160	215	.441	.51
February	200	150	170	.348	.36
March	990	170	421	.863	.99
April	1,510	815	1,090	2.23	2.49
May	855	476	725	1.49	1.72
June	746	444	640	1.31	1.46
July	610	226	359	.736	.85
August	215	162	178	.365	.42
September	412	144	193	.395	.44
The year	1,510	144	465	.953	12.92
1919–20.					
October	780	324	529	1.08	1.24
November	1,410	430	838	1.72	1.92
December	400	295	297	.609	.70
January	315	200	236	.484	.56
February	250	180	207	.424	.46
March	2,480	180	675	1.38	1.59
April	1,460	476	841	1.72	1.92
May	746	338	516	1.06	1.22
June	1,460	298	771	1.58	1.76
July	1,360	298	623	1.28	1.48
August	746	286	499	1.02	1.18
September	367	238	294	.602	.67
The year	2,480	180	527	1.08	14.70

Days of deficiency in discharge of Pine River near Florence, Wis., for the years ending Sept. 30, 1916–1920.

Discharge in sec.-ft.	Days of deficient discharge.						
	1915–16.	1916–17.	1917–18.	1918–19.	1919–20.	Oct. 1, 1915, to Sept. 30, 1920.	
						Days.	Per cent. of time.
130	6	.....	.....	.....	.....	6	0.3
150	13	16	.....	4	.....	33	1.8
170	29	37	20	54	.....	140	7.7
200	41	80	107	96	11	335	18.3
220	59	90	117	109	29	404	22.1
240	75	99	128	126	56	484	26.5
260	85	111	138	140	81	555	30.4
280	88	117	150	148	99	602	33.0
300	98	130	184	151	112	675	36.9
320	114	148	197	157	121	737	40.3
340	120	152	198	163	137	770	42.1
360	143	162	209	169	152	835	45.8
380	150	168	223	175	158	874	47.8
400	170	180	226	182	174	932	51.0
425	181	191	239	199	186	996	54.5
450	185	192	249	214	200	1,040	56.9
475	196	204	257	227	200	1,084	59.3
500	202	208	260	232	215	1,117	61.1
550	211	216	276	242	242	1,187	64.9
600	221	230	285	248	254	1,238	67.8
700	245	257	296	278	276	1,352	74.0
900	269	296	341	338	312	1,556	85.2
1,000	300	315	349	350	333	1,647	90.2
1,500	341	354	359	364	363	1,781	97.5
3,000	361	365	365	365	366	1,822	99.7
5,000	366	.....	.....	.....	.....	1,827	100.0
Discharge (sec-ft.):							
Mean	666	557	425	465	527	.....	.....
Maximum	4,370	2,460	[a] 1,720	1,510	2,480	.....	.....
Minimum	118	135	[a] 170	144	180	.....	.....

[a] Estimated.

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, 1920.

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 the year ending September 30, 1919, 4.22 feet April 12 (discharge, 990 second-feet); minimum stage recorded 1.5 feet September 12–14 (discharge, from extension of rating curve, about 100 second-feet).

Maximum stage recorded during the year ending September 30, 1920, 5.15 feet March 27 (discharge, 1,450 second-feet); minimum stage recorded 1.60 feet September 8 (discharge, 118 second-feet).

1914–1920: Maximum stage recorded, 5.15 feet March 27, 1920 (discharge, 1,450 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 curve, or for periods when stage-discharge relation was affected by ice, from discharge measurements, observer's notes, and weather records. Open-water records excellent, except for extremely low stages, for which they are fair. Records for winter fair.

Discharge measurements of Pike River near Amberg, Wis., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 13	S. B. Soulé	[a] 3.18	201	Jan. 16	S. B. Soulé	[a] 1.98	166
Feb. 13	do	1.80	157	Feb. 14	do	[a] 2.26	168
Mar. 9	do	[a] 1.98	165	June 14	do	3.60	758
May 23	W. G. Hoyt	2.46	355				
Dec. 13	S. B. Soulé	[a] 2.62	194				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Pike River at Amberg, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	162	522	150	205	150	140	471	390	247	204	142	134
2	162	406	160	190	150	140	438	422	342	192	138	128
3	158	358	170	190	140	140	406	390	358	185	138	128
4	162	326	180	190	140	140	438	390	358	180	138	122
5	192	310	180	190	140	150	471	406	358	204	162	118
6	185	294	190	190	130	150	522	422	358	192	162	134
7	185	310	190	180	130	160	592	454	358	180	158	122
8	192	326	205	180	140	160	662	438	358	169	154	122
9	204	342	215	180	140	165	740	438	358	162	142	118
10	232	236	215	180	140	170	820	390	358	154	134	114
11	247	326	218	190	140	170	904	374	358	148	136	109
12	218	294	218	190	150	180	990	358	294	148	138	100
13	204	278	218	200	160	180	904	326	278	148	142	100
14	192	262	218	205	154	205	780	294	262	154	169	100
15	180	262	232	205	148	230	740	294	294	148	158	104
16	169	232	247	205	151	305	626	326	326	158	148	109
17	169	326	240	205	155	379	590	358	326	154	142	109
18	169	342	232	205	158	454	556	390	294	148	148	104
19	162	374	225	205	156	597	522	358	310	138	142	118
20	158	342	218	190	154	740	522	326	310	138	138	114
21	158	294	247	190	156	760	505	326	294	134	148	138
22	158	262	290	190	158	780	471	326	278	128	148	154
23	158	204	290	190	160	753	454	358	232	128	148	158
24	169	180	290	190	160	727	422	358	326	128	142	162
25	162	148	290	180	150	700	390	358	406	134	134	169
26	158	142	290	180	150	681	358	326	422	158	128	158
27	158	138	275	170	150	662	374	294	342	162	122	142
28	422	138	260	170	140	626	358	262	278	169	118	138
29	590	140	245	170	.....	590	358	262	262	162	122	154
30	662	140	230	160	.....	590	358	247	232	158	134	169
31	590	.....	215	160	.....	505	.....	232	.....	154	134	.....

Daily discharge, in second-feet, of Pike River at Amberg, Wis., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	176	556	230	190	160	160	662	326	204	342	169	192
2	185	522	230	185	160	160	590	326	232	342	162	169
3	185	522	225	180	160	160	505	326	278	326	154	148
4	180	522	225	170	160	160	488	310	262	310	148	138
5	180	505	220	160	160	160	438	294	232	278	145	128
6	185	471	215	160	165	165	382	278	204	247	142	122
7	180	454	210	160	170	165	326	262	199	278	262	120
8	169	438	210	165	175	170	204	262	247	310	358	118
9	158	422	205	165	175	175	265	262	278	278	326	122
10	162	471	205	170	180	180	326	262	262	247	358	151
11	154	590	200	170	175	190	326	247	390	232	326	180
12	148	645	200	170	175	200	326	232	662	218	262	204
13	148	700	195	165	170	205	326	232	740	204	232	232
14	154	590	190	165	170	220	310	232	740	199	204	204
15	148	505	180	165	170	230	302	218	662	192	192	162
16	148	471	180	165	165	245	294	204	626	169	169	278
17	142	422	175	165	165	260	294	204	590	162	164	294
18	138	358	170	160	165	294	294	204	488	169	158	247
19	148	358	165	160	160	334	294	232	422	166	156	294
20	169	342	160	160	160	374	326	262	342	162	154	247
21	176	326	160	160	160	406	342	294	310	158	148	262
22	192	326	165	160	160	438	358	278	278	158	154	195
23	199	294	170	160	160	589	522	374	326	180	151	180
24	192	294	170	155	160	740	740	390	347	232	148	169
25	232	294	175	150	160	947	740	406	358	219	142	158
26	310	294	180	150	160	1,350	662	358	310	206	138	154
27	326	263	190	150	160	1,450	590	310	278	193	128	148
28	310	232	205	150	160	1,280	522	262	294	180	122	142
29	310	232	205	155	160	1,120	471	232	326	180	162	140
30	471	230	205	155	.....	740	390	232	326	176	199	140
31	522	.....	190	160	.....	662	.....	204	.....	176	204	.....

NOTE.—Stage-discharge relation affected by ice Nov. 29 to Dec. 10, 1918, Dec. 22, 1918, to Feb. 13, 1919, Feb. 23 to Mar. 15, 1919, and Nov. 30, 1919, to Mar. 17, 1920. Gage not read, discharge interpolated, Dec. 12, 15, 17, 19, 1918; Feb. 14, 16, 17, 19, 21, Mar. 16, 17, 19, 21, 23, 24, 26, 28, Apr. 2, 4, 7, Aug. 11, Sept. 15, Nov. 12, 27, 1919; Mar. 19, 21, 23, 28, Apr. 6, 9, 12, 15, May 2, June 21, July 19, 25–27, Aug. 2, 5, 17, 19, 23, Sept. 7, and 10, 1920.

Monthly discharge of Pike River at Amberg, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	662	158	229	0.954	1.10
November	522	138	278	1.16	1.29
December	290	150	227	.946	1.09
January	205	160	188	.783	.90
February	160	130	148	.617	.64
March	780	140	398	1.66	1.91
April	990	358	558	2.32	2.59
May	454	232	351	1.46	1.68
June	422	232	319	1.33	1.48
July	204	128	159	.662	.76
August	169	118	142	.592	.68
September	169	100	128	.533	.59
The year	990	100	261	1.09	14.71

Monthly discharge of Pike River at Amberg, Wis., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919–20.					
October	522	138	201	0.838	0.97
November	700	230	422	1.76	1.96
December	230	160	194	.808	.93
January	190	150	163	.679	.78
February	180	160	165	.688	.74
March	1,450	160	449	1.87	2.16
April	740	204	420	1.75	1.95
May	406	204	275	1.15	1.33
June	740	199	374	1.56	1.74
July	342	158	222	.925	1.07
August	358	122	192	.800	.92
September	294	118	181	.754	.84
The period	1,450	118	272	1.13	15.39

Days of deficiency in discharge of Pike River at Amberg, Wis., for the years ending Sept. 30, 1915–1920.

Discharge in sec.-ft.	Days of deficient discharge.							
	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	Oct. 1, 1914, to Sept. 30, 1920.	
							Days.	Per cent of time.
80				5			5	0.2
90				19			19	.9
100				28	3		31	1.4
110	1			45	8		54	2.5
120	4			63	14	1	82	3.7
130	10	3	13	80	27	7	140	6.4
140	67	15	20	89	62	10	263	12.0
150	100	27	32	104	91	27	381	17.4
160	125	53	53	127	128	48	534	24.4
170	148	83	73	154	154	112	724	33.0
180	171	87	84	162	166	135	805	36.7
190	178	99	103	188	185	153	906	41.3
200	195	114	113	203	191	170	986	45.0
215	225	131	127	223	208	194	1,108	50.6
230	241	143	149	229	217	202	1,181	53.9
250	259	170	175	256	231	220	1,319	60.2
280	268	186	201	269	244	252	1,420	64.8
320	288	227	250	301	264	277	1,607	73.3
370	311	255	281	324	303	309	1,783	81.3
430	332	279	302	335	322	320	1,890	86.2
500	342	294	314	339	332	331	1,952	89.0
600	357	320	340	348	346	347	2,053	93.9
750	364	340	360	361	358	361	2,144	97.8
950	365	357	363	365	364	362	2,176	99.3
1,200		366	365		365	363	2,189	99.9
1,500						366	2,192	100.0
Discharge (sec.-ft.):								
Mean	238	344	306	232	261	272		
Maximum	778	1,160	1,120	820	990	1,450		
Minimum	109	128	120	70	100	118		

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

RECORDS AVAILABLE.—October 1, 1912, to September 30, 1920.

GAGE.—Gurley graph water-stage recorder, set over a wooden well about 15 feet from the left bank and a quarter of a mile downstream from power house; replaced a Barrett & Lawrence water-stage recorder about May 1, 1918; well is protected from floating logs by a large boulder.

DISCHARGE MEASUREMENTS.—Made from cable, half a mile below the gage. About 2 second-feet of seepage water enters the river below the gage but above the cable and is included in the 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 mean daily discharge during the year ending September 30, 1919, 2,290 second-feet, April 12; minimum mean daily discharge 55 second-feet January 19 and March 2.

Maximum mean daily discharge during the year ending September 30, 1920, 1,830 second-feet, April 3; minimum stage recorded 0.97 foot from midnight to 7 a. m. October 27 (discharge, 43 second-feet).

1912–1920: Maximum stage from water-stage recorder 7.2 feet May 13, 1916 (discharge, 3,480 second-feet); minimum stage 0.97 foot from midnight to 7 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; open-water rating curve used throughout year.

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

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined between 145 and 3,980 second-feet. Water-stage recorder operated satisfactorily about 80 per cent of time. Daily discharge during periods when recording gage was in operation ascertained by use of the discharge integrator. Discharge for periods when gage was not in operation based on power plant records; the power plant records for 1919 were increased by 5 per cent and for 1920 they were used without change, the corrections being derived by comparing the results obtained from the water-stage recorder with those obtained from records of operation of the power plant. Records fair.

Discharge measurements of Peshtigo River at High Falls, near Crivitz, Wis., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
May 22	W. G. Hoyt	3.25	1,060	June 15	S. B. Soulé	3.52	1,330
				15	do	3.25	1,120

Daily discharge, in second-feet, of Peshtigo River at High Falls, near Crivitz, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	475	665	110	225	200	215	900	880	335	755	355	68
2	510	850	475	515	240	55	900	800	600	670	225	418
3	541	690	595	395	465	260	890	1,000	660	570	75	459
4	509	815	550	225	465	285	820	370	700	240	360	459
5	449	655	500	90	290	275	660	1,120	690	355	435	432
6	217	575	395	370	310	275	920	815	710	290	430	378
7	400	560	345	390	325	325	1,340	1,120	660	620	405	75
8	541	660	90	365	170	290	1,350	1,130	320	730	440	428
9	491	665	420	320	535	255	1,500	760	600	760	355	420
10	548	440	510	275	250	550	1,730	990	630	700	76	420
11	555	580	395	230	320	550	2,180	370	625	620	345	435
12	482	800	365	195	320	540	2,290	980	640	645	380	412
13	145	760	370	405	300	510	1,490	790	690	325	340	364
14	415	705	310	380	230	490	1,810	775	650	570	330	80
15	440	705	115	400	185	500	2,220	770	335	580	355	415
16	455	680	350	395	170	315	1,810	710	570	550	335	450
17	470	380	385	405	280	550	1,540	630	660	510	124	430
18	450	655	375	280	340	650	1,060	340	625	480	428	415
19	410	725	385	55	420	640	1,000	680	630	560	450	415
20	180	655	465	320	445	665	1,040	610	650	360	430	470
21	435	600	525	325	425	670	1,500	675	580	465	345	120
22	405	650	325	405	245	580	840	1,030	300	570	340	295
23	395	560	585	295	75	280	1,060	1,020	530	640	305	295
24	400	220	640	420	425	580	1,440	635	640	535	70	300
25	410	550	280	405	465	680	1,470	365	670	375	440	230
26	390	565	530	250	520	670	970	750	740	275	520	340
27	145	470	605	420	435	1,020	470	800	800	125	500	325
28	240	155	535	405	465	1,200	935	810	800	480	475	75
29	335	555	255	315	.....	1,020	940	800	645	450	440	320
30	530	520	440	305	.....	1,030	875	360	885	380	286	300
31	665	.....	430	305	.....	1,230	.....	540	.....	350	70	.....
1919–20.												
1	330	652	371	321	51	304	1,500	809	561	550	133	437
2	365	402	405	493	287	400	1,590	505	1,740	542	388	438
3	308	714	383	437	284	384	1,830	798	1,450	642	506	485
4	271	805	328	183	198	372	1,050	1,010	1,540	530	506	504
5	53	882	318	533	223	342	861	1,010	508	377	542	100
6	340	903	424	566	214	292	1,060	1,040	168	688	479	400
7	350	902	229	496	401	72	1,040	934	592	731	466	453
8	352	852	354	410	146	319	866	1,640	658	694	183	495
9	326	545	366	428	372	293	891	308	716	596	392	501
10	365	1,190	354	381	326	288	794	792	744	507	522	470
11	306	932	356	99	300	437	375	927	750	231	514	438
12	56	1,120	362	392	313	434	758	881	810	476	494	108
13	355	1,400	429	359	348	284	865	790	148	595	491	404
14	350	1,240	59	306	270	300	814	860	593	537	424	525
15	351	916	466	362	113	638	840	840	892	546	150	272
16	340	464	539	338	271	723	855	183	898	551	391	471
17	322	968	412	280	275	594	766	527	837	492	511	511
18	287	902	395	125	268	554	354	640	880	164	544	335
19	57	854	384	303	267	663	666	649	1,100	430	548	148
20	394	822	330	305	337	557	670	613	546	470	511	472
21	397	843	82	300	402	184	570	632	804	432	515	562
22	361	784	346	304	237	476	507	568	907	456	222	616
23	340	421	440	387	326	752	674	183	953	453	401	618
24	356	608	300	389	338	834	763	484	627	444	520	569
25	361	645	60	74	311	883	724	574	656	166	513	482
26	133	543	306	279	299	912	1,580	558	601	359	475	136
27	462	176	298	233	316	833	1,280	584	178	444	506	394
28	674	374	236	249	288	590	961	558	554	412	480	402
29	510	601	425	223	100	1,670	1,050	522	591	458	234	344
30	416	452	386	243	.....	1,790	843	94	587	460	460	536
31	654	.....	364	274	.....	1,760	.....	328	.....	410	480	.....

Monthly discharge of Peshtigo River at High Falls, near Crivitz, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	665	145	420	0.808	0.93
November	850	155	602	1.16	1.29
December	640	90	408	.785	.90
January	515	55	325	.625	.72
February	535	75	333	.640	.67
March	1,230	55	553	1.06	1.22
April	2,290	470	1,260	2.42	2.70
May	1,130	340	756	1.45	1.67
June	885	300	619	1.19	1.33
July	760	125	501	.964	1.11
August	520	70	338	.650	.75
September	470	68	335	.644	.72
The year	2,290	55	538	1.03	14.01
1919–20.					
October	674	53	340	.654	.75
November	1,400	176	764	1.47	1.64
December	539	59	339	.652	.75
January	566	74	325	.625	.72
February	402	51	272	.523	.56
March	1,790	72	611	1.18	1.36
April	1,830	354	913	1.76	1.96
May	1,640	94	672	1.29	1.49
June	1,740	148	753	1.45	1.62
July	731	164	479	.921	1.06
August	548	133	436	.838	.97
September	618	100	421	.810	.90
The year	1,830	51	526	1.01	13.78

Days of deficiency in discharge of Peshtigo River at High Falls, near Crivitz, Wis., for the years ending Sept. 30, 1913–1920.

[Drainage area, 520 square miles.]

Discharge in second-feet.	Days of deficient discharge.									
	1912–13	1913–14	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	Oct. 1, 1912, to Sept. 30, 1920.	
									Days.	Per cent of time.
40										
60							2	5	7	0.2
80				1			10	8	19	.7
100			1	5			13	11	30	1.0
120			3	8	3	4	15	15	48	1.6
150		1	4	11	5	10	20	22	73	2.5
180		1	4	12	5	20	23	28	93	3.2
210		1	6	23	8	32	27	34	131	4.5
250	2	4	18	48	15	52	40	46	225	7.7
290	13	22	56	60	41	71	55	62	380	13.0
330	56	44	81	75	55	91	84	91	577	19.8
370	96	122	97	87	73	116	110	124	825	28.3
420	141	156	139	119	89	168	148	159	1,119	38.3
470	178	181	222	140	109	214	188	187	1,419	48.6
520	207	208	261	180	135	230	209	222	1,652	56.6
600	238	242	296	245	214	259	248	263	2,005	68.7
700	263	279	314	263	270	305	295	287	2,276	78.0
800	285	294	333	275	295	338	312	303	2,435	83.4
1,000	306	317	352	290	325	348	336	342	2,616	89.6
1,300	339	352	364	315	354	355	351	354	2,784	95.4
1,700	354	362	365	338	359	360	359	362	2,859	98.0
2,200	362	365		352	362	365	363	366	2,900	99.3
2,800	365			363	365		365		2,919	99.9
3,500				366					2,922	100.0
4,300										
Discharge (sec.-ft.):										
Mean	626	578	485	708	626	503	538	526		
Maximum	2,480	2,070	1,310	2,850	2,590	2,140	2,290	1,830		
Minimum	222	140	98	72	104	110	55	51		

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

RECORDS AVAILABLE.—June 7, 1906, to March 30, 1909; January 6, 1914, to September 30, 1920.

GAGE.—Chain gage attached to iron railing on upstream side of bridge; read by Harvie Gilbertson. Zero of gage used January 6, 1914, to date is 4 feet above that of gage used June 7, 1906, to March 31, 1909.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year ending September 30, 1919, 4.25 feet at 1.30 p. m. April 10 and 5.30 p. m. April 12 (discharge, 2,350 second-feet); minimum discharge, estimated, 305 second-feet February 7–9.

Maximum discharge recorded during the year ending September 30, 1920, 3,220 second-feet March 28; minimum stage recorded 1.00 foot at 3 p. m. September 9 (discharge, 305 second-feet).

1906–1920: Maximum stage recorded 5.3 feet at 3.30 p. m. April 25, 1916, and at 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 and occasionally by log jams. Rating curve well defined, between 239 and 1,790 second-feet. Gage read once daily to quarter-tenths. Daily discharge obtained by applying daily gage height to rating table, except for period when stage-discharge relation was affected by ice, for which it was obtained 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 except for periods when logs were in river, for which they are fair; records for winter fair.

Discharge measurements of Oconto River near Gillett, Wis., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 15	S. B. Soulé	[a] 4.40	448	Jan. 19	S. B. Soulé	[a] 2.68	452
Feb. 14	do	[a] 2.82	374	Feb. 17	do	[a] 2.85	449
Mar. 10	do	[a] 3.20	398	June 16	do	2.08	806
May 20	W. G. Hoyt	2.58	1,130				
Dec. 15	S. B. Soulé	[a] 3.45	521				

[a] Complete ice cover at control and measuring section.

Daily discharge, in second-feet, of Oconto River near Gillett, Wis., for the years ending Sept. 30, 1919 and 1920.

Date	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1918–19.												
1	446	960	446	640	340	360	1,290	992	642	1,160	810	468
2	446	992	446	615	340	365	1,220	1,020	670	1,020	670	403
3	446	992	445	590	330	370	1,160	1,060	752	930	615	424
4	468	960	460	580	325	380	1,160	1,090	870	870	642	446
5	492	960	470	565	320	385	1,090	1,220	900	810	698	403
6	492	960	490	540	315	390	1,160	1,720	930	810	670	446
7	515	930	515	515	305	395	1,290	1,720	930	725	725	492
8	492	930	515	490	305	400	1,430	1,570	960	615	698	468
9	515	900	540	470	305	400	1,940	1,570	1,020	590	615	468
10	515	840	540	465	325	400	2,320	1,430	992	590	565	446
11	468	840	565	460	330	405	2,160	1,160	1,060	515	590	424
12	468	780	780	460	340	405	2,320	930	1,160	540	515	424
13	424	725	615	455	360	425	2,320	1,160	1,090	468	540	403
14	446	725	615	450	375	445	2,160	1,140	1,020	492	515	382
15	403	698	698	450	375	470	2,090	1,110	1,060	515	492	382
16	403	670	590	440	380	565	1,860	1,020	1,020	515	424	468
17	446	670	515	430	380	780	1,860	1,060	992	492	424	382
18	446	725	565	430	380	1,090	1,790	780	900	468	424	382
19	403	725	590	425	380	1,360	1,940	1,020	752	424	446	424
20	403	698	615	415	380	2,090	2,160	1,160	725	446	492	382
21	424	840	642	405	380	2,020	2,020	960	780	468	515	403
22	424	840	780	400	380	1,940	1,940	1,090	810	424	492	468
23	446	752	930	390	380	1,830	1,430	1,220	780	446	468	424
24	424	642	930	385	380	1,720	1,220	1,020	900	424	565	446
25	424	615	930	380	380	1,680	1,020	1,060	1,640	492	492	468
26	446	590	900	380	375	1,640	960	1,020	1,720	468	515	446
27	515	515	780	375	370	1,570	992	930	1,790	725	492	424
28	670	492	725	370	360	1,500	992	900	1,640	930	446	446
29	698	468	700	370	.....	1,460	960	992	1,570	1,160	435	424
30	725	446	670	360	.....	1,430	992	725	1,290	840	424	403
31	900	.....	640	360	.....	1,500	.....	670	.....	870	446	.....
1919–20.												
1	424	1,020	490	425	490	410	2,240	1,160	565	642	382	515
2	468	1,090	490	425	480	395	2,160	1,060	540	565	362	424
3	403	1,220	495	425	475	380	2,020	992	540	540	403	382
4	515	1,290	495	435	470	400	2,020	960	540	515	403	342
5	565	1,290	500	445	505	425	1,860	870	515	468	342	342
6	468	1,290	500	425	540	435	1,720	810	515	468	362	324
7	590	1,220	500	405	530	445	1,430	780	515	515	342	342
8	540	1,220	510	405	520	450	1,430	780	515	515	342	324
9	565	1,160	515	405	520	460	1,360	725	565	725	342	305
10	565	1,290	515	415	515	470	1,500	615	565	840	382	324
11	468	1,290	515	425	530	480	1,220	615	615	515	382	342
12	540	1,360	515	425	540	500	1,160	642	670	468	382	342
13	515	1,430	520	425	520	515	1,090	615	752	446	486	342
14	540	1,720	520	450	505	530	1,020	565	780	424	362	362
15	565	1,720	520	470	490	550	870	590	810	492	342	362
16	540	1,360	490	450	470	565	900	590	840	324	324	382
17	492	1,290	490	435	450	590	900	615	900	362	342	403
18	468	1,360	490	440	445	615	900	642	960	446	342	446
19	492	1,290	490	450	445	640	870	670	960	492	324	468
20	515	1,220	490	450	445	670	840	670	900	492	342	515
21	492	2,950	480	445	435	725	840	725	810	468	382	515
22	468	1,020	470	450	425	840	870	725	698	468	403	492
23	515	870	480	455	440	1,090	1,060	698	670	468	382	492
24	515	930	490	465	460	2,160	1,220	725	698	468	382	468
25	515	900	490	470	440	3,040	1,290	725	725	424	342	424
26	540	752	490	490	425	3,130	1,500	725	752	424	342	424
27	565	468	490	515	425	3,040	1,500	698	725	382	342	424
28	670	670	490	500	425	3,220	1,430	642	565	362	342	446
29	698	492	490	490	415	2,630	1,290	615	670	342	382	446
30	725	490	490	500	.....	2,550	1,220	615	670	342	424	424
31	992	.....	490	505	.....	2,240	.....	590	.....	342	468	.....

NOTE.—Stage-discharge relation affected by ice Dec. 3–10 and Dec. 29, 1918, to Mar. 21, 1919, and Nov. 30, 1919, to Mar. 24, 1920. Channel obstructed by logs May 14–16, 1919; discharge estimated. Gage not read Nov. 28, 1918, July 4, and Aug. 29, 1919; discharge interpolated.

Monthly discharge of Oconto River near Gillett, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 678 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	900	403	491	0.724	0.83
November	992	446	763	1.13	1.26
December	930	445	634	.935	1.08
January	640	360	454	.670	.77
February	380	305	353	.521	.54
March	2,090	360	973	1.44	1.66
April	2,320	960	1,570	2.32	2.59
May	1,720	670	1,120	1.65	1.90
June	1,790	642	1,050	1.55	1.73
July	1,160	424	653	.963	1.11
August	810	424	544	.802	.92
September	492	382	429	.633	.71
The year	2,320	305	753	1.11	15.10
1919-20.					
October	992	403	546	.805	.93
November	2,950	468	1,190	1.75	1.95
December	520	470	497	.733	.84
January	515	405	449	.662	.76
February	540	415	475	.700	.76
March	3,220	380	1,120	1.65	1.90
April	2,240	840	1,320	1.95	2.18
May	1,160	565	724	1.07	1.23
June	960	515	685	1.01	1.13
July	840	324	476	.702	.81
August	468	324	367	.541	.62
September	515	305	405	.597	.67
The year	3,220	305	687	1.01	13.78

Days of deficiency in discharge of Oconto River near Gillett, Wis., for the years ending Sept. 30, 1915-1920.

Discharge in second feet.	Days of deficient discharge.							
	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	Oct. 1, 1914 to Sept. 30, 1920.	
							Days	Per cent of time
200								
250								
300				11			11	0.5
350	20	52	40	39	12	28	191	8.7
400	53	75	70	104	53	49	404	18.4
450	106	122	103	114	117	101	663	30.2
500	135	149	131	149	155	170	889	40.6
600	204	175	178	199	190	242	1,183	54.0
700	255	217	207	265	219	269	1,432	65.3
800	268	229	245	283	241	286	1,552	70.8
900	286	244	267	291	259	299	1,646	75.1
1,000	302	266	277	301	288	311	1,745	79.6
1,200	332	295	299	313	319	322	1,880	85.8
1,500	358	315	338	322	334	346	2,013	91.8
2,000	365	343	352	336	355	353	2,104	96.0
2,500		358	361	354	365	359	2,162	98.6
3,000		364	365	365		362	2,186	99.7
4,000		366				366	2,192	100.0
Discharge (sec.-ft.):								
Mean	675	834	778	632	753	687		
Maximum	1,720	3,220	2,870	2,470	2,320	3,220		
Minimum	340	305	305	230	305	305		

FOX RIVER AT BERLIN, WIS.

LOCATION.—In sec. 16, T. 17 N., R. 13 E., at Government lock and dam 2⅓ 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, 1920.

GAGE.—Staff gage located in pool immediately below the dam. Read by lock tender for United States Army Engineers office.

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

DISCHARGE MEASUREMENTS.—Made from downstream side of Huron Street highway bridge in city of Berlin about 2⅓ 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 ending September 30, 1919, 2,670 second-feet, March 20 and 21; minimum mean daily discharge, 560 second-feet, September 8.

Maximum mean daily discharge recorded during year ending September 30, 1920, 5,150 second-feet, March 29; minimum discharge, 550 second-feet, January 5–9.

1898–1920: Maximum mean daily discharge, 6,400 second-feet, March 28 and 30, 1916; minimum mean daily discharge, 250 second-feet, February 1–4, 1900.

ICE.—Stage-discharge relation affected by ice.

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

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

Discharge measurements of Fox River at Berlin, Wis., in 1917–1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1917.		*Feet.*	*Sec.-ft.*	1918.		*Feet.*	*Sec.-ft.*
June 7	R. B. Kilgore	10.37	1,950	Jan. 18	Hoyt and Grover	[a] 8.75	609
14	Kilgore and Kane	11.27	2,460	Mar. 28	W. G. Hoyt	13.92	5,080
July 25	do	9.83	1,600	Apr. 5	T. G. Bedford	11.86	2,940
Aug. 1	Hoyt and Kane	8.97	1,210				
28	Kilgore and Welsch	8.10	824	1919.			
Nov. 7	R. B. Kilgore	10.17	1,780	July 28	W. G. Hoyt	7.31	593

[a] Stage-discharge relation affected by ice; ice cover, 13 inches thick.

NOTE.—Discharge measured at Huron Street highway bridge. Discharge at gage obtained by applying a correction factor of 0.993 to the figures shown in the above table.

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1898.												
1	.....	.....	.....	500	450	600	2,100	1,320	765	765	645	675
2	.....	.....	.....	500	450	600	2,040	1,360	735	765	645	675
3	.....	.....	.....	500	450	600	1,910	1,420	705	765	765	645
4	.....	.....	.....	500	450	600	1,800	1,420	675	735	830	645
5	.....	.....	.....	500	450	600	1,740	1,360	645	735	830	645
6	.....	.....	.....	475	450	625	1,620	1,320	645	765	865	645
7	.....	.....	.....	500	450	725	1,520	1,270	645	675	830	615
8	.....	.....	.....	500	450	825	1,420	1,180	645	675	830	615
9	.....	.....	.....	500	475	1,100	1,360	1,100	615	675	800	615
10	.....	.....	.....	500	500	1,400	1,270	1,100	645	645	765	615
11	.....	.....	.....	475	550	1,600	1,180	975	645	645	735	615
12	.....	.....	.....	475	600	1,800	1,100	940	735	615	735	615
13	.....	.....	.....	475	600	2,100	1,060	905	735	615	705	615
14	.....	.....	.....	475	625	2,380	940	865	705	590	705	645
15	.....	.....	.....	500	625	2,650	940	830	675	590	705	645
16	.....	.....	.....	475	625	2,730	940	705	645	590	735	645
17	.....	.....	.....	475	625	2,670	905	615	615	590	769	675
18	.....	.....	.....	475	625	2,600	865	645	590	590	769	645
19	.....	.....	.....	475	625	2,600	905	675	590	560	735	675
20	.....	.....	.....	475	625	2,600	1,060	675	560	645	735	675
21	.....	.....	.....	475	550	2,520	1,100	645	590	645	735	645
22	.....	.....	.....	475	550	2,520	1,270	675	590	645	735	675
23	.....	.....	.....	475	575	2,520	1,460	735	560	615	705	675
24	.....	.....	.....	450	600	2,520	1,520	735	590	615	705	675
25	.....	.....	.....	450	625	2,380	1,570	705	615	615	705	675
26	.....	.....	.....	475	625	2,310	1,570	675	590	590	705	675
27	.....	.....	.....	475	625	2,310	1,570	645	590	590	705	675
28	.....	.....	.....	475	625	2,380	1,520	705	590	590	675	675
29	.....	.....	.....	475	.....	2,310	1,460	830	590	590	675	645
30	.....	.....	.....	475	.....	2,240	1,360	830	735	590	675	645
31	.....	.....	.....	450	.....	2,170	.....	800	.....	590	675	.....
1898–99.												
1	675	765	500	300	370	450	940	1,520	830	940	675	675
2	675	765	500	300	350	450	940	1,520	765	940	675	675
3	675	765	500	300	340	450	940	1,570	800	905	675	675
4	675	735	490	300	320	450	940	1,570	800	905	675	675
5	645	705	490	300	300	450	1,000	1,520	800	865	675	675
6	645	765	480	300	300	450	1,220	1,460	735	830	675	675
7	645	765	480	300	300	420	1,600	1,420	800	830	675	705
8	645	735	480	350	300	420	2,300	1,320	865	800	645	705
9	645	735	480	300	300	420	2,800	1,220	865	765	645	705
10	615	650	480	300	300	420	2,750	1,180	865	765	645	705
11	645	600	480	300	300	450	2,800	1,140	800	735	675	705
12	675	600	480	300	300	850	2,750	1,140	905	735	675	675
13	705	600	450	300	300	850	2,650	1,060	1,060	765	675	675
14	675	600	450	300	300	870	2,650	940	1,420	765	675	675
15	675	600	475	300	300	900	2,600	905	1,570	800	675	675
16	675	550	475	320	300	870	2,600	830	1,620	800	645	675
17	675	600	475	340	320	870	2,550	765	1,680	800	645	675
18	735	500	475	340	340	870	2,500	765	1,680	800	645	675
19	735	500	475	340	350	870	2,500	765	1,680	865	645	675
20	735	500	480	350	400	870	2,380	735	1,570	830	645	645
21	735	500	480	350	450	870	2,240	705	1,520	830	645	645
22	735	500	480	350	400	900	2,100	465	1,420	800	615	645
23	705	475	480	370	400	900	1,980	615	1,320	800	615	645
24	735	475	480	370	400	900	1,850	705	1,220	765	645	705
25	735	490	480	370	400	920	1,740	705	1,140	765	675	735
26	735	475	480	370	450	920	1,620	675	1,060	735	675	705
27	765	475	480	350	450	920	1,460	765	1,020	705	675	705
28	765	475	480	350	420	920	1,460	830	1,020	675	675	705
29	800	470	480	350	.....	920	1,520	830	975	675	675	735
30	800	470	480	370	.....	940	1,520	830	940	675	675	705
31	800	.....	480	370	.....	960	.....	830	.....	675	675	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1899–1900.												
1	705	675	645	350	250	400	2,650	1,320	535	490	590	675
2	705	645	560	320	250	400	2,830	1,320	535	490	590	675
3	705	615	560	320	250	420	2,450	1,270	535	510	675	705
4	675	645	560	320	250	450	2,380	1,220	535	510	645	675
5	675	645	510	350	280	450	2,310	1,180	535	490	645	675
6	675	645	535	320	300	450	2,240	1,100	510	490	615	645
7	675	615	560	350	300	420	2,170	1,020	510	490	615	645
8	675	615	450	350	500	450	2,100	975	490	510	615	645
9	675	615	500	350	500	450	1,980	905	490	510	615	645
10	705	615	500	350	350	480	1,850	865	510	535	590	645
11	735	590	500	350	380	520	1,800	940	510	535	590	615
12	735	615	600	350	400	520	1,620	735	510	510	705	705
13	735	615	640	350	400	610	1,570	830	510	510	705	675
14	735	645	600	350	400	700	1,520	865	510	510	675	675
15	735	645	600	350	400	700	1,520	800	510	510	705	675
16	765	645	620	350	400	720	1,520	645	490	590	705	645
17	765	645	620	350	400	800	1,520	640	490	615	705	645
18	735	645	640	350	400	800	1,570	615	490	590	675	645
19	765	645	620	350	400	800	1,620	615	490	615	675	645
20	735	705	600	350	400	840	1,620	615	490	705	645	645
21	735	615	620	350	400	840	1,620	615	490	675	675	645
22	735	615	600	350	400	840	1,620	615	490	645	675	645
23	735	615	600	380	450	1,100	1,570	615	510	645	705	645
24	705	615	600	380	450	1,150	1,570	615	510	645	705	645
25	735	615	350	380	400	1,200	1,460	615	510	645	705	675
26	735	615	400	320	400	1,400	1,420	590	510	645	705	940
27	705	615	400	300	400	1,420	1,360	590	490	615	705	905
28	705	615	380	300	400	1,520	1,360	590	490	615	705	830
29	705	615	400	300	.....	1,550	1,360	560	490	615	675	830
30	705	645	380	300	.....	1,950	1,320	560	465	615	675	830
31	675	.....	380	280	.....	2,200	.....	560	.....	590	675	.....
1900–1901.												
1	800	1,420	975	450	420	420	4,300	940	645	975	615	590
2	800	1,460	940	450	400	450	4,200	940	645	1,180	615	590
3	830	1,460	905	400	400	475	4,200	940	645	1,140	590	590
4	1,020	1,520	905	350	400	500	4,100	865	615	1,060	590	590
5	1,180	1,520	905	350	400	520	4,000	865	615	1,180	590	560
6	1,140	1,460	905	375	400	500	3,910	830	615	1,180	590	560
7	1,140	1,460	905	375	375	500	3,820	800	615	1,100	560	560
8	1,140	1,420	700	375	375	500	3,720	800	645	975	560	560
9	1,140	1,320	700	375	400	520	3,440	765	645	905	560	615
10	1,100	1,270	700	400	400	520	3,260	765	675	830	590	654
11	1,060	1,220	720	375	400	520	3,120	765	1,020	800	590	645
12	1,020	1,180	700	375	400	500	3,000	765	940	765	590	675
13	1,020	1,270	700	400	400	550	2,830	765	975	705	590	705
14	975	1,140	700	400	400	580	2,670	735	940	705	590	705
15	975	1,140	680	400	400	580	2,600	735	830	695	590	705
16	975	1,060	680	420	400	600	2,380	705	765	615	560	705
17	940	1,180	680	420	420	620	2,310	705	765	590	560	705
18	940	1,270	680	350	420	700	2,240	705	765	590	560	705
19	940	1,360	700	350	420	800	2,100	675	765	590	560	705
20	940	1,360	700	350	420	900	1,980	645	735	590	560	705
21	905	1,360	700	375	420	900	1,910	615	705	560	560	705
22	905	1,360	700	375	420	900	1,740	615	675	560	560	705
23	905	1,520	700	375	400	920	1,620	645	675	560	615	705
24	940	1,420	700	400	400	1,300	1,460	705	675	535	590	705
25	940	1,620	550	420	400	2,300	1,420	615	675	590	590	675
26	940	1,270	600	420	400	3,800	1,270	645	645	765	590	675
27	940	1,060	600	420	420	4,400	1,180	705	615	735	590	645
28	1,060	1,060	600	420	420	4,600	1,140	675	615	705	590	675
29	1,140	1,140	600	400	.....	4,800	1,060	675	645	705	590	705
30	1,180	1,020	550	400	.....	4,600	1,020	675	1,060	675	590	705
31	1,320	.....	550	400	.....	4,450	.....	675	.....	645	590	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1901–2.												
1	735	800	645	400	320	820	765	675	1,680	705	975	800
2	735	800	645	380	320	790	765	675	1,570	735	975	800
3	735	800	615	380	320	790	765	735	1,520	765	975	765
4	735	765	590	350	300	880	735	865	1,520	765	940	765
5	735	735	615	350	300	950	735	1,060	1,460	735	940	735
6	735	735	645	350	300	990	705	1,020	1,420	735	940	800
7	705	735	645	350	300	1,100	705	1,100	1,420	735	940	800
8	705	735	645	350	300	1,080	645	1,100	1,360	705	905	865
9	800	735	645	350	300	1,080	675	1,060	1,320	705	905	800
10	800	735	645	350	300	1,080	645	1,020	1,270	625	905	800
11	865	735	645	350	300	1,300	645	1,100	1,140	625	905	800
12	940	705	615	300	300	1,900	510	1,140	1,100	625	865	765
13	940	705	615	300	300	2,000	675	1,270	1,060	625	940	765
14	940	705	450	300	320	1,900	705	1,320	1,020	645	940	735
15	940	675	400	320	320	1,700	645	1,270	1,020	675	940	735
16	905	560	400	320	320	1,550	560	1,270	975	645	940	735
17	905	590	450	340	320	1,200	590	1,270	940	645	905	735
18	865	645	450	340	320	1,300	590	1,420	940	645	865	735
19	865	675	450	340	320	1,350	590	1,460	865	645	865	735
20	865	735	450	340	320	1,250	615	1,520	830	675	865	735
21	830	705	450	365	320	1,150	615	1,680	830	675	865	735
22	830	705	450	365	320	1,050	615	1,800	800	675	865	735
23	830	645	450	365	350	1,000	705	1,910	800	675	865	735
24	800	675	400	365	370	975	645	2,040	765	675	865	765
25	800	705	450	365	370	905	615	2,450	765	765	830	765
26	765	765	450	365	380	905	675	2,380	765	765	830	765
27	735	705	450	340	400	905	705	2,240	765	800	830	830
28	765	645	450	300	700	830	735	2,170	765	800	800	865
29	765	645	450	320	.....	830	735	1,980	735	800	800	865
30	765	645	450	320	.....	830	705	1,910	705	800	800	865
31	800	.....	450	320	.....	800	.....	1,740	.....	940	800	.....
1902–3.												
1	865	765	705	600	420	800	2,100	1,180	1,460	800	735	2,240
2	865	735	645	600	420	720	2,040	1,220	1,420	765	765	2,170
3	865	735	615	600	450	780	1,980	1,220	1,360	765	800	2,040
4	865	735	735	600	500	800	1,980	1,220	1,320	800	830	2,100
5	865	735	800	600	420	900	1,910	1,220	1,270	765	940	2,040
6	865	705	800	600	420	950	1,910	1,180	1,180	735	940	2,040
7	830	705	735	600	420	1,200	1,850	1,140	1,140	735	940	1,980
8	830	705	675	600	420	1,300	1,800	1,100	1,100	735	905	2,100
9	830	705	615	600	500	1,500	1,740	1,060	1,060	765	905	2,170
10	800	705	675	550	500	1,750	1,680	1,020	1,020	800	905	2,240
11	800	675	600	500	500	2,200	1,570	975	1,020	800	905	2,240
12	830	705	600	450	520	2,600	1,520	975	1,020	765	865	2,240
13	905	705	600	450	550	2,200	1,460	905	975	735	830	2,240
14	940	765	600	450	550	2,200	1,460	865	940	735	800	2,200
15	940	765	600	450	550	2,100	1,460	865	905	735	975	2,240
16	940	765	600	450	550	2,050	1,570	865	865	735	1,020	2,240
17	940	765	600	450	500	2,100	1,570	865	830	735	1,060	2,170
18	940	765	600	450	450	2,040	1,570	830	830	765	1,020	2,100
19	905	765	600	400	420	2,170	1,520	830	830	765	1,020	2,100
20	905	765	600	400	400	2,380	1,460	830	830	765	1,020	2,100
21	865	675	650	400	400	2,450	1,420	830	830	765	1,020	2,040
22	865	830	720	400	400	2,600	1,360	800	800	735	975	1,980
23	865	940	800	400	420	2,600	1,320	905	830	735	975	1,910
24	865	905	800	400	420	2,670	1,320	975	800	735	1,520	1,910
25	865	830	800	400	450	2,670	1,270	1,020	800	735	1,980	1,850
26	800	800	650	400	500	2,600	1,220	1,100	765	705	2,240	1,850
27	830	675	650	420	700	2,520	1,220	1,320	765	705	2,310	1,800
28	800	705	650	420	850	2,450	1,220	1,520	735	705	2,380	1,800
29	800	705	600	450	.....	2,380	1,180	1,520	735	765	2,450	1,740
30	800	940	600	450	.....	2,310	1,180	1,570	735	765	2,380	1,740
31	765	.....	600	450	.....	2,170	.....	1,520	.....	735	2,310	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903–4.												
1	1,740	1,020	700	350	300	600	4,500	1,980	1,680	705	940	675
2	1,680	1,020	700	350	300	650	4,350	1,910	1,570	675	940	830
3	1,620	975	700	350	300	650	4,340	1,800	1,420	675	905	865
4	1,740	975	700	350	300	650	4,340	1,620	1,420	705	830	865
5	1,740	940	700	350	300	650	4,340	1,520	1,520	735	800	865
6	1,740	905	700	350	350	800	4,230	1,460	1,520	735	800	830
7	1,800	905	700	350	400	800	4,020	1,460	1,460	705	800	830
8	1,800	905	700	400	400	900	3,820	1,680	1,360	705	765	800
9	1,800	905	700	400	400	1,000	3,820	1,910	1,270	705	735	765
10	1,800	905	700	400	400	1,000	3,720	1,980	1,180	705	800	765
11	1,740	940	700	400	400	1,100	3,620	2,100	1,100	735	800	765
12	1,740	975	700	400	400	1,100	3,530	2,170	1,010	735	800	765
13	1,740	940	500	400	430	1,100	3,440	2,240	765	705	865	765
14	1,680	940	500	400	430	1,150	3,260	2,310	865	675	830	800
15	1,680	1,020	500	400	430	1,200	3,170	2,310	905	675	800	830
16	1,680	1,100	500	400	400	1,200	3,080	2,310	865	675	800	830
17	1,620	1,060	500	400	400	1,270	3,000	2,240	830	675	765	830
18	1,570	1,220	500	400	400	1,270	3,000	2,240	765	765	765	865
19	1,570	1,180	500	350	380	1,300	3,000	2,170	735	765	735	865
20	1,520	1,000	500	350	400	1,400	2,910	2,040	705	765	735	830
21	1,460	900	520	400	430	1,500	2,750	1,910	705	735	735	830
22	1,420	800	520	400	500	2,100	2,670	1,850	705	705	735	800
23	1,360	900	520	400	500	2,400	2,670	1,800	705	705	735	800
24	1,320	900	520	400	500	3,500	2,670	1,680	705	705	735	800
25	1,270	900	520	400	550	4,800	2,600	1,680	705	675	705	800
26	1,220	800	500	400	550	5,100	2,520	1,740	675	645	705	830
27	1,180	760	500	400	550	5,400	2,450	1,850	645	735	675	830
28	1,140	760	520	350	600	5,300	1,680	1,850	615	705	675	905
29	1,100	740	500	350	600	5,250	2,170	1,850	705	705	675	1,060
30	1,060	740	500	300	.....	5,000	2,040	1,850	705	905	675	1,100
31	1,060	.....	500	300	.....	4,750	.....	1,800	.....	975	675	.....
1904–5.												
1	1,100	1,100	550	400	520	570	4,560	800	1,910	3,170	1,020	1,020
2	1,060	1,060	550	400	520	570	4,560	1,020	1,850	3,080	1,060	1,060
3	1,020	1,020	550	400	520	700	4,450	1,020	1,800	2,910	1,060	1,100
4	1,060	975	550	400	500	700	4,230	1,020	2,100	3,000	1,060	1,140
5	1,140	940	550	450	500	700	4,120	975	2,240	2,910	1,100	1,140
6	1,140	940	550	450	500	700	4,020	1,020	3,720	2,750	1,100	1,140
7	1,140	940	550	450	500	730	3,920	940	4,560	2,750	1,060	1,100
8	1,270	905	550	450	500	730	3,720	940	5,390	2,670	1,020	1,100
9	1,520	905	550	450	520	800	3,620	905	5,790	2,600	1,100	1,100
10	1,680	865	550	450	520	800	3,440	1,020	5,920	2,600	1,100	1,060
11	1,800	830	550	450	520	800	3,260	1,270	5,920	2,520	1,100	1,060
12	1,800	975	550	480	520	950	3,170	1,620	5,790	2,450	1,100	1,020
13	1,800	1,020	550	480	520	1,000	2,910	1,740	5,790	2,380	1,060	1,020
14	1,800	1,180	500	480	520	1,000	2,750	1,910	5,270	2,310	1,020	975
15	1,800	975	500	480	520	1,050	2,670	2,170	5,030	2,240	1,100	975
16	1,850	905	500	480	520	1,100	2,600	2,380	4,910	2,170	1,140	1,020
17	1,800	905	500	480	520	1,150	2,520	2,450	5,030	2,100	1,140	1,020
18	1,800	865	500	500	520	1,250	2,310	2,520	4,910	1,980	1,140	1,060
19	1,740	865	500	500	520	1,500	2,240	2,520	4,910	1,910	1,100	1,060
20	1,680	865	500	500	520	1,600	2,170	2,520	4,790	1,850	1,060	1,100
21	1,680	865	500	500	520	1,700	2,040	2,520	4,560	1,680	1,060	1,100
22	1,620	865	500	500	520	1,950	1,980	2,450	4,450	1,570	1,060	1,100
23	1,570	865	500	500	520	2,500	1,740	2,380	4,340	1,460	1,020	1,100
24	1,520	830	500	500	520	3,350	1,520	2,310	4,120	1,420	1,020	1,100
25	1,460	830	500	520	550	4,250	1,360	2,240	4,020	1,360	975	1,060
26	1,420	830	500	520	550	4,300	1,180	2,100	3,820	1,360	975	1,020
27	1,320	800	550	520	550	4,300	1,140	2,040	3,720	1,270	1,020	1,020
28	1,270	735	550	520	550	4,300	1,140	1,910	3,530	1,180	1,020	975
29	1,220	735	480	520	.....	4,560	1,140	1,910	3,440	1,180	1,020	975
30	1,180	800	500	520	.....	4,560	1,100	1,910	3,260	1,180	1,060	1,020
31	1,140	.....	550	520	.....	4,560	.....	1,910	.....	1,140	1,020	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1905–6.												
1	1,020	1,140	1,150	520	820	2,100	4,340	1,740	1,180	1,740	905	940
2	975	1,060	1,200	500	820	2,100	4,340	1,740	1,140	1,800	865	940
3	975	1,060	1,200	520	800	2,250	4,230	1,680	1,060	1,800	865	940
4	975	1,060	1,100	600	770	2,400	4,230	1,620	1,020	1,800	865	940
5	940	1,020	1,100	620	770	2,550	4,230	1,570	905	1,800	865	940
6	940	1,140	1,100	620	750	2,600	4,120	1,520	940	1,800	905	905
7	940	1,180	1,050	620	700	2,650	4,120	1,460	1,060	1,740	905	865
8	940	1,180	1,020	600	670	2,650	4,120	1,420	1,180	1,680	865	865
9	905	1,220	980	550	670	2,800	4,120	1,460	1,180	1,620	865	865
10	865	1,270	900	550	670	2,900	4,120	1,460	1,180	1,560	905	830
11	830	1,270	820	600	620	2,900	4,020	1,460	1,140	1,460	940	800
12	830	1,270	900	600	620	2,900	3,920	1,460	1,100	1,420	948	830
13	830	1,270	800	600	620	2,800	3,920	1,460	1,100	1,320	905	940
14	830	1,180	750	600	620	2,650	3,820	1,420	1,100	1,220	865	940
15	830	1,270	780	620	620	2,600	3,620	1,360	1,100	1,220	865	940
16	865	1,420	780	700	670	2,600	3,530	1,420	1,100	1,220	830	940
17	865	1,360	800	750	670	2,650	3,350	1,420	1,100	1,180	940	905
18	940	1,180	800	700	670	2,650	3,170	1,360	1,060	1,140	1,140	905
19	940	1,140	780	670	700	2,600	3,080	1,270	1,020	1,100	1,140	940
20	1,100	1,140	780	750	800	2,600	2,910	1,180	1,100	1,100	1,100	975
21	1,180	1,060	800	870	950	2,600	2,830	1,100	1,270	1,060	1,060	975
22	1,270	1,060	800	900	1,100	2,550	2,670	1,140	1,420	1,020	1,100	1,020
23	1,270	1,020	800	870	1,350	2,550	2,520	1,140	1,420	975	1,140	1,020
24	1,320	1,020	700	820	1,500	2,300	2,450	1,020	1,420	940	1,140	1,020
25	1,320	1,060	600	820	1,600	2,270	2,310	975	1,420	905	1,100	1,020
26	1,320	1,020	600	820	1,700	2,450	2,240	1,020	1,360	905	1,140	940
27	1,320	975	650	870	1,750	3,100	2,170	1,020	1,270	905	1,140	940
28	1,270	1,020	650	870	1,900	4,050	2,040	1,060	1,360	905	1,100	905
29	1,220	1,180	700	900	.....	4,340	1,980	1,180	1,520	975	1,100	865
30	1,180	1,100	650	900	.....	4,450	1,850	1,220	1,680	975	1,020	830
31	1,140	.....	600	900	.....	4,340	.....	1,220	.....	940	980	.....
1906–7.												
1	830	1,420	2,200	1,100	1,000	1,200	2,310	1,680	1,360	765	1,220	1,220
2	830	1,420	2,200	1,100	1,000	1,250	2,240	1,620	1,270	735	1,180	1,220
3	865	1,420	2,100	1,150	950	1,250	2,170	1,570	1,270	735	1,140	1,220
4	865	1,360	2,050	1,100	900	1,280	2,100	1,570	1,270	800	1,100	1,180
5	865	1,360	2,000	1,100	900	1,280	1,980	1,460	1,270	865	1,060	1,180
6	865	1,320	1,900	1,100	900	1,250	1,850	1,420	1,270	940	1,020	1,180
7	830	1,270	1,900	1,150	900	1,250	1,850	1,360	1,220	940	975	1,180
8	865	1,270	1,900	1,280	850	1,250	1,850	1,320	1,180	940	975	1,180
9	830	1,220	1,800	1,280	850	1,280	1,910	1,220	1,140	940	940	1,140
10	830	1,180	1,800	1,200	850	1,320	2,040	1,220	1,100	940	905	1,140
11	800	1,140	1,750	1,100	850	1,350	2,100	1,180	1,100	905	865	1,140
12	800	1,100	1,750	1,000	850	1,500	2,170	975	1,100	940	865	1,140
13	800	1,100	1,750	950	850	1,700	2,240	975	1,100	940	830	1,100
14	800	1,020	1,750	950	800	2,000	2,240	975	1,060	940	830	1,060
15	765	1,020	1,700	950	800	2,200	2,240	1,060	1,020	940	830	1,020
16	735	1,020	1,300	950	850	1,900	2,240	1,140	1,020	940	940	1,020
17	735	1,020	1,220	900	900	1,700	2,170	1,140	1,020	940	940	1,020
18	765	1,020	1,180	900	1,000	1,700	2,170	1,140	940	905	940	1,140
19	865	1,060	1,150	1,100	1,100	1,600	2,100	1,100	905	905	975	1,270
20	905	1,360	1,150	1,400	1,300	1,600	2,040	1,060	905	905	1,100	1,360
21	905	1,180	1,050	1,150	1,300	1,600	1,980	975	905	975	1,100	1,360
22	865	1,270	950	1,000	1,220	1,600	1,910	1,020	905	1,520	1,060	1,360
23	865	1,270	950	1,000	1,220	1,800	1,800	1,100	905	1,570	1,020	1,360
24	940	1,360	950	1,050	1,200	1,850	1,680	1,140	905	1,570	1,020	1,360
25	1,100	1,420	950	1,050	1,200	1,850	1,680	1,220	905	1,570	975	1,360
26	1,180	1,180	950	1,100	1,150	1,950	1,680	1,320	865	1,570	975	1,320
27	1,220	1,910	950	1,050	1,150	2,130	1,680	1,420	830	1,570	1,140	1,320
28	1,270	2,040	800	1,050	1,200	2,520	1,680	1,460	800	1,520	1,220	1,320
29	1,320	2,170	800	1,050	.....	2,520	1,620	1,520	765	1,460	1,270	1,320
30	1,320	2,200	800	1,050	.....	2,520	1,620	1,520	765	1,420	1,270	1,320
31	1,360	.....	1,200	1,050	.....	2,520	.....	1,460	.....	1,320	1,270	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1907–8.												
1	1,320	830	800	520	460	1,060	2,310	2,830	1,740	975	590	590
2	1,320	830	800	500	460	1,060	2,240	2,830	1,680	975	615	590
3	1,320	830	750	500	460	1,060	2,170	2,750	1,680	940	590	590
4	1,320	830	750	500	460	1,060	2,100	2,670	1,620	940	590	590
5	1,320	865	750	500	480	1,080	2,040	2,600	1,520	1,060	590	590
6	1,270	865	750	480	500	1,300	1,980	2,520	1,420	1,100	590	590
7	1,220	865	800	480	500	1,800	1,980	2,380	1,360	1,140	590	590
8	1,180	830	800	480	500	2,200	2,040	2,310	1,320	1,100	560	590
9	1,140	830	850	480	500	2,600	2,040	2,240	1,270	1,020	560	590
10	1,140	830	980	480	500	3,000	2,100	2,170	1,180	940	560	590
11	1,100	830	800	480	520	3,300	2,100	2,100	1,140	905	560	560
12	1,060	830	820	480	520	3,650	2,100	2,040	1,100	865	590	560
13	1,020	830	850	480	720	3,850	2,040	2,040	1,060	830	615	535
14	1,020	830	850	480	800	4,020	2,040	2,040	1,020	800	615	535
15	1,020	1,100	850	480	800	4,020	1,980	2,040	975	765	615	535
16	1,020	865	850	480	800	3,820	1,910	2,040	905	765	675	535
17	1,020	830	800	480	800	3,620	1,850	2,040	865	765	675	535
18	1,020	830	800	480	800	3,530	1,800	2,040	830	765	575	535
19	1,020	830	800	480	870	3,440	1,840	2,040	735	735	645	535
20	975	830	800	500	900	3,350	1,680	2,040	865	735	615	560
21	940	905	800	500	940	3,260	1,620	1,980	865	735	615	560
22	905	940	800	520	940	3,170	1,570	1,980	830	705	615	560
23	905	975	750	520	940	3,080	1,520	1,980	1,060	675	590	560
24	905	975	750	520	940	3,000	1,520	1,910	1,140	675	590	560
25	865	940	750	460	1,000	2,830	1,570	1,910	1,180	675	590	560
26	865	940	750	460	1,060	2,750	1,680	1,850	1,140	705	560	535
27	830	905	750	460	1,060	2,670	1,850	1,800	1,100	675	560	560
28	830	905	750	480	1,060	2,600	2,170	1,800	1,020	615	560	590
29	830	870	750	480	1,060	2,520	2,450	1,800	1,020	590	560	615
30	830	835	700	480	.....	2,450	2,750	1,800	1,020	590	560	615
31	830	.....	700	460	.....	2,380	.....	1,800	.....	590	560	.....
1908–9.												
1	615	645	500	400	500	630	2,380	2,380	1,020	830	560	615
2	615	645	600	400	500	630	2,380	2,750	940	735	560	615
3	590	645	550	400	500	650	2,380	2,910	1,020	735	560	615
4	590	645	500	400	520	700	2,380	2,910	940	735	560	645
5	590	615	500	400	550	730	2,380	2,910	940	705	535	645
6	590	615	500	350	550	760	2,310	2,910	905	645	535	615
7	590	615	500	320	550	800	2,310	2,830	905	705	510	590
8	590	615	500	320	550	860	2,240	2,670	1,060	735	510	590
9	590	590	500	320	550	950	2,240	2,520	1,140	705	510	615
10	590	590	500	320	550	1,100	2,240	2,380	1,330	735	535	615
11	590	590	500	320	550	1,100	2,170	2,240	1,420	705	535	615
12	560	560	500	320	520	1,150	2,100	2,100	1,460	705	535	615
13	560	560	500	320	520	1,220	2,040	2,040	1,520	705	590	615
14	560	865	500	350	520	1,220	1,980	1,980	1,520	675	615	645
15	560	800	500	350	520	1,350	1,910	1,910	1,460	675	615	735
16	590	975	500	380	520	1,350	1,850	1,910	1,420	675	615	735
17	590	735	500	380	550	1,400	1,800	1,850	1,520	615	590	735
18	590	800	500	380	550	1,500	1,800	1,850	1,520	615	615	705
19	560	600	520	400	550	1,500	1,800	1,800	1,520	590	590	705
20	560	600	520	400	550	1,600	1,740	1,740	1,520	560	590	705
21	560	600	520	400	550	1,600	1,740	1,620	1,460	590	590	705
22	590	550	520	420	600	1,700	1,740	1,570	1,360	590	615	735
23	590	550	520	440	600	1,800	1,740	1,420	1,320	590	590	735
24	590	500	520	460	600	1,950	1,740	1,320	1,320	560	615	735
25	615	550	520	500	600	2,200	1,740	1,180	1,270	560	615	735
26	645	600	500	500	600	2,450	1,740	1,060	1,140	560	590	705
27	645	600	500	500	600	2,670	1,740	1,100	1,060	560	645	675
28	645	550	500	500	600	2,600	1,800	1,140	975	560	615	705
29	645	550	500	500	.....	2,520	1,850	1,100	940	560	615	705
30	645	500	500	550	.....	2,450	1,980	1,060	865	560	645	675
31	645	.....	500	540	.....	2,420	.....	1,020	.....	560	645	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909–10.												
1	675	615	700	500	630	600	1,680	2,240	705	510	445	590
2	675	615	700	500	630	600	1,520	2,170	705	510	445	560
3	675	675	700	500	630	600	1,420	2,100	705	510	445	560
4	645	675	700	500	630	700	1,220	1,980	735	490	445	590
5	645	645	700	500	630	800	1,180	1,910	735	445	445	645
6	645	645	700	500	630	800	1,180	1,800	735	465	445	675
7	645	645	700	500	630	900	1,220	1,680	735	465	445	705
8	645	645	500	500	630	950	1,220	1,570	735	465	420	705
9	615	645	520	500	630	1,000	1,180	1,420	735	465	465	705
10	645	645	600	500	630	1,150	1,140	1,270	705	465	465	675
11	675	675	600	500	630	1,250	1,100	1,180	675	445	490	675
12	675	705	600	500	630	1,450	975	1,140	705	465	465	735
13	705	675	500	500	630	1,700	940	1,100	675	465	465	735
14	675	705	500	500	630	1,800	975	1,020	675	465	490	735
15	645	705	500	500	630	2,150	975	975	645	465	490	705
16	645	975	500	500	630	2,750	975	975	645	490	465	705
17	645	905	500	520	630	3,080	1,020	1,020	645	490	490	675
18	645	865	600	520	630	2,910	975	1,100	615	465	490	705
19	615	830	600	520	600	2,750	975	1,040	615	465	490	645
20	590	830	500	520	600	2,670	975	1,040	560	465	490	645
21	615	830	480	520	600	2,670	975	1,980	560	465	490	645
22	645	830	480	570	600	2,600	1,060	1,980	560	465	465	645
23	645	700	480	570	600	2,600	1,220	1,980	560	465	490	645
24	645	700	480	600	600	2,520	1,270	940	560	490	490	705
25	645	700	480	600	600	2,450	1,460	940	535	465	560	765
26	615	700	480	600	600	2,380	1,680	800	510	465	535	800
27	615	750	480	600	600	2,310	1,980	800	510	465	535	800
28	615	750	480	600	600	2,170	2,310	800	535	465	535	800
29	615	750	480	600	.....	2,040	2,380	800	510	465	535	800
30	615	750	480	630	.....	1,980	2,310	830	490	445	535	765
31	615	.....	480	630	.....	1,850	.....	800	.....	445	560	.....
1910–11.												
1	765	615	400	400	500	2,520	905	830	1,060	705	560	590
2	765	645	400	380	500	2,500	865	830	1,060	705	560	590
3	735	645	400	400	500	2,400	865	865	1,420	675	590	560
4	765	645	400	380	500	2,400	830	865	1,740	645	590	560
5	765	645	400	380	500	2,310	800	830	1,910	615	560	560
6	735	645	400	400	500	2,240	940	800	2,040	615	560	560
7	735	615	400	400	450	2,170	940	800	2,170	615	560	560
8	705	765	400	400	450	2,100	975	800	2,240	615	560	560
9	705	1,060	400	400	470	2,040	1,100	765	2,170	615	560	590
10	645	800	380	400	470	2,040	1,060	940	2,040	615	560	590
11	645	700	400	400	470	1,910	1,020	1,020	1,910	615	590	590
12	675	650	380	400	500	1,910	975	1,020	1,740	615	590	645
13	615	650	380	420	520	1,800	1,060	940	1,520	590	590	645
14	645	680	380	420	900	1,680	1,020	905	1,360	560	590	645
15	645	680	380	420	1,100	1,570	1,020	905	1,180	560	615	645
16	645	680	400	420	1,300	1,220	975	975	1,020	590	645	645
17	590	500	400	420	1,900	1,100	975	1,020	1,100	535	645	645
18	615	700	400	450	2,400	1,220	940	1,060	1,100	560	645	765
19	615	600	380	450	2,400	1,180	975	1,020	1,060	560	615	800
20	615	600	380	450	2,500	1,140	975	1,020	975	535	615	735
21	615	600	380	450	2,500	1,100	1,020	975	940	535	590	765
22	645	550	380	450	2,450	1,100	1,020	940	940	560	590	735
23	645	550	380	450	2,450	1,020	975	1,100	865	535	590	705
24	615	550	380	420	2,500	975	940	1,320	830	560	615	675
25	645	500	400	420	2,550	940	940	1,420	800	560	590	675
26	615	480	380	450	2,600	940	905	1,420	765	560	590	675
27	615	600	380	470	2,600	940	865	1,420	735	560	590	675
28	615	600	380	470	2,500	905	865	1,360	735	560	590	705
29	615	700	400	500	.....	905	865	1,270	735	560	560	735
30	615	800	400	500	.....	905	830	1,140	735	590	560	735
31	590	.....	400	500	.....	905	.....	1,100	.....	560	560	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	905	1,180	900	1,220	660	730	4,100	940	2,830	675	1,570	1,910
2	940	1,100	900	1,220	660	800	3,920	975	2,830	675	1,520	2,100
3	1,020	975	900	1,150	660	800	3,720	975	2,830	745	1,420	2,380
4	1,220	1,060	850	1,080	660	800	3,440	940	2,750	675	1,360	2,910
5	1,180	1,020	800	950	660	800	3,350	975	2,670	705	1,270	3,260
6	1,360	1,060	800	820	660	800	3,350	1,020	2,600	705	1,220	3,530
7	1,520	1,020	800	760	660	800	3,350	1,020	2,450	705	1,180	3,440
8	1,570	1,020	820	700	660	800	3,350	975	2,450	705	1,180	3,350
9	1,620	1,060	1,200	650	660	800	3,260	905	2,310	705	1,180	3,260
10	1,620	1,180	1,850	650	700	800	3,170	865	2,240	735	1,270	3,080
11	1,850	1,270	2,050	650	700	850	3,000	905	2,100	735	1,320	2,910
12	1,800	1,520	2,050	620	700	800	2,910	830	1,980	735	1,360	2,750
13	1,740	1,520	2,000	620	700	880	2,750	830	1,800	865	1,360	2,600
14	1,800	1,800	2,000	620	700	880	2,670	865	1,620	905	1,360	2,520
15	1,800	1,620	2,000	600	700	910	2,600	905	1,460	905	1,320	2,380
16	1,800	1,680	1,850	600	700	930	2,520	905	1,270	865	1,270	2,240
17	1,850	1,600	1,800	600	700	930	2,380	940	1,180	800	1,180	2,170
18	1,850	1,620	1,700	600	700	1,200	3,210	975	905	800	1,140	2,100
19	1,850	1,450	1,600	600	700	1,300	2,170	975	1,060	765	1,140	2,100
20	1,850	1,450	1,500	600	700	1,500	2,100	1,420	1,020	735	1,180	2,100
21	1,850	1,500	1,420	600	700	1,680	1,980	1,680	940	1,020	1,180	2,170
22	1,850	1,530	1,400	630	700	1,680	1,910	1,980	940	1,060	1,220	2,310
23	1,800	1,530	1,520	600	730	1,680	1,740	2,380	905	1,320	1,220	2,380
24	1,740	1,500	1,520	630	730	1,680	1,620	2,520	865	1,520	1,180	2,380
25	1,680	1,400	1,200	630	730	1,740	1,460	2,520	865	1,520	1,180	2,380
26	1,620	1,300	1,200	630	760	1,960	1,360	2,520	830	1,520	1,180	2,380
27	1,520	1,100	820	660	730	2,000	1,360	2,600	765	1,520	1,180	2,380
28	1,420	1,100	860	660	730	2,200	1,220	2,750	735	1,520	1,270	2,310
29	1,270	1,050	950	660	730	2,800	1,140	2,750	735	1,620	1,270	2,310
30	1,220	950	1,100	660	.....	3,400	800	2,830	735	1,620	1,520	2,170
31	1,200	.....	1,150	660	.....	4,100	.....	2,830	.....	1,570	1,800	.....
1912–13.												
1	2,100	1,100	1,020	600	550	800	4,120	1,460	2,750	940	830	765
2	2,040	1,060	1,140	620	520	850	3,920	1,320	2,670	940	830	735
3	1,980	1,100	1,180	600	520	850	3,920	1,220	2,520	905	830	735
4	1,910	1,100	1,180	500	500	780	3,920	1,270	2,450	905	830	735
5	1,800	1,020	1,180	450	500	780	3,920	1,520	2,310	865	800	735
6	1,740	1,020	1,180	480	500	780	3,820	1,680	2,240	830	800	735
7	1,680	1,100	1,220	500	500	780	3,720	1,740	2,100	800	800	735
8	1,570	1,100	1,420	520	500	780	3,620	1,740	1,980	765	765	735
9	1,520	1,020	1,360	520	500	780	3,440	1,740	1,850	800	800	705
10	1,460	1,060	1,220	520	500	850	3,440	1,740	1,680	800	800	705
11	1,420	975	1,200	520	500	1,000	3,530	1,740	1,570	765	765	705
12	1,360	975	1,250	520	500	1,100	3,440	1,620	1,460	865	765	705
13	1,360	1,100	1,100	500	500	1,400	3,440	1,620	1,320	940	765	705
14	1,360	1,180	1,000	480	480	2,400	3,440	1,620	1,270	940	765	705
15	1,320	1,180	1,100	480	500	3,600	3,350	1,680	1,220	905	765	675
16	1,270	1,220	920	500	500	3,800	3,260	1,680	1,180	865	765	705
17	1,270	1,220	900	600	520	3,800	3,170	1,740	1,100	865	800	765
18	1,220	1,270	900	650	520	3,800	3,080	1,740	1,140	865	765	765
19	1,220	1,220	900	650	680	4,000	2,910	1,680	1,100	830	765	735
20	1,180	1,220	900	600	780	4,000	2,830	1,740	1,100	865	765	830
21	1,180	1,220	800	600	800	3,700	2,670	1,910	1,140	830	800	940
22	1,180	1,180	800	550	780	3,600	2,600	2,170	1,140	830	800	905
23	1,220	1,180	700	550	700	3,600	2,520	2,310	1,140	865	800	905
24	1,220	1,100	600	600	700	4,000	2,380	2,380	1,100	865	800	865
25	1,220	1,100	650	600	780	4,200	2,310	2,450	1,100	865	765	865
26	1,180	1,060	620	620	800	4,200	2,170	2,450	1,060	865	765	905
27	1,180	1,020	620	620	800	4,200	2,040	2,450	1,060	865	765	905
28	1,180	940	620	600	800	3,850	1,910	2,520	1,020	830	765	905
29	1,180	1,100	620	600	.....	3,900	1,740	2,750	1,020	830	765	865
30	1,180	1,060	600	600	.....	4,250	1,570	2,750	940	865	765	865
31	1,140	.....	600	600	.....	4,340	.....	2,830	.....	865	765	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	940	1,100	1,100	500	480	600	1,060	1,320	905	1,180	675	765
2	940	1,060	1,000	500	480	600	1,140	1,360	865	1,140	675	800
3	975	1,060	1,000	500	480	600	1,140	1,320	905	1,140	645	800
4	975	1,060	1,000	480	520	600	1,140	1,360	1,270	1,100	615	800
5	975	1,020	950	480	480	620	1,060	1,360	1,420	1,060	590	800
6	975	1,020	950	480	480	670	1,060	1,360	1,520	830	590	865
7	975	1,020	1,000	500	480	670	1,060	1,320	2,170	940	590	830
8	975	1,020	850	480	450	670	1,060	1,220	2,380	905	590	865
9	975	940	900	480	420	720	1,020	1,180	2,600	865	590	830
10	975	905	870	480	420	720	1.020	1,180	2,670	865	535	830
11	1,100	705	870	450	420	720	1,100	1,140	2,750	865	560	865
12	1,180	905	800	400	420	750	1,060	1,100	2,750	830	590	865
13	1,140	975	800	400	420	770	1,020	1,180	2,670	830	560	865
14	1,140	940	780	450	420	950	975	1,220	2,520	865	560	905
15	1,140	975	700	480	450	1,000	975	1,180	2,310	865	560	1,060
16	1,140	905	700	480	420	1,200	940	1,140	2,100	865	560	1,140
17	1,100	940	700	500	420	1,300	830	1,100	1,910	800	535	1,140
18	1,140	940	600	500	420	1,600	830	1,020	1,740	800	560	1,180
19	1,140	1,020	600	480	420	1,400	940	1,020	1,570	800	590	1,180
20	1,100	1,060	600	500	450	1,150	865	1,020	1,320	765	705	1,180
21	1,060	1,060	500	520	480	1,400	940	940	1,270	765	765	1,180
22	1,100	1,140	500	500	480	1,250	940	975	1,220	735	765	1,140
23	1,100	1,180	500	420	480	1,020	830	940	1,140	735	800	1,100
24	1,100	1,180	500	480	450	940	865	940	1,100	705	800	1,100
25	1,060	1,420	520	500	450	940	975	1,100	1,100	705	765	1,020
26	1,060	1,320	500	420	450	1,020	1,100	1,100	1,060	705	735	1,020
27	1,100	1,220	450	420	480	940	1,100	1,060	1,180	705	735	975
28	1,100	1,220	480	500	520	905	1,140	975	1,270	705	735	905
29	1,100	1,180	480	600	.....	940	1,220	975	1,220	705	735	905
30	1,060	1,220	500	600	.....	975	1,270	975	1,180	705	735	905
31	1,100	.....	500	480	.....	1,020	.....	940	.....	675	735	.....
1914–15.												
1	865	1,020	420	400	400	2,000	2,380	800	1,460	800	735	765
2	865	940	420	400	400	2,200	2,380	800	1,460	765	800	765
3	865	940	420	400	400	2,200	3,310	830	1,420	735	865	765
4	865	905	420	400	400	2,200	2,240	865	1,320	735	905	735
5	800	865	400	420	420	2,150	2,170	865	1,270	735	940	735
6	800	865	400	420	450	2,200	2,170	865	1,220	735	975	705
7	800	865	380	480	450	2,200	2,100	865	1,180	765	1,020	705
8	800	830	400	480	450	2,200	2,040	940	1,140	800	1,020	705
9	905	800	400	480	450	2,200	2,040	940	1,140	800	1,020	830
10	905	800	400	480	450	2,200	1,980	905	1,100	800	1,020	975
11	905	800	420	480	450	2,300	1,980	830	1,060	765	1,020	975
12	905	905	420	420	500	2,300	1,910	830	1,020	765	975	1,060
13	975	940	420	420	550	2,350	1,850	830	1,060	735	975	1,420
14	1,020	905	350	480	600	2,450	1,800	800	1,100	735	975	1,570
15	1,060	900	350	480	600	2,600	1,740	800	1,060	735	940	1,740
16	1,100	800	450	500	600	2,700	1,680	830	1,020	735	905	2,100
17	1,140	600	500	520	700	2,800	1,620	905	975	705	940	2,380
18	1,180	700	500	550	750	3,000	1,620	975	975	705	905	2,600
19	1,220	500	400	550	800	2,910	1,570	940	975	705	905	2,670
20	1,270	520	400	500	850	2,830	1,460	1,020	1,060	705	905	2,830
21	1,270	540	400	500	900	2,830	1,420	1,180	1,020	735	905	2,830
22	1,270	540	400	600	1,050	2,830	1,320	1,320	1,020	735	865	2,750
23	1,270	520	400	600	1,200	2,750	1,220	1,420	905	735	865	2,670
24	1,270	520	400	550	1,300	2,750	1,220	1,520	905	735	835	2,600
25	1,220	520	400	550	1,350	2,750	1,140	1,520	905	735	835	2,600
26	1,220	520	400	450	1,600	2,670	1,060	1,570	865	735	835	2,520
27	1,140	540	400	450	1,700	2,670	1,060	1,570	830	705	800	2,450
28	1,140	500	400	450	1,800	2,670	940	1,520	800	735	800	2,380
29	1,100	400	400	450	.....	2,600	830	1,520	800	735	800	2,310
30	1,060	400	420	450	.....	2,520	830	1,460	800	735	765	2,240
31	1,020	.....	420	450	.....	2,450	.....	1,460	.....	735	765	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	2,170	940	2,000	600	1,150	900	6,050	2,310	1,270	1,420	645	705
2	2,170	905	1,950	700	1,200	900	5,520	2,310	1,360	1,360	615	705
3	2,100	905	1,900	650	1,270	900	5,150	2,240	1,420	1,270	675	675
4	2,040	905	1,850	650	1,270	900	4,910	2,240	1,420	1,180	675	705
5	1,980	905	1,800	700	1,270	850	4,560	2,170	1,420	1,100	940	705
6	1,910	905	1,700	650	1,270	800	4,230	2,170	1,420	1,060	940	735
7	1,850	905	1,650	600	1,270	800	3,920	2,100	1,460	975	905	830
8	1,740	830	1,500	600	1,270	800	3,620	2,100	1,850	940	940	865
9	1,740	1,020	1,300	600	1,200	800	3,530	1,980	2,170	865	940	865
10	1,680	1,060	1,400	600	1,150	800	3,350	1,980	2,450	800	940	865
11	1,620	1,270	1,350	600	1,150	900	3,170	1,910	2,670	735	975	830
12	1,520	1,460	1,300	550	1,100	940	3,000	1,800	2,830	715	975	830
13	1,460	1,460	1,250	600	1,100	1,200	2,910	1,740	2,910	800	975	905
14	1,460	1,520	1,000	600	1,080	1,300	2,830	1,800	2,910	800	975	940
15	1,420	1,570	1,100	600	1,080	1,300	2,600	2,040	2,910	765	940	940
16	1,360	1,620	1,100	550	1,080	1,400	2,600	2,310	2,830	765	940	940
17	1,320	1,620	1,100	550	1,000	1,460	2,520	2,450	2,830	735	905	940
18	1,320	1,570	1,050	550	1,000	1,520	2,380	2,380	2,750	735	905	905
19	1,320	1,800	1,050	550	1,000	1,700	2,310	2,380	2,670	735	905	905
20	1,320	1,910	1,000	550	1,000	1,780	2,380	2,310	2,600	765	905	905
21	1,320	1,980	950	550	950	2,000	2,520	2,240	2,520	735	905	905
22	1,270	2,100	950	750	950	2,200	2,600	2,170	2,380	735	800	905
23	1,220	1,980	950	750	950	2,400	2,750	2,100	2,310	705	830	905
24	1,180	2,040	950	750	950	2,600	2,670	1,980	2,240	645	830	830
25	1,100	2,100	950	900	950	3,000	2,670	1,910	2,100	675	765	830
26	1,100	2,170	900	900	950	4,400	2,600	1,800	2,040	705	800	830
27	1,100	2,240	900	975	900	5,600	2,520	1,740	1,910	675	800	940
28	1,060	2,310	850	1,000	850	6,400	2,450	1,680	1,800	675	735	1,020
29	1,020	2,310	750	1,080	875	6,200	2,380	1,520	1,680	645	735	1,060
30	975	2,240	750	1,100	.....	6,400	2,310	1,460	1,520	675	735	1,060
31	975	.....	780	1,150	.....	6,200	.....	1,360	.....	675	705	.....
1916–17.												
1	1,060	1,980	1,850	600	550	550	5,150	2,600	1,140	2,310	1,180	800
2	1,060	1,980	1,850	525	550	550	5,150	2,600	1,270	2,310	1,140	800
3	1,060	1,980	1,800	525	550	550	5,030	2,600	1,360	2,310	1,060	800
4	1,060	1,980	1,740	525	550	590	4,790	2,600	1,460	2,380	1,020	800
5	1,020	2,040	1,740	600	550	590	4,560	2,520	1,520	2,380	1,060	830
6	1,020	1,980	1,620	600	550	590	4,450	2,450	1,620	2,380	1,020	975
7	1,020	1,980	1,620	600	550	590	4,120	2,380	1,850	2,380	975	975
8	975	1,980	1,620	600	550	590	4,020	2,310	2,040	2,380	1,060	1,020
9	975	1,980	1,570	600	550	590	3,820	2,240	2,240	2,310	1,100	1,060
10	940	2,040	1,360	600	550	625	3,530	2,100	2,310	2,310	1,100	1,060
11	905	1,980	1,570	590	550	650	3,440	2,040	2,380	2,240	1,060	1,060
12	905	1,980	1,680	590	550	675	3,260	1,910	2,450	2,240	940	1,060
13	975	1,910	1,520	580	550	700	3,000	1,850	2,520	2,170	1,020	1,100
14	975	1,850	1,680	580	550	725	2,910	1,680	2,520	2,100	1,060	1,180
15	1,020	1,910	1,570	575	550	750	2,750	1,570	2,450	2,040	1,060	1,180
16	975	1,850	1,570	575	550	800	2,600	1,420	2,380	1,920	1,020	1,180
17	940	1,980	1,460	575	550	850	2,520	1,320	2,310	1,910	975	1,180
18	905	1,980	1,460	575	550	900	2,450	1,270	2,240	1,850	975	1,140
19	905	2,040	1,420	575	550	950	2,520	1,220	2,170	1,800	940	1,100
20	940	1,910	1,360	575	550	1,050	2,600	2,220	2,100	1,680	975	1,100
21	1,060	1,800	1,320	550	550	1,200	2,670	1,100	2,040	1,620	800	1,060
22	1,100	1,850	1,270	550	550	1,500	2,750	1,220	1,980	1,520	905	1,060
23	1,140	1,850	1,270	550	550	2,000	2,750	1,270	1,980	1,570	905	1,060
24	1,250	1,910	1,000	550	550	3,500	2,750	1,360	1,910	1,570	905	1,100
25	1,350	2,040	900	550	550	5,200	2,750	1,320	1,910	1,570	905	1,060
26	1,460	2,040	900	550	550	5,400	2,670	1,320	1,980	1,520	905	1,020
27	1,570	1,910	850	550	550	5,650	2,670	1,270	2,040	1,460	865	1,020
28	1,570	1,910	850	550	550	5,390	2,600	1,220	2,100	1,360	830	975
29	1,740	1,910	800	550	.....	5,270	2,520	1,180	2,170	1,320	830	975
30	1,800	1,910	700	550	.....	5,150	2,520	1,180	2,240	1,270	830	940
31	1,910	.....	600	550	.....	5,270	.....	1,140	.....	1,180	800	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.												
1	940	1,460	940	480	700	940	3,920	1,800	3,080	940	735	675
2	905	1,460	905	480	700	980	3,620	1,740	3,000	975	765	675
3	905	1,520	865	480	700	1,060	3,350	1,740	2,910	905	735	675
4	905	1,520	865	510	700	1,020	3,170	1,680	2,910	905	735	615
5	905	1,680	765	510	700	1,350	3,000	1,570	2,670	975	765	615
6	905	1,850	800	540	660	1,600	2,830	1,460	2,600	940	735	615
7	905	1,800	700	540	660	1,800	2,750	1,420	2,520	940	675	645
8	830	1,740	700	540	700	2,000	2,670	1,320	2,380	905	735	590
9	865	1,680	800	540	700	2,200	2,520	1,270	2,310	865	735	590
10	865	1,620	800	540	740	2,200	2,450	1,740	2,240	800	765	590
11	865	1,570	800	570	740	2,200	2,310	1,910	2,170	800	735	645
12	865	1,460	800	570	740	2,300	2,170	2,040	2,040	800	765	645
13	865	1,420	750	600	740	2,500	2,100	2,100	1,910	800	735	645
14	865	1,360	800	600	780	2,700	1,980	2,100	1,850	765	705	645
15	865	1,320	800	600	780	2,900	1,850	2,040	1,680	800	765	645
16	865	1,270	800	600	780	3,100	1,740	1,910	1,520	800	705	645
17	865	1,220	800	600	780	3,340	1,620	1,850	1,420	765	735	645
18	865	1,180	800	600	780	3,700	1,570	2,040	1,320	765	735	675
19	905	1,140	840	630	780	4,420	1,520	2,240	1,220	765	735	645
20	940	1,140	840	630	820	5,790	1,420	2,830	1,180	765	675	645
21	905	1,140	840	630	820	6,050	1,460	2,450	1,140	735	645	645
22	905	1,100	840	630	820	6,050	1,680	3,530	1,100	735	645	645
23	975	1,060	880	630	820	6,050	1,740	4,120	1,020	735	675	675
24	975	1,020	880	630	820	5,920	1,740	4,020	975	675	675	675
25	1,020	1,020	880	630	860	5,920	1,800	3,820	940	765	645	645
26	1,100	1,020	750	660	900	5,520	1,800	3,530	905	800	675	645
27	1,220	975	750	660	900	5,270	1,740	3,440	865	765	645	615
28	1,270	975	700	660	940	5,030	1,680	3,350	905	735	645	645
29	1,360	975	750	660	.....	4,790	1,740	3,260	865	800	645	615
30	1,360	940	750	660	.....	4,560	1,800	3,170	905	800	675	615
31	1,420	.....	750	700	.....	4,230	.....	3,080	.....	735	675	.....
1918–19.												
1	645	800	865	980	1,180	940	1,800	1,680	940	905	645	615
2	615	800	830	1,020	1,140	900	1,680	1,680	975	905	645	615
3	645	865	905	1,060	1,140	860	1,620	1,680	1,180	905	645	615
4	645	865	830	1,060	1,140	860	1,570	1,680	1,180	830	615	615
5	645	865	865	1,060	900	900	1,460	1,620	1,420	865	645	615
6	645	905	905	1,060	900	900	1,460	1,680	1,460	905	675	590
7	645	1,020	940	1,060	940	860	1,420	1,800	1,520	830	675	590
8	645	1,060	940	1,060	900	900	1,460	1,850	1,520	800	675	560
9	645	975	940	1,060	860	1,000	1,570	1,910	1,460	830	675	615
10	615	940	1,020	1,020	860	1,100	1,680	1,910	1,460	905	675	645
11	645	905	1,060	1,020	860	1,220	1,740	1,910	1,520	905	645	645
12	675	865	1,060	980	900	1,320	1,850	1,910	1,520	905	645	645
13	615	865	1,060	940	940	1,460	1,850	1,850	1,570	830	675	615
14	615	865	1,100	940	1,060	1,570	1,850	1,800	1,520	830	645	615
15	615	830	1,100	940	1,100	1,620	1,800	1,680	1,420	830	675	590
16	615	830	1,100	940	1,140	2,100	1,740	1,680	1,320	765	675	615
17	645	830	1,060	940	1,180	2,310	1,800	1,680	1,570	765	705	615
18	615	800	1,060	940	1,180	2,520	1,910	1,620	1,420	765	675	615
19	615	830	1,060	940	1,180	2,600	1,980	1,570	1,360	735	675	645
20	615	830	1,060	940	1,140	2,670	2,040	1,520	1,320	735	675	645
21	615	830	1,060	940	1,140	2,670	2,100	1,360	1,270	705	705	705
22	615	830	1,100	980	1,180	2,600	2,100	1,320	1,180	705	705	705
23	615	800	1,100	1,020	1,180	2,520	2,170	1,360	1,140	675	705	705
24	615	645	1,020	1,060	1,180	2,450	2,100	1,320	1,100	675	705	705
25	615	940	675	1,100	1,180	2,380	2,040	1,270	1,140	675	675	675
26	645	735	865	1,140	860	2,310	1,980	1,180	1,180	675	675	675
27	675	1,020	900	1,180	860	2,170	1,910	1,140	1,100	645	705	675
28	735	830	930	1,220	940	2,100	1,800	1,100	1,060	645	675	675
29	800	1,060	930	1,220	.....	2,040	1,800	1,060	1,020	645	675	705
30	800	865	930	1,220	.....	1,980	1,740	1,020	800	615	645	735
31	800	.....	930	1,220	.....	1,850	.....	940	.....	645	645	.....

Daily discharge, in second-feet, of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898-1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	735	1,140	1,320	650	580	650	4,790	1,910	1,100	1,620	675	1,020
2	735	1,140	1,360	600	600	650	4,910	1,850	1,060	1,570	675	1,020
3	800	1,180	1,340	580	600	650	4,560	1,740	1,020	1,570	675	975
4	865	1,180	1,320	580	600	700	4,340	1,620	940	1,460	645	975
5	905	1,220	1,250	550	600	700	4,120	1,570	905	1,360	645	975
6	940	1,220	1,180	550	600	700	4,020	1,520	865	1,420	645	975
7	975	1,270	1,110	550	650	700	3,820	1,420	905	1,520	645	940
8	975	1,220	1,040	550	650	650	3,530	1,360	940	1,520	645	865
9	1,020	1,220	950	550	650	650	3,350	1,270	905	1,520	645	865
10	1,060	1,220	950	580	650	650	3,260	1,180	905	1,520	675	905
11	1,060	1,320	910	580	650	700	3,170	1,180	830	1,520	615	940
12	1,060	1,420	905	580	650	900	3,000	1,180	800	1,520	590	905
13	1,060	1,360	865	580	650	950	2,910	1,180	800	1,460	735	905
14	1,060	1,620	860	600	650	950	2,750	1,140	830	1,420	735	905
15	1,020	1,100	780	600	700	1,250	2,600	1,140	905	1,320	705	865
16	1,020	1,270	740	600	650	1,720	2,520	1,060	1,060	1,260	705	865
17	1,020	1,460	700	600	600	2,020	2,380	1,060	1,060	1,180	705	865
18	940	1,570	700	600	600	2,750	2,310	1,060	1,140	1,100	675	800
19	905	1,360	700	600	600	3,100	2,180	1,100	1,220	1,020	675	830
20	905	1,220	700	600	650	3,200	2,100	1,100	1,270	975	645	800
21	865	1,180	700	600	650	3,300	2,100	1,060	1,320	975	705	800
22	905	1,180	700	600	650	3,400	2,040	1,020	1,360	905	735	800
23	905	1,140	700	600	650	4,120	2,100	1,320	1,460	865	705	800
24	865	1,100	700	600	650	4,120	2,100	1,460	1,520	865	705	800
25	905	1,100	700	600	650	4,340	2,100	1,460	1,520	800	705	800
26	905	940	700	600	650	4,910	2,100	1,460	1,520	765	705	765
27	830	905	700	600	650	4,910	2,100	1,460	1,520	765	705	765
28	830	1,020	700	600	650	4,910	2,040	1,420	1,460	735	705	765
29	865	1,020	700	600	650	5,150	1,980	1,360	1,620	735	675	735
30	905	1,270	700	600	.....	5,030	1,980	1,270	1,620	705	1,020	735
31	1,100	.....	700	600	.....	4,790	.....	1,180	.....	705	1,020	.....

NOTE.—Daily discharge computed by engineers of U. S. Army from tables based on measurements made by engineers of U. S. Geol. Survey.

Monthly discharge of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920.

[Drainage area 1,430 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1898.					
January	500	450	481	0.336	0.39
February	625	450	553	.387	.40
March	2,730	600	1,860	1.30	1.50
April	2,100	865	1,370	.958	1.07
May	1,420	615	925	.647	.75
June	765	560	642	.449	.50
July	765	560	642	.449	.52
August	865	645	736	.515	.59
September	675	615	650	.455	.51
1898–99.					
October	800	615	703	.492	.57
November	765	470	595	.416	.46
December	500	450	480	.336	.39
January	370	300	329	.230	.27
February	450	300	349	.244	.25
March	960	420	733	.513	.59
April	2,800	940	1,960	1.37	1.53
May	1,570	465	1,010	.706	.81
June	1,680	735	1,120	.783	.87
July	940	675	792	.554	.64
August	675	615	661	.462	.53
September	735	645	685	.479	.53
The year	2,800	300	786	.550	7.44

Monthly discharge of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1899–1900.					
October	765	675	716	0.501	0.58
November	705	590	630	.441	.49
December	645	350	533	.373	.43
January	380	280	339	.237	.27
February	500	250	375	.262	.27
March	2,200	400	856	.599	.69
April	2,830	1,320	1,780	1.24	1.38
May	1,320	560	806	.564	.65
June	535	465	505	.353	.39
July	705	490	570	.399	.46
August	705	590	664	.464	.53
September	940	615	693	.485	.54
The year	2,830	250	707	.494	6.68
1900–1901.					
October	1,320	800	1,010	.706	.81
November	1,520	1,020	1,310	.916	1.02
December	975	550	720	.504	.56
January	450	350	392	.274	.32
February	420	375	405	.283	.29
March	4,800	420	1,430	1.00	1.15
April	4,300	1,020	2,600	1.82	2.03
May	940	615	740	.517	.60
June	1,060	615	728	.509	.57
July	1,180	535	781	.546	.63
August	615	560	583	.408	.47
September	705	560	657	.459	.51
The year	4,800	350	946	.662	8.98
1901–2.					
October	940	705	811	.567	.65
November	800	560	705	.493	.55
December	645	400	521	.364	.42
January	400	300	344	.241	.28
February	700	300	336	.235	.24
March	2,000	790	1,140	.797	.92
April	765	510	667	.466	.52
May	2,450	675	1,440	1.01	1.16
June	1,680	705	1,070	.748	.83
July	940	625	711	.497	.57
August	975	800	890	.622	.72
September	865	735	778	.544	.61
The year	2,450	300	787	.550	7.47
1902–3.					
October	940	765	860	.601	69
November	940	675	756	.529	.59
December	800	600	662	.463	.53
January	600	400	484	.338	.39
February	850	400	486	.340	.35
March	2,670	720	1,940	1.36	1.57
April	2,100	1,180	1,560	1.09	1.22
May	1,570	800	1,080	.755	.87
June	1,460	735	972	.680	.76
July	800	705	751	.525	.61
August	2,450	735	1,250	.874	1.01
September	2,240	1,740	2,050	1.43	1.60
The year	2,670	400	1,070	.748	10.19
1903–4.					
October	1,800	1,060	1,540	1.08	1.24
November	1,220	740	934	.653	.73
December	700	500	581	.406	.47
January	400	300	376	.263	.30
February	600	300	424	.297	.32
March	5,400	600	2,090	1.46	1.68
April	4,500	1,680	3,260	2.28	2.54
May	2,310	1,460	1,910	1.34	1.54
June	1,680	615	994	.695	.78
July	975	645	723	.506	.58
August	940	675	772	.540	.62
September	1,100	675	833	.583	.65
The year	5,400	300	1,200	.839	11.45

Monthly discharge of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1904–5.					
October	1,850	1,020	1,460	1.02	1.18
November	1,180	735	906	.634	.71
December	550	480	525	.367	.42
January	520	400	476	.333	.38
February	550	500	521	.364	.38
March	4,560	570	1,890	1.32	1.52
April	4,560	1,100	2,720	1.90	2.12
May	2,520	800	1,760	1.23	1.42
June	5,920	1,800	4,230	2.96	3.30
July	3,170	1,140	2,100	1.47	1.70
August	1,140	975	1,060	.741	.85
September	1,140	975	1,060	.741	.83
The year	5,920	400	1,560	1.09	14.81
1905–6.					
October	1,320	830	1,040	.727	.84
November	1,420	975	1,140	.797	.89
December	1,200	600	850	.594	.68
January	900	500	704	.492	.57
February	1,900	620	925	.647	.67
March	4,450	2,100	2,800	1.96	2.26
April	4,340	1,850	3,350	2.34	2.61
May	1,740	975	1,340	.937	1.08
June	1,680	905	1,200	.839	.94
July	1,800	905	1,300	.909	1.05
August	1,140	830	984	.688	.79
September	1,020	800	923	.645	.72
The year	4,450	500	1,380	.965	13.10
1906–7.					
October	1,360	735	929	.650	.75
November	2,200	1,020	1,340	.937	1.05
December	2,200	800	1,450	1.01	1.16
January	1,400	900	1,080	.755	.87
February	1,300	800	1,000	.699	.73
March	2,520	1,200	1,700	1.19	1.37
April	2,310	1,620	1,980	1.38	1.54
May	1,680	975	1,270	.888	1.02
June	1,360	765	1,040	.727	.81
July	1,570	735	1,090	.762	.88
August	1,270	830	1,030	.720	.83
September	1,360	1,020	1,220	.853	.95
The year	2,520	735	1,260	.881	11.96
1907–8.					
October	1,320	830	1,040	.727	.84
November	1,100	830	873	.610	.68
December	980	700	790	.552	.64
January	520	460	486	.340	.39
February	1,060	460	736	.515	.56
March	4,020	1,060	2,690	1.88	2.17
April	2,750	1,520	1,970	1.38	1.54
May	2,830	1,800	2,140	1.50	1.73
June	1,740	735	1,160	.811	.90
July	1,140	590	818	.571	.66
August	675	560	596	.417	.48
September	615	535	568	.397	.44
The year	4,020	460	1,160	.811	11.03
1908–9.					
October	645	560	596	.417	.48
November	975	500	628	.439	.49
December	600	500	509	.356	.41
January	550	320	405	.283	.33
February	600	500	551	.385	.40
March	2,670	630	1,470	1.03	1.19
April	2,380	1,740	2,010	1.41	1.57
May	2,910	1,020	1,940	1.36	1.57
June	1,520	865	1,230	.860	.96
July	830	560	711	.497	.57
August	645	510	582	.407	.47
September	735	590	669	.468	.52
The year	2,910	320	943	.659	8.96

Monthly discharge of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Month	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1909–10.					
October	705	590	642	0.449	0.52
November	975	615	726	.508	.57
December	700	480	555	.388	.45
January	630	500	535	.374	.43
February	630	600	619	.433	.45
March	3,080	600	1,810	1.27	1.46
April	2,380	940	1,320	.923	1.03
May	2,240	800	1,330	.930	1.07
June	735	490	634	.443	.49
July	510	445	470	.329	.38
August	560	420	485	.339	.39
September	800	560	691	.483	.54
The year	3,080	420	820	.573	7.78
1910–11.					
October	765	590	660	.462	.53
November	1,060	480	648	.453	.51
December	400	380	391	.273	.31
January	500	380	428	.299	.34
February	2,600	450	1,390	.972	1.01
March	2,520	905	1,550	1.08	1.24
April	1,100	800	948	.663	.74
May	1,420	765	1,020	.713	.82
June	2,240	735	1,300	.909	1.01
July	705	535	590	.413	.48
August	645	560	588	.411	.47
September	800	560	652	.456	.51
The year	2,600	380	842	.589	7.97
1911–12.					
October	1,850	905	1,560	1.09	1.26
November	1,800	950	1,310	.916	1.02
December	2,050	800	1,340	.937	1.08
January	1,220	600	720	.503	.58
February	760	660	696	.487	.53
March	4,100	730	1,390	.972	1.12
April	4,100	800	2,500	1.75	1.95
May	2,830	830	1,500	1.05	1.21
June	2,830	735	1,620	1.13	1.26
July	1,620	675	998	.698	.80
August	1,800	1,140	1,290	.902	1.04
September	3,530	1,910	2,540	1.78	1.99
The year	4,100	600	1,450	1.01	13.84
1912–13.					
October	2,100	1,140	1,410	.986	1.14
November	1,270	940	1,110	.776	.87
December	1,420	600	952	.666	.77
January	650	450	560	.392	.45
February	800	480	598	.418	.44
March	4,340	780	2,610	1.83	2.11
April	4,120	1,570	3,070	2.15	2.40
May	2,830	1,220	1,910	1.34	1.54
June	2,750	940	1,520	1.06	1.18
July	940	765	859	.601	.69
August	830	765	785	.549	.63
September	940	675	785	.549	.61
The year	4,340	450	1,350	.944	12.83
1913–14.					
October	1,180	940	1,060	.741	.85
November	1,420	705	1,060	.741	.83
December	1,100	450	716	.501	.58
January	600	400	483	.338	.39
February	520	420	455	.318	.33
March	1,600	600	925	.647	.75
April	1,270	830	1,020	.713	.80
May	1,360	940	1,130	.790	.91
June	2,750	865	1,670	1.17	1.30
July	1,180	675	844	.59	.68
August	800	535	651	.455	.52
September	1,180	765	960	.671	.75
The year	2,750	400	915	.640	8.69

Monthly discharge of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1914–15.					
October	1,270	800	1,040	0.727	0.84
November	1,020	400	713	.499	.56
December	500	350	410	.287	.33
January	600	400	476	.333	.38
February	1,800	400	770	.538	.56
March	3,000	2,000	2,500	1.75	2.02
April	2,380	830	1,670	1.17	1.30
May	1,570	800	1,080	.755	.87
June	1,460	800	1,060	.741	.83
July	800	705	742	.519	.60
August	1,020	735	897	.627	.72
September	2,830	705	1,750	1.22	1.36
The year	3,000	350	1,090	.762	10.37
1915–16.					
October	2,170	975	1,480	1.03	1.19
November	2,310	830	1,550	1.08	1.20
December	2,000	750	1,230	.860	.99
January	1,150	550	708	.495	.57
February	1,270	850	1,080	.755	.81
March	6,400	800	2,240	1.57	1.81
April	6,050	2,310	3,230	2.26	2.52
May	2,450	1,360	2,020	1.41	1.63
June	2,910	1,270	2,160	1.51	1.68
July	1,420	645	841	.588	.68
August	975	615	847	.592	.68
September	1,060	675	866	.606	.68
The year	6,400	550	1,520	1.06	14.44
1916–17.					
October	1,910	905	1,150	.804	.93
November	2,040	1,800	1,950	1.36	1.52
December	1,850	600	1,370	.958	1.10
January	600	525	568	.397	.46
February	550	550	550	.385	.40
March	5,650	550	1,920	1.34	1.54
April	5,150	2,450	3,310	2.31	2.58
May	2,600	1,100	1,730	1.21	1.40
June	2,520	1,140	2,020	1.41	1.57
July	2,380	1,180	1,910	1.34	1.54
August	1,180	800	975	.682	.79
September	1,180	800	1,020	.713	.80
The year	5,650	525	1,540	1.08	14.63
1917–18.					
October	1,420	830	974	0.681	0.79
November	1,850	940	1,320	.923	1.03
December	940	700	805	.563	.65
January	700	480	591	.413	.48
February	940	660	771	.539	.56
March	6,050	940	3,470	2.43	2.80
April	3,920	1,420	2,190	1.53	1.71
May	4,120	1,270	2,410	1.69	1.95
June	3,080	865	1,750	1.22	1.36
July	975	675	815	.570	.66
August	765	645	707	.494	.57
September	675	590	640	.448	.50
The year	6,050	480	1,370	.958	13.06
1918–19.					
October	800	615	651	.455	.52
November	1,060	645	870	.608	.68
December	1,100	675	974	.681	.79
January	1,220	940	1,040	.727	.84
February	1,180	860	1,040	.727	.76
March	2,670	860	1,730	1.21	1.40
April	2,170	1,420	1,800	1.26	1.41
May	1,910	940	1,540	1.08	1.24
June	1,570	800	1,290	.902	1.01
July	905	615	776	.543	.63
August	705	615	670	.469	.54
September	735	560	643	.450	.50
The year	2,670	560	1,090	.762	10.32

Monthly discharge of Fox River at Berlin, Wis., for the years ending Sept. 30, 1898–1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919–20.					
October	1,100	735	933	0.653	0.75
November	1,620	905	1,220	.852	.95
December	1,360	700	883	.618	.71
January	650	550	590	.413	.48
February	700	580	636	.445	.48
March	5,150	650	2,360	1.65	1.90
April	4,910	1,980	2,910	2.03	2.27
May	1,910	1,020	1,330	.927	1.07
June	1,620	800	1,150	.801	.89
July	1,620	705	1,180	.827	.95
August	1,020	645	701	.490	.56
September	1,020	735	865	.605	.68
The year	5,150	550	1,230	.860	11.69

Days of deficiency in discharge of Fox River at Berlin, Wis., for the years ending Sept. 30, 1899–1920.

Discharge in second-feet.	Days of deficient discharge.											
	1898–99	1899–1900	1900–1901	1901–2	1902–3	1903–4	1904–5	1905–6	1906–7	1907–8	1908–9	1909–10
250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
275	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
300	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
325	29	17	.....	31	.....	7	.....	.....	.....	.....	7	.....
350	34	17	.....	36	.....	7	.....	.....	.....	.....	7	.....
375	50	37	5	53	.....	19	.....	.....	.....	.....	10	.....
400	50	44	16	56	.....	20	.....	.....	.....	.....	18	.....
450	60	66	58	61	22	52	4	.....	.....	.....	23	12
500	107	93	62	76	35	52	18	.....	.....	26	24	64
550	115	129	72	77	43	74	70	3	.....	51	79	106
600	116	147	122	84	48	77	92	5	.....	94	150	120
650	146	232	156	119	73	82	92	23	.....	105	209	206
700	194	256	176	133	82	101	98	33	.....	112	215	223
750	229	297	218	189	121	151	100	38	4	121	243	260
800	247	301	230	216	145	166	100	49	9	136	244	266
900	286	314	245	274	206	205	117	92	48	195	251	283
1,000	310	319	275	306	237	229	138	150	107	222	260	300
1,200	320	324	309	326	260	252	226	233	198	263	276	317
1,400	325	333	322	339	281	264	236	262	271	274	286	324
1,700	347	352	336	351	297	292	253	292	308	286	305	333
2,000	350	356	339	359	316	317	278	306	335	307	332	344
2,500	354	363	344	365	358	332	299	318	361	338	354	356
3,000	365	365	347	.....	365	339	317	341	365	351	365	364
4,000	.....	.....	355	.....	.....	352	333	350	.....	364	.....	365
5,000	.....	.....	365	.....	.....	361	356	365	.....	366	.....	.....
7,000	.....	.....	.....	.....	.....	366	365	.....	.....	.....	.....	.....
Discharge (sec.-ft.):												
Mean	786	707	946	787	1,070	1,200	1,560	1,380	1,260	1,160	943	820
Maximum	2,800	2,830	4,800	2,450	2,670	5,400	5,920	4,450	2,520	4,020	2,910	3,080
Minimum	300	250	350	300	400	300	400	500	735	460	320	420

Days of deficiency in discharge of Fox River at Berlin, Wis., for the years ending Sept. 30, 1899–1920—Continued.

Discharge in second-feet.	Days of deficient discharge.										Oct. 1, 1898 to Sept. 30, 1920.	
	1910–11	1911–12	1912–13	1913–14	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	Days.	Per cent of time.
250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
275	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	0.05
300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	.1
325	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91	1.1
350	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	101	1.3
375	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	176	2.2
400	17	.....	.....	.....	3	.....	.....	.....	.....	.....	224	2.8
450	50	.....	.....	13	43	.....	.....	.....	.....	.....	464	5.8
500	65	.....	5	47	63	.....	.....	3	.....	.....	740	9.2
550	82	.....	30	70	80	.....	3	10	.....	.....	1,094	13.6
600	137	.....	33	83	85	7	61	15	4	13	1,493	18.6
650	190	15	54	95	91	20	70	55	61	48	2,142	26.7
700	201	35	59	101	91	31	72	76	87	81	2,451	30.5
750	220	69	77	124	122	51	75	109	105	124	3,047	37.9
800	230	73	108	133	132	61	76	134	108	130	3,294	41.0
900	252	106	159	170	185	89	92	182	152	160	4,063	50.6
1,000	285	137	181	223	226	152	124	219	201	201	4,802	59.8
1,200	317	175	236	322	262	189	177	235	268	253	5,738	71.4
1,400	324	208	264	346	280	217	201	249	283	283	6,172	76.8
1,700	331	258	284	352	301	248	232	275	320	317	6,670	83.0
2,000	339	287	301	355	310	277	277	298	345	323	7,051	87.8
2,500	356	322	318	359	340	323	321	319	359	336	7,495	93.3
3,000	365	347	330	365	364	347	344	332	365	341	7,749	96.4
4,000	.....	364	356	.....	365	354	350	350	.....	351	7,894	98.2
5,000	.....	366	365	.....	.....	358	355	356	.....	364	7,992	99.5
7,000	.....	.....	.....	.....	.....	366	365	365	.....	366	8,035	100.0
Discharge (sec.-ft.):												
Mean	842	1,450	1,350	915	1,090	1,520	1,540	1,370	1,090	1,230	.....	.....
Maximum	2,600	4,100	4,340	2,750	3,000	6,400	5,650	6,050	2,670	5,150	.....	.....
Minimum	380	600	450	400	350	550	525	480	560	550	.....	.....

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

LOCATION.—At Rapide Croche dam, in sec. 4, T. 21 N., R. 19 E., Outagamie County, 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, 1920. Daily-discharge records for this station, 1896–1914, published by the Wisconsin Railroad Commission in "Water-power report to the Legislature, 1915," have since been found to be considerably in error and should not be used. See "Determination of discharge."

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 Army engineers to aid navigation, is made of timber and is equipped with 4 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., 12 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. See Water-Supply Paper 454 for determination of error which existed in the records published in the report of the Wisconsin Railroad Commission.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during the year ending September 30, 1919, 13,100 second-feet, April 18; minimum mean daily discharge 1,250 second-feet, October 20.

Maximum mean daily discharge during the year ending September 30, 1920, 16,600 second-feet, April 10; minimum mean daily discharge, 1,320 second-feet, September 6.

1918–1920: Maximum mean daily discharge, 16,600 second-feet, April 10, 1920; minimum mean daily discharge, 1,250 second-feet, October 20, 1918. Information relative to daily maximum and minimum 1896–1917 may be obtained from the U. S. 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.—The accuracy of the method used to determine the records of daily flow was checked by a current-meter measurement made by W. G. Hoyt July 30, 1919, and based on the results of the measurement the records are believed good for the period.

COOPERATION.—The records were collected and computations of daily discharge made by the U. S. Army engineers based on curves which were developed by current-meter measurements made by engineers of the United States Geological Survey.

The following discharge measurement was made by W. G. Hoyt:

July 30, 1919: Upper gage, 9.10 feet (lower gage, 7.80 feet); discharge, 3,830 second-feet.

Daily discharge, in second-feet, of Fox River at Rapide Croche dam, near Wrightstown, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1,910	2,880	3,190	4,640	4,660	4,390	8,580	9,070	4,040	5,330	3,570	2,160
2	2,010	2,710	3,970	4,500	3,830	3,580	7,830	8,130	4,870	5,300	3,650	4,260
3	1,870	2,800	4,070	4,550	4,860	4,690	5,730	5,720	5,530	5,300	2,650	4,530
4	1,930	3,040	4,090	4,470	4,860	4,710	5,580	4,500	5,710	3,770	2,900	4,380
5	2,030	3,440	4,380	3,440	4,900	4,720	5,660	5,170	5,710	3,120	3,880	4,580
6	1,380	3,520	4,200	4,250	5,380	4,630	4,460	5,760	5,580	2,930	3,840	4,460
7	1,540	3,410	4,250	4,270	4,730	4,600	4,950	6,350	5,480	4,050	3,830	3,250
8	2,030	3,460	3,500	4,460	4,600	4,550	6,360	6,320	4,360	5,090	3,410	2,670
9	2,080	2,560	4,220	4,500	3,970	3,700	8,340	8,150	4,820	5,270	3,430	4,370
10	2,030	3,520	4,490	4,530	4,820	4,450	8,760	8,260	5,540	5,010	2,500	4,560
11	1,990	2,980	4,510	4,360	4,910	4,520	8,700	9,700	5,650	4,780	2,760	4,480
12	1,920	3,850	4,390	3,460	4,720	4,340	8,240	10,500	5,840	4,840	3,580	4,440
13	1,350	4,180	4,570	4,730	4,870	4,380	7,330	10,400	5,840	3,480	3,770	4,410
14	1,540	4,060	4,590	4,710	4,800	4,470	7,990	10,200	5,700	4,050	3,740	3,310
15	1,880	4,210	3,410	4,500	4,760	4,580	8,480	8,360	4,460	4,810	4,080	2,690
16	1,910	4,180	4,020	4,600	3,900	4,980	10,400	8,010	4,840	4,910	4,300	3,200
17	1,880	3,430	4,260	4,540	4,600	5,120	12,600	7,320	5,500	4,800	3,350	3,220
18	1,920	4,120	4,290	4,210	5,030	4,790	13,100	7,170	5,300	4,700	2,970	3,280
19	1,860	4,370	4,480	3,620	4,830	4,830	12,900	7,480	5,010	4,560	4,280	2,840
20	1,250	4,040	4,720	4,780	4,820	4,850	12,600	6,720	5,440	3,180	4,520	2,700
21	1,440	4,290	4,430	4,900	4,740	4,330	12,700	7,120	5,400	3,430	4,430	2,130
22	1,840	4,380	3,500	4,750	4,510	4,400	12,600	7,760	4,640	4,220	4,350	1,890
23	1,940	4,200	4,430	4,760	3,600	4,090	12,100	7,980	4,920	4,530	4,580	2,580
24	1,960	3,350	2,100	4,770	4,440	5,100	11,500	7,820	5,350	4,380	3,320	2,570
25	1,880	3,980	2,590	4,520	4,310	5,240	12,300	6,330	5,500	4,330	2,880	2,620
26	1,800	4,170	4,180	3,590	3,960	5,240	12,300	6,310	5,560	4,220	4,560	2,730
27	1,560	4,250	4,160	4,620	4,680	5,120	11,900	5,740	5,430	3,150	4,700	2,760
28	2,100	3,810	4,160	4,620	4,560	6,980	12,100	5,540	5,220	2,740	4,710	2,020
29	2,060	4,610	3,840	4,460	.....	7,370	12,100	5,600	4,400	4,490	4,770	1,730
30	1,960	4,400	4,570	4,750	.....	6,370	11,600	5,490	3,550	3,900	4,780	2,590
31	2,060	.....	4,840	4,850	.....	6,650	.....	5,160	.....	3,920	3,280	.....

Daily discharge, in second-feet, of Fox River at Rapide Croche dam, near Wrightstown, Wis., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	2,660	4,180	4,600	4,730	4,260	4,970	13,000	8,460	5,130	4,440	3,520	2,400
2	2,650	3,010	5,090	4,250	4,850	5,530	14,400	7,480	5,160	4,440	2,870	2,480
3	2,650	3,980	4,900	5,090	4,930	5,480	14,800	7,610	5,090	4,400	3,770	2,560
4	2,720	4,620	5,200	4,320	4,530	5,460	14,600	8,160	5,080	3,550	3,650	2,500
5	2,160	4,570	5,380	4,640	4,540	5,330	14,700	8,160	5,050	2,720	3,450	1,880
6	2,260	4,680	5,360	5,340	5,340	5,380	16,100	8,070	4,130	3,360	3,460	1,320
7	2,820	4,660	4,640	5,180	4,950	4,980	16,100	7,940	4,340	4,740	3,330	2,030
8	3,050	4,600	4,630	5,260	4,090	4,820	15,200	7,720	4,750	5,080	2,380	2,660
9	3,530	3,880	5,260	5,150	4,940	5,440	16,500	6,960	4,760	5,100	2,120	2,600
10	3,530	4,810	5,170	5,040	4,980	5,390	16,600	7,140	4,790	5,080	2,530	2,610
11	3,600	4,870	5,250	4,140	4,800	5,170	16,000	7,340	4,750	4,080	2,330	2,600
12	2,320	4,810	5,210	4,360	4,840	5,160	15,100	7,140	4,700	3,730	2,600	2,080
13	2,630	5,080	5,250	4,880	4,770	5,090	15,500	6,690	3,620	4,900	2,490	1,690
14	3,510	5,090	4,190	4,400	4,620	4,540	15,700	6,930	4,460	4,940	2,620	2,580
15	3,420	5,220	4,000	5,310	3,400	6,600	15,500	7,170	4,840	4,930	2,020	2,800
16	3,450	4,810	5,000	5,250	4,520	6,690	14,900	5,870	4,870	4,780	1,960	2,490
17	3,430	3,930	5,290	5,150	5,150	5,630	14,300	5,660	4,640	4,870	2,710	2,380
18	3,460	5,170	5,420	4,050	4,810	6,530	12,900	5,840	4,520	3,630	2,680	2,420
19	2,510	5,360	5,460	3,910	4,810	6,230	12,300	5,620	4,620	3,480	2,520	1,760
20	2,580	5,630	5,420	5,440	4,930	5,480	11,600	5,350	3,700	4,690	2,580	1,900
21	3,970	5,620	4,500	5,340	4,900	3,500	11,300	5,250	4,160	4,730	2,460	2,670
22	3,960	5,510	4,960	5,130	4,190	5,170	11,400	5,110	4,760	4,760	1,710	2,780
23	3,980	4,420	5,270	5,080	4,350	7,480	11,300	4,300	4,370	4,620	1,840	2,700
24	4,010	4,300	5,000	5,090	4,870	6,970	9,920	4,560	4,280	4,530	2,610	2,720
25	3,980	5,150	4,090	4,010	4,670	7,120	7,820	5,290	4,260	3,540	2,600	2,580
26	2,620	4,640	5,070	4,380	4,780	8,510	7,850	5,460	4,260	3,400	2,480	1,890
27	2,670	4,700	5,310	5,310	4,860	8,760	7,960	5,280	3,650	4,580	2,560	2,110
28	4,030	5,140	4,180	5,130	5,430	8,340	8,060	5,300	3,910	4,670	2,350	2,670
29	4,100	5,640	4,740	5,110	4,660	9,240	8,610	5,310	4,500	4,610	1,820	2,140
30	4,090	4,700	5,030	5,080	.....	12,100	8,590	4,260	4,440	4,580	2,080	2,420
31	4,360	.....	5,000	5,020	.....	12,500	.....	4,440	.....	4,460	2,680	.....

Monthly discharge of Fox River at Rapide Croche dam, near Wrightstown, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 6,150 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	2,100	1,250	1,840	0.299	0.34
November	4,610	2,560	3,740	.608	.68
December	4,840	2,100	4,080	.663	.76
January	4,900	3,440	4,440	.722	.83
February	5,380	3,600	4,590	.746	.78
March	7,370	3,580	4,900	.797	.92
April	13,100	4,460	9,660	1.57	1.75
May	10,500	4,500	7,230	1.18	1.36
June	5,840	3,550	5,170	.841	.94
July	5,330	2,740	4,280	.696	.80
August	4,780	2,500	3,790	.616	.71
September	4,580	1,730	3,250	.528	.59
The year	13,100	1,250	4,740	.771	10.46
1919–20.					
October	4,360	2,160	3,250	.528	.61
November	5,640	3,010	4,760	.774	.86
December	5,460	4,000	4,960	.807	.93
January	5,440	3,910	4,860	.790	.91
February	5,430	3,400	4,720	.767	.83
March	12,500	3,500	6,440	1.05	1.21
April	16,600	7,820	13,000	2.11	2.35
May	8,460	4,260	6,320	1.03	1.19
June	5,160	3,620	4,520	.735	.82
July	5,100	2,720	4,370	.711	.82
August	3,770	1,710	2,610	.424	.49
September	2,800	1,320	2,350	.382	.43
The year	16,600	1,320	5,170	.841	11.45

NOTE.—Monthly discharge computed by engineers of United States Geological Survey.

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, 1920.

GAGE.—Chain gage fastened to downstream side of new 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 Jerome M. Beauprey and 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 the year ending September 30, 1919, 4.5 feet at 8 a. m., April 12 and 4 p. m., April 15 (discharge, about 2,400 second-feet); minimum discharge, estimated because of ice, 480 second-feet February 10.

Maximum discharge recorded during the year ending September 30, 1920, 2,550 second-feet 6.15 a. m., April 2; minimum discharge, estimated because of ice, 510 second-feet February 13–17.

1907–1909 and 1911–1920: 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 changed during spring and summer of 1919; practically permanent after July 10, 1919. Rating curve well defined between 380 and 1,920 second-feet; above and below these limits curve is extended, and 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; shifting-control method used March 27 to July 10, 1919. Open-water records October 1, 1918, to July 31, 1919, fair; August 1, 1919, to September 30, 1920, good. Winter records roughly approximate.

Discharge measurements of Wolf River at Keshena, Wis., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 16	S. B. Soulé	[a] 4.2	733	Jan. 20	S. B. Soulé	[a] 4.00	571
Feb. 15	do	[a] 2.92	550	Feb. 15	do	[a] 3.61	511
Mar. 11	do	[a] 2.97	532	Mar. 9	do	[a] 3.42	558
May 20	W. G. Hoyt	2.24	977	Apr. 28	W. G. Hoyt	3.35	1,490
20	do	2.24	971	June 17	S. B. Soulé	3.99	1,900
June 6	S. B. Soulé	2.58	1,090				
July 29	W. G. Hoyt	2.76	1,140				
Sept. 13	S. B. Soulé	1.52	573				
Dec. 14	do	[a] 5.83	607				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Wolf River at Keshena, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	630	901	760	715	695	495	1,220	1,220	853	901	1,050	630
2	715	853	760	710	670	495	1,220	1,160	1,000	950	901	630
3	672	901	805	700	650	495	1,280	1,160	1,110	1,050	901	715
4	806	950	853	695	630	495	1,280	1,340	1,110	1,000	901	853
5	760	853	950	695	590	495	1,220	1,400	1,050	1,000	1,050	715
6	672	1,050	1,000	695	550	500	1,280	1,340	1,050	853	1,050	630
7	672	853	853	700	515	505	1,340	1,220	1,160	715	1,000	630
8	552	1,050	853	700	495	510	1,990	1,110	1,160	806	853	630
9	630	1,000	1,000	705	495	515	2,260	1,160	1,220	901	853	590
10	715	853	760	710	480	525	2,190	1,160	1,050	853	760	630
11	672	853	1,220	715	495	535	1,720	1,000	1,340	806	760	672
12	715	950	950	720	495	550	2,330	1,110	1,160	806	672	590
13	630	853	901	725	515	560	1,990	1,110	1,110	806	760	552
14	590	853	851	730	535	580	2,120	1,050	1,050	853	806	552
15	590	901	950	730	550	590	2,330	950	1,000	901	715	552
16	630	672	901	735	570	715	2,190	1,160	1,000	853	715	590
17	515	950	1,000	735	590	1,000	1,920	1,220	853	715	672	552
18	515	853	950	735	590	1,160	1,850	1,280	853	715	715	552
19	590	853	806	735	610	1,280	1,790	1,160	950	672	672	590
20	552	806	760	735	610	1,340	1,790	1,110	1,050	630	715	630
21	590	785	740	735	610	1,430	1,660	1,000	1,160	630	715	672
22	590	785	715	735	610	1,490	1,400	1,050	1,000	630	760	672
23	672	785	715	735	590	1,490	1,220	1,220	901	630	760	630
24	630	785	715	735	570	1,400	1,220	1,110	1,110	630	715	630
25	590	785	715	735	550	1,370	1,280	1,000	1,530	672	672	630
26	590	785	715	730	540	1,340	1,280	1,050	1,790	1,000	630	590
27	630	785	715	730	525	1,530	1,220	950	1,530	1,220	590	590
28	1,400	785	715	725	515	1,790	1,050	950	1,280	1,220	590	590
29	1,590	785	715	720	.....	1,530	1,110	760	1,160	1,160	590	590
30	1,340	785	715	715	.....	1,530	1,110	760	1,110	1,160	630	630
31	1,000	.....	715	715	.....	1,660	.....	853	.....	1,110	630	.....
1919–20.												
1	672	1,660	610	590	535	535	2,400	950	806	1,000	630	715
2	672	1,590	610	590	535	535	2,470	1,000	853	1,000	590	672
3	853	1,400	610	570	515	535	2,330	1,050	806	950	590	630
4	1,110	1,340	610	570	515	550	1,990	1,050	760	901	552	590
5	1,000	1,340	610	570	515	550	1,850	1,050	760	901	552	590
6	853	1,220	610	570	515	550	1,720	950	715	950	552	552
7	760	1,220	610	570	515	550	1,590	853	760	950	590	590
8	715	1,160	610	570	515	550	1,530	901	853	950	630	515
9	672	1,110	610	570	515	560	1,400	901	806	901	630	515
10	715	1,340	610	570	515	570	1,400	950	760	853	715	552
11	715	1,920	610	570	515	570	1,400	1,050	950	830	901	552
12	672	1,990	610	570	515	590	1,340	1,110	1,160	806	806	552
13	672	1,660	610	570	510	610	1,280	1,000	1,280	760	672	590
14	672	1,220	610	570	510	630	1,220	950	1,340	760	552	552
15	672	1,110	610	570	510	650	1,220	901	1,460	715	630	590
16	630	1,160	610	570	510	670	1,160	853	1,720	672	672	806
17	630	1,280	610	570	510	695	1,110	806	1,920	672	630	760
18	630	1,160	610	570	515	715	1,110	760	1,850	715	552	760
19	630	1,160	590	570	515	740	1,050	853	1,720	672	515	760
20	672	1,050	590	570	515	760	853	901	1,530	672	515	715
21	715	1,110	590	570	515	785	806	950	1,400	630	515	630
22	715	1,000	590	570	515	830	950	1,000	1,280	630	515	672
23	715	950	590	550	515	900	1,400	1,050	1,220	630	515	715
24	715	901	590	550	515	950	1,720	1,220	1,160	630	515	630
25	760	806	590	550	515	1,160	1,590	950	1,050	672	515	630
26	950	672	590	535	535	1,920	1,400	1,220	1,000	672	515	630
27	950	670	590	535	535	2,120	1,340	1,000	1,000	672	515	590
28	950	650	590	535	535	2,250	1,460	950	950	630	515	552
29	901	630	590	535	535	2,400	1,340	901	1,050	630	590	552
30	950	610	590	535	.....	2,330	1,110	853	1,050	672	806	590
31	1,460	.....	590	535	.....	2,400	.....	806	.....	630	760	.....

NOTE.—Stage-discharge relation affected by ice Nov. 21 to Dec. 3, 1918, Dec. 21, 1918, to Mar. 26, 1919, and Nov. 27, 1919, to Mar. 28, 1920. Discharge, July 11, 1920, interpolated; gage not read.

Monthly discharge of Wolf River at Keshena, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 840 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	1,590	515	724	0.862	0.99
November	1,050	672	855	1.02	1.14
December	1,220	715	831	.989	1.14
January	735	695	720	.857	.99
February	695	480	566	.674	.70
March	1,790	495	965	1.15	1.33
April	2,330	1,050	1,600	1.90	2.12
May	1,400	760	1,100	1.31	1.51
June	1,790	853	1,120	1.33	1.48
July	1,220	630	866	1.03	1.19
August	1,050	590	768	.914	1.05
September	853	552	624	.743	.83
The year	2,330	480	896	1.07	14.47
1919–20.					
October	1,460	630	787	.937	1.08
November	1,990	610	1,170	1.39	1.55
December	610	590	602	.717	.83
January	590	535	563	.670	.77
February	535	510	518	.617	.67
March	2,400	535	973	1.16	1.34
April	2,470	806	1,451	1.73	1.93
May	1,220	760	959	1.14	1.31
June	1,920	715	1,130	1.35	1.51
July	1,000	630	765	.911	1.05
August	901	515	605	.720	.83
September	806	515	625	.744	.83
The year	2,470	510	845	1.01	13.70

Days of deficiency in discharge of Wolf River at Keshena, Wis., for the years ending Sept. 30, 1908 and 1912–1920.

Discharge in second-feet.	Days of deficient discharge.									
	1907–8	1911–12	1912–13	1913–14	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20
200										
220										
240										
270										
300	2									
340	3							17		
380	32							40		
430	37	29			2	7		63		
480	74	60		33	10	43	9	92	2	
530	90	60		107	66	90	63	111	22	35
580	144	66	28	110	116	106	105	123	44	93
630	200	106	29	118	167	159	150	151	93	140
680	231	108	70	163	191	173	161	183	110	188
730	243	113	107	180	209	189	187	207	157	203
780	261	115	112	193	222	203	199	234	190	219
830	273	134	140	209	240	217	216	247	199	241
890	278	137	162	245	276	225	232	265	222	243
960	287	143	204	277	301	239	246	292	246	275
1,060	309	187	232	302	330	258	278	318	276	295
1,260	334	232	301	338	358	290	329	339	317	319
1,560	351	326	324	360	364	319	349	354	347	342
1,960	360	350	348	365	365	344	361	359	357	356
2,460	363	358	365			354	365	365	365	365
3,260	366	365				366				366
4,000										
Discharge (sec.-ft.):										
Mean	752	1,080	1,010	794	735	939	834	750	896	845
Maximum				1,920	1,600	3,370	2,260	2,330	2,330	2,470
Minimum					428	414	470	315	480	510

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, 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, 1920. Unpublished gage-heights, March 1, 1899, to September 30, 1912, are in the unpublished records of the office of the United States Army Engineers, Milwaukee, Wis.

GAGE.—Enameled steel 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 the United States Army Engineers; zero of gage is at an elevation of 748.874 feet above mean sea level, New York City datum.

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

CHANNEL AND CONTROL.—Sand, hardpan, and mud; not permanent; control not well defined. Both 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 the Wolf River below the gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year ending September 30, 1919, 8.7 feet April 14 and 15 (discharge, 6,350 second-feet); minimum discharge somewhat less than 980 second-feet in February.

Maximum stage recorded during the year ending September 30, 1920, 10.3 feet March 28 and 29 (discharge, 10,800 second-feet); minimum discharge, estimated because of ice, 780 second-feet January 29 to February 6.

1914–1920: Maximum stage 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 office reports a stage of 11.6 feet on April 16, 1888.

ICE.—Stage-discharge relation affected by ice.

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

ACCURACY.—Stage-discharge relation not permanent. Rating curves applicable during open-water periods October 1, 1918, to November 30, 1918, and March 18, 1919, to September 30, 1920, fairly well defined. Gage read once daily to tenths. 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 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 7	W. G. Hoyt	4.31	2,150	Sept. 12	S. B. Soulé	1.98	1,160
1919.				Dec. 17	do	[a] 3.97	1,340
Feb. 16	S. B. Soulé	[a] 2.95	985	1920.			
Mar. 12	do	[a] 4.59	1,340	Feb. 4	J. W. Harris	[a] 4.0	784
19	Roy S. Huffman	8.55	6,050	Mar. 10	S. B. Soulé	[a] 3.71	987
23	do	8.42	5,790	Apr. 29	W. G. Hoyt	6.49	3,460
May 18	W. G. Hoyt	6.19	3,220	June 17	S. B. Soulé	5.90	2,990
July 29	do	3.44	1,900				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Wolf River at New London, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1,030	2,140					3,760	3,040	1,950	2,940	2,440	1,140
2	1,030	2,140					3,590	2,990	1,950	2,940	2,550	1,220
3	990	2,140					3,430	2,940	1,950	2,820	2,600	1,180
4	990	2,190					3,430	2,940	2,190	2,660	2,720	1,140
5	1,030	2,140					3,360	2,940	2,290	2,290	2,940	1,100
6	1,030	2,140					3,290	2,940	2,550	2,190	3,100	1,180
7	1,030	2,140					3,290	3,360	2,600	2,000	3,220	1,180
8	1,070	2,140	1,270	1,020	1,020	1,280	3,670	3,590	2,720	1,820	3,220	1,300
9	1,070	2,040					3,940	3,940	2,720	1,720	3,220	1,260
10	1,070	1,940					4,480	4,030	2,770	1,640	3,160	1,260
11	1,030	1,840					5,050	4,130	2,820	1,599	2,990	1,220
12	1,030	1,760					5,760	4,130	2,990	1,500	2,770	1,180
13	1,030	1,660					6,150	4,030	3,160	1,540	2,500	1,180
14	1,030	1,620					6,350	3,940	3,160	1,590	2,240	1,180
15	990	1,580					6,350	3,670	3,160	1,720	2,040	1,140
16	990	1,440				3,100	5,950	3,430	3,160	1,640	1,950	1,060
17	990	1,440				3,850	5,950	3,220	3,160	1,590	1,860	1,100
18	990	1,580				5,390	5,760	3,220	3,100	1,590	1,860	1,100
19	990	1,710				5,570	5,570	3,100	2,990	1,460	1,720	1,100
20	990	1,760				5,950	5,390	2,940	2,770	1,460	1,680	1,260
21	1,030	1,840				6,150	5,050	2,770	2,500	1,380	1,680	1,340
22	990	1,890			980	6,150	4,750	2,720	2,340	1,300	1,720	1,380
23	990	1,840	1,270	1,060		5,760	4,610	2,550	2,240	1,220	1,680	1,460
24	990	1,760				5,210	4,360	2,550	2,240	1,140	1,680	1,540
25	990	1,710				5,210	4,030	2,600	2,190	1,140	1,590	1,460
26	990	1,530				4,900	3,760	2,550	2,390	1,140	1,500	1,340
27	1,070	1,400				4,610	3,510	2,500	2,600	1,260	1,500	1,220
28	1,350	1,310				4,480	3,430	2,440	2,770	1,500	1,340	1,220
29	1,580	1,310			.....	4,130	3,290	2,340	2,820	1,770	1,260	1,260
30	1,890	1,310			.....	3,940	3,100	2,190	2,940	1,950	1,180	1,220
31	2,040	.....			.....	3,850	.....	2,040	.....	2,290	1,180	.....
1919–20.												
1	1,220	2,500	1,860	1,100	780	900	9,590	3,360	1,860	2,290	1,100	1,220
2	1,300	2,660	1,680	1,060	780	900	9,280	3,290	1,860	2,290	1,030	1,340
3	1,380	2,880	1,640	1,060	780	900	8,680	3,220	1,720	2,190	995	1,300
4	1,380	2,990	1,590	1,060	780	900	8,080	3,100	1,640	2,000	995	1,140
5	1,380	3,100	1,590	1,060	780	930	7,780	2,940	1,640	1,900	930	1,100
6	1,500	3,100	1,540	1,060	780	930	7,240	2,820	1,640	1,860	930	1,100
7	1,590	3,100	1,500	1,060	810	930	6,350	2,660	1,590	2,040	995	1,030
8	1,640	3,220	1,500	1,030	840	960	5,950	2,390	1,590	2,190	995	1,030
9	1,540	3,290	1,460	1,030	840	960	5,570	2,240	1,590	2,290	1,060	1,030
10	1,590	3,290	1,460	1,030	840	995	5,210	2,190	1,500	2,440	1,100	1,030
11	1,500	3,290	1,460	995	840	995	4,900	2,190	1,500	2,440	1,100	955
12	1,380	3,510	1,420	995	840	1,060	4,360	2,390	2,440	2,500	1,100	995
13	1,420	3,430	1,420	960	840	1,140	4,240	2,440	2,660	2,390	1,220	960
14	1,460	3,360	1,380	960	840	1,300	3,850	2,550	2,820	2,290	1,260	930
15	1,380	3,220	1,380	930	840	1,500	3,670	2,600	2,990	2,240	1,180	930
16	1,380	3,100	1,340	930	870	1,950	3,590	2,600	3,040	2,040	1,140	995
17	1,340	3,100	1,340	900	870	2,140	3,360	2,550	3,040	1,900	1,030	1,030
18	1,300	3,430	1,340	900	870	2,390	3,290	2,390	3,100	1,770	960	1,100
19	1,260	3,430	1,300	900	870	2,600	3,160	2,290	3,100	1,680	995	1,100
20	1,260	3,160	1,300	870	870	2,770	3,100	2,240	3,100	1,500	1,030	1,100
21	1,260	2,940	1,260	870	870	2,880	2,990	2,240	3,040	1,380	960	1,180
22	1,300	2,880	1,260	870	870	3,040	2,940	2,190	2,940	1,340	930	1,100
23	1,300	2,770	1,260	840	900	4,900	3,040	2,190	2,920	1,300	900	1,100
24	1,300	2,720	1,220	840	900	6,350	3,160	2,240	2,920	1,260	900	1,140
25	1,300	2,600	1,220	840	900	7,240	3,290	2,290	2,920	1,260	900	1,060
26	1,380	2,440	1,220	810	900	9,590	3,290	2,340	2,920	1,220	900	1,100
27	1,460	2,290	1,130	810	900	10,500	3,360	2,340	2,920	1,140	900	1,030
28	1,500	2,190	1,180	810	900	10,800	3,430	2,290	2,990	1,180	900	960
29	1,590	2,090	1,140	780	900	10,800	3,430	2,190	2,920	1,180	900	930
30	1,770	2,000	1,140	780	.....	10,500	3,430	2,190	2,880	1,180	1,030	900
31	2,190	.....	1,100	780	.....	10,200	.....	2,090	.....	1,140	1,100	.....

NOTE.—Stage-discharge relation affected by ice Dec. 1, 1918, to Mar. 17, 1919, and Nov. 28, 1919, to Mar. 22, 1920. Braced figures show mean discharge for periods indicated.

Monthly discharge of Wolf River at New London, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 2,240 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	2,040	990	1,110	0.496	0.57
November	2,190	1,310	1,780	.795	.89
December	.....	.....	1,270	.567	.65
January	.....	.....	1,040	.464	.53
February	.....	.....	1,000	.446	.46
March	6,150	.....	3,140	1.40	1.61
April	6,350	3,100	4,480	2.00	2.23
May	4,130	2,040	3,090	1.38	1.59
June	3,160	1,950	2,640	1.18	1.32
July	2,940	1,140	1,770	.790	.91
August	3,220	1,180	2,160	.964	1.11
September	1,540	1,060	1,230	.549	.61
The year	6,350	.....	2,060	.920	12.48
1919–20.					
October	2,190	1,220	1,440	.643	.74
November	3,510	2,000	2,940	1.31	1.46
December	1,860	1,100	1,380	.616	.71
January	1,100	780	933	.417	.48
February	900	780	848	.379	.41
March	10,800	900	3,680	1.64	1.89
April	9,590	2,940	4,790	2.14	2.39
May	3,360	2,090	2,490	1.11	1.28
June	3,100	1,500	2,460	1.10	1.23
July	2,500	1,140	1,800	.804	.93
August	1,260	900	1,020	.455	.52
September	1,340	900	1,070	.478	.53
The year	10,800	780	2,070	.924	12.57

Days of deficiency in discharge of Wolf River at New London, Wis., for the years ending Sept. 30, 1914–1920.

Discharge in second-feet.	Days of deficient discharge.								
	1913–14	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	Oct. 1, 1913, to Sept. 30, 1920.	
								Days.	Per cent of time.
800	.....	10	.....	.....	77	.....	9	96	3.8
825	28	30	4	.....	88	.....	13	163	6.4
850	28	30	34	5	89	.....	24	210	8.2
875	28	55	48	23	91	.....	34	279	10.9
900	28	55	49	23	95	.....	34	284	11.1
950	28	58	56	46	105	.....	67	360	14.1
1,000	59	61	64	60	114	26	87	471	18.4
1,100	66	75	95	99	146	91	109	681	26.6
1,200	78	80	108	130	190	105	139	830	32.5
1,300	112	112	129	147	206	165	159	1,030	40.3
1,400	127	139	169	162	229	175	182	1,183	46.3
1,500	140	171	190	172	243	185	190	1,291	50.5
1,600	169	196	198	188	251	196	209	1,407	55.0
1,700	189	216	208	194	257	204	216	1,484	58.0
1,800	203	243	218	200	261	214	219	1,558	60.9
1,900	219	253	226	206	265	222	223	1,614	63.1
2,000	230	258	228	212	268	229	226	1,651	64.6
2,200	262	269	237	226	283	245	243	1,765	69.0
2,500	293	294	244	251	300	259	267	1,908	74.6
2,900	320	324	268	281	312	281	288	2,074	81.1
3,400	345	345	283	311	323	316	334	2,157	84.4
4,000	354	362	313	334	331	333	344	2,371	92.7
5,000	357	365	331	349	339	346	348	2,445	95.6
7,000	360	.....	350	362	363	365	353	2,518	98.5
10,000	365	.....	366	365	365	.....	361	2,552	99.8
15,000	.....	.....	.....	.....	.....	.....	366	2,557	100.0
Discharge (sec.-ft.):									
Mean	1,900	1,780	2,360	2,120	1,790	2,060	2,070	.....	.....
Maximum	8,490	4,260	8,960	8,060	7,270	6,350	10,800	.....	.....
Minimum	.....	[a] 755	815	840	700	[a] 980	780	.....	.....

[a] Estimated.

EMBARRASS RIVER NEAR EMBARRASS WIS.

LOCATION.—At highway bridge at line between T. 26 N., R. 14 E., and T. 26 N., R. 15 E., Shawano County, 1 mile downstream from mouth of Mill Creek, coming in from left, and 4 miles upstream from Embarrass.

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, 1920.

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 the 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 period of records 7.65 feet at 4 p. m. March 27, 1920 (discharge, 2,760 second-feet); minimum stage recorded 2.52 feet at 7.05 a. m. August 2, 1920 (discharge, 52 second-feet).

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

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

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined between 140 and 2,800 second-feet. Gage read twice daily to hundredths. Daily discharge ascertained by applying the mean daily gage height to the rating table except during period when stage-discharge relation was affected by ice for which it was obtained by applying to the 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
May 19	W. G. Hoyt	3.50	393	Jan. 21	S. B. Soulé	[a] 4.14	180
June 5	S. B. Soulé	3.98	580	Feb. 18	do	[a] 3.70	164
July 29	W. G. Hoyt	3.94	556	Mar. 26	do	7.60	2,730
Aug. 27	S. B. Soulé	2.98	162	Apr. 28	W. G. Hoyt	4.05	630
27	do	3.00	168	June 17	S. B. Soulé	4.02	601
Sept. 13	do	3.03	182				
13	do	2.99	172				
Dec. 16	do	[a] 3.78	188				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Embarrass River near Embarrass, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	June.	July.	Aug.	Sept.	Day—	June.	July.	Aug.	Sept.
1919.					1919.				
1	.....	333	1,060	146	16	550	239	266	173
2	.....	262	1,010	173	17	455	210	258	155
3	.....	262	824	152	18	364	190	295	137
4	.....	239	772	158	19	364	177	243	164
5	598	225	747	167	20	386	170	251	190
6	550	228	850	193	21	386	155	320	221
7	578	225	955	239	22	329	149	225	262
8	550	214	824	200	23	274	140	258	291
9	550	196	578	183	24	502	135	221	274
10	598	186	409	170	25	1,010	143	196	247
11	902	180	338	177	26	1,480	207	170	221
12	1,060	190	286	161	27	955	550	173	193
13	1,060	170	295	164	28	955	647	158	190
14	902	200	312	161	29	672	550	161	190
15	747	266	286	167	30	432	578	167	200
					31	.....	798	193	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	221	955	245	170	135	175	1,300	364	247	312	81	170
2	232	1,180	240	155	125	175	1,420	364	221	200	70	161
3	232	1,120	240	155	145	185	1,240	360	203	193	109	155
4	232	1,010	235	155	155	205	1,240	333	210	196	112	143
5	221	850	230	155	160	210	1,010	324	293	196	112	146
6	228	772	225	155	150	260	850	333	203	196	135	132
7	239	722	220	165	165	260	747	316	214	269	152	137
8	282	550	215	170	170	260	598	320	255	320	127	146
9	324	478	210	170	185	225	455	299	270	409	127	155
10	270	747	205	165	155	250	526	316	235	355	140	143
11	258	1,060	200	165	155	260	502	455	409	225	130	122
12	316	1,300	195	185	155	270	478	672	550	239	119	143
13	312	1,300	190	185	160	280	478	598	578	193	135	143
14	270	1,010	185	165	170	300	455	578	526	155	138	146
15	247	747	185	155	170	310	478	455	432	170	135	149
16	239	647	190	150	180	320	455	299	622	173	112	177
17	228	622	210	140	180	340	432	351	622	164	117	190
18	221	502	200	165	165	365	432	409	550	140	114	177
19	210	432	185	170	165	410	386	386	550	130	107	180
20	203	364	200	180	175	455	364	386	364	146	124	190
21	239	386	200	180	175	500	432	386	282	167	130	215
22	364	364	220	170	195	578	478	386	255	167	117	210
23	251	409	210	180	195	747	672	386	258	117	109	170
24	247	364	200	170	195	1,060	850	502	295	149	104	161
25	255	364	195	140	185	1,720	902	455	259	140	124	164
26	278	299	210	155	185	2,450	824	409	193	135	97	158
27	278	262	185	145	175	2,730	697	360	193	135	90	143
28	320	250	175	140	175	2,320	622	324	193	140	137	152
29	190	245	165	140	175	2,200	578	291	248	137	152	149
30	214	245	175	135	.....	1,960	526	258	427	105	170	149
31	798	.....	180	150	.....	1,660	.....	239	.....	83	190	.....

NOTE.—Stage-discharge relation affected by ice Nov. 28 to Mar. 21.

Monthly discharge of Embarrass River near Embarrass, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919.					
June 5-30	1,480	274	662	1.68	1.62
July	798	135	271	.686	.79
August	1,060	158	423	1.07	1.23
September	291	137	191	.484	.54
1919-20.					
October	798	190	272	.689	.79
November	1,300	245	652	1.66	1.85
December	245	165	204	.516	.59
January	185	135	161	.408	.47
February	195	125	168	.425	.46
March	2,730	175	756	1.91	2.20
April	1,420	364	681	1.72	1.92
May	672	239	384	.972	1.12
June	622	193	335	.848	.95
July	409	83	188	.476	.55
August	190	70	123	.311	.36
September	215	122	159	.402	.45
The year	2,730	70	340	.861	11.71

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 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—January 13, 1914, to September 30, 1920.

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 chain gage or by wading.

CHANNEL AND CONTROL.—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 ending September 30, 1919, 5.8 feet at 5.30 p. m. March 16 (discharge, estimated because of ice, about 3,000 second-feet); minimum discharge, about 150 second-feet February 5.

Maximum discharge recorded during the year ending September 30, 1920, 3,950 second feet, at 1.30 p. m. March 26; minimum stage recorded 1.27 feet at 8 a. m. and 6 p. m. July 31 (discharge, 198 second-feet).

1914-1920: Maximum stage recorded 7.5 feet at 7.15 p. m. June 7, 1914 (discharge, 5,350 second-feet); minimum discharge approximately 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; and no diurnal fluctuation has been observed at the gage.

ACCURACY.—Stage-discharge relation fairly permanent throughout the period. Rating curve well defined below 3,200 second-feet. Gage read twice daily to quarter-tenths. 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. During winter, chain gage is read; no definite relation between the readings on the two gages. Open-water records good. Winter records fair.

Discharge measurements of Little Wolf River at Royalton, Wis., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 17	S. B. Soulé	[a] [b] 1.83	238	Feb. 5	J. W. Harris	[a] 2.38	240
Feb. 16	do	[a] [b] 1.82	275	Mar. 10	S. B. Soulé	[a] 2.78	272
Mar. 12	do	[a] [b] 2.63	554	Apr. 29	W. G. Hoyt	2.41	696
19	Roy S. Huffman	[b] [c] 3.72	1,680	June 18	S. B. Soulé	2.48	735
May 17	W. G. Hoyt	2.42	728				
Dec. 17	S. G. Soulé	[a] 2.09	258				

[a] Stage-discharge relation affected by ice.
[b] Reading of chain gage.
[c] Reading of slope gage approximately 3.69 feet.

Daily discharge, in second-feet, of Little Wolf River at Royalton, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	196	560	390	300	250	235	650	590	530	770	740	273
2	213	472	390	275	235	170	710	590	560	740	770	301
3	254	472	390	260	205	205	740	650	530	620	710	305
4	260	620	390	245	215	195	770	800	560	472	865	323
5	221	560	390	235	150	185	444	680	900	472	1,300	310
6	230	530	390	235	175	205	900	830	900	444	1,300	297
7	215	501	390	235	165	195	1,050	1,570	900	260	1,300	314
8	234	450	390	225	175	185	1,210	1,670	900	243	1,210	352
9	243	434	451	225	175	245	1,390	1,480	830	352	1,010	361
10	221	376	590	225	170	310	1,570	1,050	935	428	800	428
11	225	371	640	225	180	330	1,480	830	1,130	342	620	371
12	230	361	590	225	185	560	1,300	680	1,480	361	560	328
13	221	328	640	225	205	770	1,130	560	1,300	376	501	305
14	234	297	590	260	240	1,210	970	590	1,210	444	501	310
15	234	323	519	275	270	1,300	770	620	1,050	501	590	297
16	219	361	542	260	275	2,620	770	680	900	444	560	267
17	221	450	542	240	335	2,290	935	680	830	352	620	280
18	243	450	519	235	310	1,970	970	590	620	361	530	273
19	248	590	496	245	335	1,680	900	590	501	314	314	314
20	243	530	442	240	240	1,380	970	560	501	260	342	412
21	221	501	390	300	255	1,220	1,050	560	530	251	560	472
22	219	434	380	280	315	1,010	830	402	530	264	402	530
23	221	501	370	265	260	1,050	710	444	560	267	444	620
24	217	530	370	250	320	1,050	590	530	530	254	412	590
25	227	590	370	270	310	1,050	501	620	680	243	342	501
26	243	530	370	270	275	1,050	590	560	970	280	314	310
27	314	472	370	255	320	1,210	501	560	1,210	260	352	297
28	620	450	370	235	260	970	560	530	1,210	267	342	342
29	740	390	350	220	.....	770	501	428	1,050	264	347	392
30	710	390	330	275	.....	590	530	314	865	501	342	392
31	740	.....	320	300	.....	620	.....	412	.....	740	260	.....

Daily discharge, in second-feet, of Little Wolf River at Royalton, Wis., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	412	1,300	295	340	245	205	1,770	620	342	560	201	501
2	444	1,300	295	320	260	210	1,670	620	328	530	207	444
3	428	1,300	275	320	260	220	1,480	590	342	501	221	466
4	530	1,210	275	260	275	230	1,300	560	314	456	213	456
5	392	1,130	265	275	240	240	1,210	590	297	444	213	392
6	501	1,010	260	275	275	245	970	560	243	590	221	361
7	428	935	260	260	260	250	935	530	342	680	213	305
8	392	590	255	275	245	260	865	472	314	710	213	267
9	412	710	250	260	320	270	770	501	328	710	213	238
10	456	1,050	245	265	260	270	710	530	412	740	248	234
11	392	1,300	250	295	260	275	710	830	970	740	260	251
12	392	1,300	255	245	245	295	770	830	1,210	710	472	238
13	530	1,130	260	235	225	320	740	830	1,300	620	297	234
14	450	900	260	225	235	365	680	770	1,300	530	284	243
15	376	900	260	260	235	415	650	770	1,090	466	227	260
16	392	770	260	245	225	590	590	740	970	412	201	314
17	284	710	260	260	245	770	530	590	830	297	213	297
18	342	466	260	275	225	970	501	530	740	297	238	267
19	342	560	275	260	235	1,130	530	530	680	273	243	260
20	392	590	340	260	225	1,300	501	560	530	273	260	260
21	392	560	295	275	245	1,480	560	560	530	267	234	260
22	402	530	340	295	225	1,670	800	530	472	267	297	260
23	342	560	320	260	215	1,970	900	590	444	267	273	260
24	361	466	340	295	225	2,620	800	620	444	273	273	238
25	361	428	365	320	235	3,220	800	560	444	243	273	243
26	466	390	320	275	235	3,950	800	620	428	234	284	243
27	392	365	390	275	225	3,460	865	590	392	217	273	243
28	361	340	400	260	225	2,980	865	560	412	213	314	260
29	402	320	390	245	215	2,400	710	444	466	221	392	238
30	530	320	445	260	.....	2,070	650	392	530	213	466	243
31	1,090	.....	415	275	.....	1,870	.....	361	.....	198	530	.....

NOTE.—Stage-discharge relation affected by ice Nov. 29 to Dec. 8, 1918, Dec. 21, 1918, to Mar. 18, 1919, and Nov. 26, 1919, to Mar. 25, 1920.

Monthly discharge of Little Wolf River at Royalton, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 485 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	740	196	293	0.604	0.70
November	620	297	461	.951	1.06
December	640	320	441	.909	1.05
January	300	220	252	.520	.60
February	335	150	243	.501	.52
March	2,620	170	865	1.78	2.05
April	1,570	444	866	1.79	2.00
May	1,670	314	698	1.44	1.66
June	1,480	501	840	1.73	1.93
July	770	243	392	.808	.93
August	1,300	260	621	1.28	1.48
September	620	267	362	.746	.83
The year	2,620	150	529	1.09	14.81
1919–20.					
October	1,090	284	432	.891	1.03
November	1,300	320	785	1.62	1.81
December	445	245	302	.623	.72
January	340	225	273	.563	.65
February	320	215	241	.497	.54
March	3,950	205	1,170	2.41	2.78
April	1,770	501	854	1.76	1.96
May	830	361	593	1.22	1.41
June	1,300	243	581	1.20	1.34
July	740	198	424	.874	1.01
August	530	201	273	.563	.65
September	501	234	293	.604	.67
The year	3,950	198	519	1.07	14.57

Days of deficiency in discharge of Little Wolf River at Royalton, Wis., for the years ending Sept. 30, 1914-1920.

[Drainage area, 485 square miles.]

Discharge in second-feet.	Days of deficient discharge.								
	[a] 1914	1914–15	1915–16	1916–17	1917–18	1918–19	1919–20	Jan. 13, 1914 to Sept. 30, 1920.	
								Days.	Per cent of time.
100	.....	.....	.....	.....	.....	.....	.....	.....	.....
110	.....	.....	.....	.....	.....	.....	.....	.....	.....
120	.....	.....	.....	.....	.....	.....	.....	.....	.....
130	.....	.....	2	1	.....	.....	.....	3	0.1
140	.....	.....	2	4	2	.....	.....	8	.4
150	.....	.....	2	11	8	1	.....	22	1.0
175	28	1	6	37	48	7	.....	99	4.5
200	36	27	15	61	80	14	1	198	9.0
225	53	67	57	77	111	38	21	371	16.9
250	85	117	92	103	150	67	69	498	22.7
275	104	163	111	118	192	98	124	806	36.8
300	116	201	151	141	203	108	153	957	43.7
350	144	230	204	182	234	144	180	1,174	53.6
400	165	257	224	214	248	177	204	1,324	60.4
450	184	280	238	241	261	198	226	1,444	65.9
500	194	309	249	265	271	206	240	1,540	70.3
600	214	333	281	287	292	267	284	1,744	79.6
700	227	343	291	306	307	286	294	1,827	83.4
1,000	244	357	332	340	331	326	333	2,013	91.8
1,500	253	365	339	355	348	358	354	2,119	96.7
2,000	255	.....	349	359	353	363	359	2,148	98.0
3,000	257	.....	362	361	365	365	363	2,181	99.3
4,000	259	.....	366	363	.....	.....	366	2,190	99.9
5,000	261	.....	.....	365	.....	.....	.....	2,192	100.0
6,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
Discharge (sec.-ft.):									
Mean	.....	361	550	482	455	529	519	.....	.....
Maximum	.....	1,220	3,690	4,560	2,740	2,620	3,950	.....	.....
Minimum	.....	[b] 153	130	130	132	150	198	.....	.....

[a] Jan. 13 to Sept. 30. [b] Estimated.

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, Wis. (Section and township given in Water-Supply Paper 474 are in error.)

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

RECORDS AVAILABLE.—October 18, 1917, to September 30, 1920; June 28, 1916, to October 18, 1917, records were obtained at a station near Weyauwega, about a 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 the year ending September 30, 1919, 5.6 feet March 17 (discharge, 2,600 second-feet); minimum discharge estimated because of ice, 135 second-feet February 4 and 5.

Maximum stage recorded during the year ending September 30, 1920, 3.65 feet March 26 (discharge, 1020 second-feet); minimum stage recorded 1.28 feet November 21 (discharge, 96 second-feet), probably due to regulation.

1916–1920: Maximum stage recorded, that of March 17, 1919; minimum stage, that of November 21, 1919.

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 used October 19, 1917, to Sept. 30, 1918, fairly well defined between 180 and 330 second-feet. Shifting-control method used October 1, 1918, to November 25, 1919. A shift occurred during 1920 and a curve parallel with the curve for 1919 was used from the beginning of the open-water period March 23, 1920, to September 30, 1920. For the periods during which the stage-discharge relation was affected by ice, discharge was determined by applying to rating curve the daily gage height corrected for ice effect by means of discharge measurements, observer's notes, and climatic data. Open-water records fair; winter records subject to considerable error.

Discharge measurements of Waupaca River near Waupaca, Wis., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 8	W. G. Hoyt	1.94	260	July 28	W. G. Hoyt	1.78	226
				Sept. 12	S. B. Soulé	1.84	231
1919.				Dec. 18	do	[a] 3.11	216
Jan. 18	S. B. Soulé	[a] 2.72	200				
Feb. 17	do	[a] 2.66	250	1920.			
Mar. 13	do	3.08	692	Feb. 6	J. W. Harris	[a] 3.45	234
19	R. S. Huffman	2.82	567	Mar. 11	S. B. Soulé	[a] 3.52	243
May 17	W. G. Hoyt	2.59	523	Apr. 30	W. G. Hoyt	1.97	284
18	do	2.22	380	June 18	S. B. Soulé	2.24	372
June 4	S. B. Soulé	2.07	318				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Waupaca River near Waupaca, Wis., for the years ending Sept. 30, 1918–1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.												
1	.....	225	180	145	165	210	296	296	382	242	178	196
2	.....	204	199	150	150	250	250	250	346	245	199	180
3	.....	222	178	200	155	365	265	262	312	233	209	188
4	.....	225	170	160	150	515	262	220	296	212	204	178
5	.....	220	160	145	135	680	259	214	280	245	186	153
6	.....	253	160	155	150	595	245	212	296	239	186	163
7	.....	217	145	145	155	555	265	231	296	231	186	170
8	.....	209	135	175	165	475	265	212	265	231	242	178
9	.....	217	135	175	175	295	250	236	296	196	259	163
10	.....	220	135	130	175	185	231	418	296	217	253	188
11	.....	204	135	175	180	330	217	475	280	217	231	233
12	.....	196	135	135	175	635	225	418	262	214	329	222
13	.....	206	135	175	190	855	225	346	242	209	329	212
14	.....	193	135	145	185	1,050	228	296	239	222	262	199
15	.....	199	135	165	155	1,050	259	265	239	199	236	201
16	.....	180	145	170	180	1,050	220	262	220	233	209	191
17	.....	188	145	170	175	950	201	248	225	220	225	206
18	.....	196	160	155	165	1,100	236	730	228	196	206	214
19	204	180	160	145	160	1,300	228	554	222	196	199	191
20	209	201	170	130	175	1,250	239	554	222	176	199	183
21	206	188	170	135	145	1,000	245	400	225	196	191	209
22	209	199	180	150	160	720	253	456	212	186	183	196
23	217	193	175	105	135	595	265	437	220	196	186	180
24	220	183	180	150	155	475	233	364	212	204	188	204
25	212	183	130	165	160	400	228	960	225	217	193	180
26	214	178	130	160	170	364	206	840	217	228	196	163
27	253	204	140	130	175	346	225	900	228	209	180	163
28	296	196	160	165	185	296	236	636	228	196	151	168
29	265	193	145	125	.....	312	364	494	222	222	280	173
30	253	173	145	170	.....	312	329	456	212	231	228	151
31	296	.....	160	155	.....	296	.....	382	.....	204	220	.....
1918–19.												
1	170	222	170	210	145	195	280	265	265	265	312	196
2	146	222	170	205	140	190	280	346	312	250	265	183
3	149	250	175	200	140	195	312	329	329	236	259	183
4	170	280	180	195	135	195	280	312	296	222	329	183
5	183	250	185	190	135	205	280	296	312	236	280	209
6	196	236	185	195	140	210	329	329	312	222	346	209
7	170	250	190	200	145	210	346	534	296	222	364	209
8	209	236	190	205	150	235	514	456	312	196	400	196
9	170	250	196	210	160	265	437	400	329	236	329	196
10	196	236	222	210	170	400	418	364	680	222	296	250
11	183	222	265	210	180	554	418	329	960	222	250	222
12	196	222	236	205	195	680	364	296	636	196	250	209
13	183	222	222	205	210	680	382	280	475	209	250	196
14	196	209	250	200	235	680	329	280	364	250	222	209
15	196	209	250	195	235	900	346	265	329	250	265	183
16	170	196	209	195	250	1,610	280	312	312	236	250	209
17	183	196	236	200	250	2,600	400	554	296	222	265	183
18	183	209	222	200	235	1,370	400	382	265	222	250	222
19	170	236	222	200	220	616	382	312	280	209	236	222
20	170	222	236	195	210	554	364	296	329	209	236	250
21	170	196	222	190	183	494	329	280	329	209	236	236
22	183	196	296	185	183	382	312	280	312	209	280	250
23	170	209	280	180	183	382	312	329	312	209	236	236
24	170	209	265	170	222	382	280	329	312	196	222	222
25	183	222	260	160	195	346	265	312	418	209	209	209
26	183	250	250	155	195	329	265	280	574	222	209	196
27	196	209	245	150	195	312	280	296	418	209	209	183
28	400	183	240	145	195	296	265	265	382	209	196	196
29	296	170	235	145	.....	296	250	250	345	209	196	209
30	236	170	230	145	.....	312	250	236	312	209	183	196
31	250	.....	225	145	.....	312	.....	265	.....	296	222	.....

Daily discharge, in second-feet, of Waupaca River near Waupaca, Wis., for the years ending Sept. 30, 1918–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	183	514	210	250	220	210	522	263	234	608	206	342
2	196	329	210	235	220	235	522	294	248	326	193	248
3	222	346	210	235	220	210	502	263	220	294	206	248
4	222	312	210	235	235	220	522	278	193	278	193	234
5	222	280	210	220	235	210	502	263	168	294	234	248
6	250	265	210	220	235	210	464	263	220	278	193	278
7	196	265	210	220	220	210	359	263	220	342	193	206
8	196	280	210	220	235	220	294	263	278	294	206	206
9	209	265	210	220	220	220	359	263	234	376	206	234
10	236	364	210	220	220	220	326	263	234	393	234	234
11	236	475	220	220	220	245	359	359	310	376	206	234
11	250	329	220	220	220	265	359	376	263	294	193	234
13	209	364	220	210	220	295	342	326	310	278	220	206
14	209	456	220	210	210	330	326	326	359	263	234	206
15	209	636	220	210	160	380	310	294	428	248	248	206
16	196	494	220	210	160	455	294	294	483	248	206	248
17	183	595	220	210	160	535	326	294	428	234	206	278
18	170	236	215	210	185	555	310	294	342	220	206	248
19	209	209	220	210	160	595	248	294	326	234	206	248
20	196	209	220	210	170	615	326	294	310	220	206	278
21	209	96	235	210	160	635	310	294	263	234	206	248
22	183	183	235	210	140	680	248	278	310	220	206	206
23	183	209	235	210	210	730	393	294	310	220	193	206
24	183	209	250	210	195	840	393	294	278	234	180	206
25	170	209	265	210	185	730	393	294	248	234	193	206
26	250	210	280	220	115	1,020	359	278	263	193	180	206
27	236	210	280	220	185	840	342	263	248	206	234	206
28	183	210	280	220	185	679	326	263	248	220	234	193
29	196	210	280	220	170	840	310	263	359	206	679	193
30	196	210	265	220	.....	631	278	263	376	220	522	206
31	437	.....	265	220	.....	522	.....	234	.....	206	393	.....

NOTE.—Stage-discharge relation affected by ice Dec. 4, 1917, to Mar. 22, 1918, Nov. 29 to Dec. 8, 1918, Dec. 24, 1918, to Feb. 20, 1919, Feb. 25 to Mar. 10, 1919, and Nov. 26, 1919, to Mar. 22, 1920. Discharge, Aug. 20 and Sept. 26, 1920, interpolated; gage not read.

Monthly discharge of Waupaca River near Waupaca, Wis., for the years ending Sept. 30, 1918–1920.

[Drainage area, 305 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1917–18.					
October 19–31	296	204	235	0.770	0.37
November	253	173	202	.662	.74
December	199	130	154	.505	.58
January	200	105	153	.502	.58
February	190	135	164	.538	.56
March	1,300	185	607	1.99	2.29
April	364	201	249	.816	.91
May	960	212	420	1.38	1.59
June	382	212	255	.836	.93
July	245	176	215	.705	.81
August	329	151	217	.712	.82
September	233	151	187	.613	.68

Monthly discharge of Waupaca River near Waupaca, Wis., for the years ending Sept. 30, 1918–1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	400	146	194	0.636	0.73
November	280	170	220	.721	.80
December	296	170	224	.734	.85
January	210	145	187	.613	.71
February	250	135	187	.613	.64
March	2,600	190	529	1.73	1.99
April	514	250	332	1.09	1.22
May	554	236	324	1.06	1.22
June	960	265	380	1.25	1.40
July	296	196	223	.731	.84
August	400	183	259	.849	.98
September	250	183	208	.682	.76
The year	2,600	135	273	.895	12.14
1919–20.					
October	437	170	214	.702	.81
November	636	96	306	1.00	1.12
December	280	210	231	.757	.87
January	250	210	218	.715	.82
February	235	115	196	.643	.69
March	1,020	210	470	1.54	1.78
April	522	248	364	1.19	1.33
May	376	234	285	.934	1.08
June	483	168	290	.951	1.06
July	608	193	274	.898	1.04
August	679	180	239	.784	.90
September	342	193	231	.757	.84
The year	1,020	96	277	.908	12.34

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

RECORDS AVAILABLE.—June 30, 1916, to September 30, 1920.

GAGE.—Chain gage fastened to upstream side of bridge; read by Hattie 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 DISCHARGE.—Maximum stage recorded during the year ending September 30, 1919, 6.90 feet at 2 p. m. March 16 (discharge, 3,420 second-feet); minimum discharge, somewhat less than 17 second-feet, the last part of November.

Maximum stage recorded during the year ending September 30, 1920, 9.40 feet at 7 a. m. March 26 (discharge, 7,140 second-feet); minimum stage, 1.68 feet at 8.30 a. m. August 3 (discharge, about 7 second-feet).

1916–1920: Extremes for 1920 represent extremes for period.

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 used for 1918–1920 fairly well defined below 2,920 second-feet, extended and roughly approximate above 2,920 second-feet. Gage read twice daily to hundredths; slight diurnal fluctuation may somewhat impair the accuracy of the daily mean gage height. Daily discharge obtained by applying daily gage height to rating table except for period when stage-discharge relation was affected by ice, for which it was based on results of discharge measurements, observer's records, 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Nov. 7	W. G. Hoyt	2.22	47	Jan. 14	W. G. Hoyt	[a] 2.94	34
1919.				Feb. 19	S. B. Soulé	[a] 3.08	39
Jan. 15	do	[a] 2.65	88	Mar. 23	do	6.25	2,610
Mar. 22	Roy S. Huffman	3.74	734	Apr. 27	W. G. Hoyt	3.29	535
May 16	W. G. Hoyt	2.86	280	Sept. 17	S. B. Soulé	1.96	35.7
Aug. 28	S. B. Soulé	1.96	29				
Dec. 12	W. G. Hoyt	[a] 3.06	125				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Sheboygan River near Sheboygan, Wis., for the years ending Sept. 30, 1918–1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.												
1	64	335	80		30	805	805	268	492	106	90	24
2	70	272	70		30	1,050	782	263	470	158	137	54
3	73	293	80		40	1,340	668	272	448	134	112	33
4	70	297	70		40	1,500	492	280	382	169	140	45
5	134	276	60		40	1,900	534	247	360	114	68	47
6	87	263	60		45	1,790	301	188	335	130	147	35
7	58	263	50		50	1,790	255	356	280	151	100	27
8	42	251	50		55	1,690	382	360	251	100	98	92
9	37	226	40		60	1,500	314	263	305	90	137	45
10	62	251	40		60	1,340	318	426	268	80	80	48
11	82	181	30		65	1,120	382	404	293	117	85	60
12	100	147	30		70	980	276	360	209	127	92	33
13	68	165	30		75	1,120	230	339	188	162	95	28
14	78	165	30		80	1,190	188	335	151	98	100	52
15	73	158	30		80	1,420	196	301	173	80	82	45
16	60	137	30	25	85	2,120	184	297	251	90	109	45
17	87	127	40		90	3,000	196	263	151	100	297	29
18	112	140	50		100	4,060	247	382	188	98	123	33
19	90	120	60		105	5,120	263	426	134	98	95	37
20	82	130	65		115	6,180	238	492	117	100	48	47
21	73	448	60		130	4,500	360	347	137	82	66	29
22	90	209	50		165	3,540	558	492	56	106	52	30
23	90	196	50		205	2,710	360	470	82	112	200	29
24	181	130	30		285	1,890	322	360	100	98	90	30
25	247	80	30		370	1,980	360	360	98	151	73	31
26	209	60	25		450	1,800	404	470	103	140	30	42
27	580	80	25		535	1,630	181	492	95	98	47	41
28	558	60	25		670	1,330	293	713	158	92	60	34
29	404	60	25		.....	1,190	536	668	103	151	68	27
30	339	70	25		.....	1,050	492	580	173	87	82	42
31	242	.....	25		.....	980	.....	534	.....	144	177	.....

Daily discharge, in second-feet, of Sheboygan River near Sheboygan, Wis., for the years ending Sept. 30, 1918–1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	20	50	17	60	60	70	251	426	130	64	31	28
2	28	40	18	55	60	70	184	1,120	144	34	32	26
3	31	52	22	50	60	70	181	580	120	32	32	27
4	32	52	25	45	50	70	200	805	109	37	44	33
5	44	87	30	40	40	70	217	624	134	52	68	32
6	30	73	40	50	40	70	209	646	100	75	56	22
7	26	70	50	60	40	80	276	1,800	103	58	37	30
8	22	73	60	65	40	105	759	1,050	144	62	50	28
9	22	56	70	65	40	165	624	426	112	52	42	22
10	23	40	80	70	40	285	759	558	120	60	32	37
11	28	25	105	75	40	410	668	580	117	56	41	40
12	23	29	90	80	40	536	624	492	112	80	35	34
13	28	40	105	80	60	602	558	404	103	64	34	38
14	24	54	127	85	130	580	360	404	75	66	45	45
15	20	54	103	90	370	668	382	331	80	52	48	31
16	35	29	98	90	370	3,420	448	314	75	48	45	28
17	29	47	68	95	285	1,550	1,330	426	87	37	31	30
18	42	62	68	100	205	1,050	980	347	87	25	45	31
19	29	78	78	100	165	805	668	234	85	38	56	85
20	22	82	103	105	130	805	536	259	169	35	58	85
21	34	82	120	105	120	713	448	284	112	42	60	114
22	28	62	120	105	90	690	404	448	64	47	64	28
23	32	45	110	105	80	580	624	426	78	42	66	92
24	33	24	105	105	80	534	980	343	92	42	56	64
25	31		100	105	80	492	873	335	103	32	62	66
26	58		95	115	80	534	762	297	58	44	52	47
27	100	17	95	120	75	305	659	263	87	37	44	87
28	76		90	105	70	255	552	293	87	25	38	52
29	130		85	95	.....	230	445	238	62	42	28	144
30	169		80	80	.....	251	335	200	68	35	42	144
31	66	.....	70	70	.....	284	.....	188	.....	41	40	.....
1919-20.												
1	132	428	135	55	115	50	1,430	366	158	48	30	66
2	145	428	135	60	100	55	1,590	354	179	49	34	32
3	101	252	135	60	65	55	1,220	342	162	49	32	48
4	136	220	135	30	75	60	960	360	142	74	23	35
5	216	264	130	65	65	60	740	324	136	43	33	58
6	204	231	130	60	80	60	665	168	106	43	32	22
7	168	260	130	20	60	65	518	148	132	72	32	14
8	139	227	125	105	125	70	289	126	104	74	15	38
9	155	220	125	65	105	75	356	101	88	84	44	48
10	152	428	125	175	80	92	208	93	86	66	72	60
11	139	590	125	145	240	360	165	142	101	98	43	44
12	139	428	125	115	195	980	216	165	79	88	54	72
13	136	306	90	125	80	1,050	247	142	98	62	132	70
14	136	256	75	35	60	1,120	227	120	112	49	79	56
15	142	272	70	55	125	1,190	142	123	129	54	68	37
16	148	295	50	170	85	1,260	172	109	351	58	44	48
17	139	295	25	150	55	2,190	148	112	740	58	70	62
18	115	294	30	90	80	2,100	136	152	450	46	68	54
19	126	264	30	90	40	1,430	132	176	204	51	66	41
20	112	252	160	170	45	1,290	162	165	165	58	41	41
21	112	227	170	75	45	1,670	346	165	136	48	51	38
22	104	227	105	65	50	2,700	333	129	93	52	58	41
23	101	204	85	75	50	2,700	590	235	104	58	58	32
24	109	165	90	85	50	2,920	450	342	76	44	64	35
25	132	145	85	105	50	3,800	438	201	72	26	40	38
26	126	145	45	100	50	6,660	426	208	60	25	48	38
27	123	135	50	80	50	3,800	414	216	60	74	44	60
28	132	135	40	170	50	2,700	402	165	58	26	38	44
29	152	135	30	255	50	2,590	390	179	64	20	51	30
30	168	135	50	240	.....	2,010	378	190	56	19	54	49
31	472	.....	60	270	.....	1,670	.....	168	.....	25	88	.....

NOTE.—Stage-discharge relation affected by ice Nov. 24, 1917, to about Mar. 19, 1918, and Nov. 25 to Dec. 13, 1918, Dec. 22, 1918, to March 11, 1919, Nov. 16, 17, and Nov. 27, 1919, to Mar. 16, 1920. Gage not read Nov. 18, 1918, Apr. 25–29, 1919, Apr. 25 to May 2, and Aug. 18, 1920; discharge interpolated.

Monthly discharge of Sheboygan River near Sheboygan, Wis., for the years ending Sept. 30, 1918–1920.

[Drainage area, 403 square miles.]

Month.	Discharge in second-feet				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1917–18.					
October	580	37	147	0.365	0.42
November	448	60	186	.462	.52
December	80	25	44.0	.109	.13
January	.....	.....	25	.062	.07
February	670	30	147	.365	.38
March	6,180	805	2,050	5.09	5.87
April	805	181	371	.921	1.03
May	713	188	387	.960	1.11
June	492	56	218	.541	.60
July	169	80	115	.285	.33
August	297	30	103	.256	.30
September	92	24	39.8	.099	.11
The year	6,180	.....	332	.799	10.87
1918–19.					
October	169	20	42.4	.105	.12
November	87	.....	46.9	.116	.13
December	127	17	78.3	.194	.22
January	120	40	83.9	.206	.24
February	370	40	105	.261	.27
March	3,420	70	527	1.31	1.51
April	1,330	181	543	1.35	1.51
May	1,800	188	488	1.21	1.40
June	169	58	101	.251	.28
July	80	25	47.0	.117	.13
August	68	28	45.6	.113	.13
September	144	22	52.4	.130	.14
The year	3,420	.....	181	.449	6.08
1919–20.					
October	472	101	149	.370	.43
November	590	135	262	.650	.73
December	170	25	93.4	.232	.27
January	270	20	108	.268	.31
February	240	40	80.0	.199	.21
March	6,660	50	1,510	3.75	4.32
April	1,590	132	463	1.15	1.28
May	366	93	193	.479	.55
June	740	56	150	.372	.42
July	98	19	52.9	.131	.15
August	132	15	51.8	.129	.15
September	72	14	45.0	.112	.12
The year	6,660	14	265	.658	8.94

MILWAUKEE RIVER NEAR MILWAUKEE, WIS.

LOCATION.—In NW. ¼ sec. 5, T. 7 N., R. 22 E., immediately above an old quarry near north limits of Milwaukee, Milwaukee County, half a mile below concrete highway bridge, 1 mile above Mineral Spring Road, and 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, 1920.

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 Miss Bertha Kuehl.

CHANNEL AND CONTROL.—Bed of channel at gage heavy gravel. About 200 feet below the 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 it is seldom overflowed.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.5 feet March 17 and 18 (discharge, 5,160 second-feet); minimum stage recorded 0.38 foot September 7 (discharge, about 34 second-feet).

Maximum stage recorded during year ending September 30, 1920, 6.3 feet at 8 a. m. June 17, 1920 (discharge, 6,470 second-feet); minimum stage recorded 1.20 feet, December 18, 1919 (discharge, 60 second-feet).

1914–1920: Maximum stage recorded 9.00 feet March 20, 1918 (discharge, about 12,100 second-feet); minimum stage recorded 0.50 foot at 8.30 p. m., August 2, 1916 (discharge, about 26 second-feet).

ICE.—Stage-discharge relation affected by ice.

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

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined between 200 and 3,710 second-feet; below 200 second-feet the curve was revised slightly, twice during 1919, each revision defining the stage-discharge relation somewhat more accurately as indicated by additional discharge measurements. Gage read twice daily to quarter-tenths. 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, except for extreme high and low stages, for which they are only fair. Winter records roughly approximate.

Discharge measurements of Milwaukee River near Milwaukee, Wis., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Nov. 6	W. G. Hoyt	0.86	147	Jan. 13	W. G. Hoyt	[a] 1.46	96
1919.				Feb. 20	S. B. Soulé	[a] 1.67	135
Jan. 15	do	[a] 1.30	119	Sept. 16	do	.66	86
May 15	do	1.26	329				
Aug. 28	S. B. Soulé	.47	50				
Dec. 11	W. G. Hoyt	[a] 1.14	120				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Milwaukee River near Milwaukee, Wis., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	86	162				285	495	495	198	94	67	46
2	70	143				276	447	605	194	76	60	56
3	78	143				262	421	1,040	149	62	143	67
4	70	133	95			285	421	1,800	146	85	223	58
5	64	136		140	90	249	434	1,600	206	90	219	58
6	70	146				285	460	1,310	219	76	166	42
7	72	156				206	530	995	232	120	143	38
8	64	156	180			198	605	995	219	130	117	40
9	80	162	240			219	860	995	249	117	99	0
10	72	146	365			347	1,080	905	267	136	82	76
11	72	143	568			770	1,080	815	236	125	90	60
12	84	156	460			1,600	950	685	202	104	90	67
13	70	162	495			2,040	645	421	149	114	85	71
14	70	156	434		460	2,040	605	402	180	109	56	62
15	66	125	315	115		2,520	530	359	159	114	60	71
16	78	133	232			4,410	728	347	176	117	71	76
17	78	130	202			5,160	530	530	202	102	71	67
18	72	146	219		645	5,160	685	815	315	82	71	69
19	74	130	194		605	2,280	685	605	335	80	71	71
20	58	143	198		460	1,600	1,130	447	236	90	71	78
21	72	143	215		335	1,220	950	428	143	82	62	94
22	82	133	232		310	995	685	460	130	90	58	156
23	78	109	219		383	815	605	460	130	78	76	232
24	100	95	206		353	728	995	434	125	67	67	244
25	130	93	176		335	685	1,130	389	120	62	58	166
26	125			125	285	568	1,130	315	120	76	60	136
27	136				240	568	1,040	295	136	82	62	92
28	191	80			240	495	645	267	114	90	60	82
29	276		160		.....	495	530	258	107	85	60	133
30	232				.....	495	530	258	107	80	56	162
31	202	.....			.....	460	.....	202	.....	67	48	.....
1919-20.												
1	183	389	150	100	180	155	1,260	495	183	161	77	89
2	223	244	145	100	180	160	1,260	460	180	151	75	125
3	262	219	145	95	200	160	1,400	377	144	144	92	135
4	249	434	140	80	200	180	1,220	335	158	138	75	128
5	219	389	135	180	200	220	905	310	158	114	75	128
6	295	335	135	160	220	260	815	262	141	114	99	138
7	389	310	130	105	180	310	685	262	102	161	92	114
8	325	295	125	95	160	395	568	219	148	172	65	89
9	240	310	125	105	180	495	495	223	114	187	65	138
10	202	530	120	105	220	770	432	240	144	194	119	144
11	183	685	120	110	180	1,130	428	258	128	180	161	148
12	183	770	135	105	200	1,800	568	262	99	172	144	99
13	180	530	130	95	175	2,760	530	262	99	180	187	106
14	158	495	145	85	115	2,890	530	254	172	161	128	128
15	128	408	170	145	115	2,890	432	240	1,700	151	187	92
16	161	290	110	105	90	3,710	377	227	3,150	144	198	87
17	180	330	70	120	115	3,150	365	198	5,630	128	180	87
18	183	280	60	105	130	2,890	377	240	2,520	114	144	106
19	176	223	80	125	145	2,520	320	310	1,400	114	128	99
20	158	202	90	130	135	2,040	335	240	1,130	119	99	82
21	148	198	90	160	130	1,920	568	240	685	97	128	92
22	158	183	100	160	130	1,800	568	262	530	114	114	82
23	164	176	100	200	135	1,800	728	530	335	114	114	92
24	158	170	70	220	135	2,040	815	495	262	102	138	92
25	144	160	130	230	140	3,150	815	568	262	119	144	87
26	144	160	130	240	140	5,160	728	460	262	114	161	114
27	176	160	130	220	145	5,010	568	310	219	87	92	99
28	202	160	80	200	145	3,710	645	280	187	92	75	99
29	190	155	140	200	145	2,890	645	223	180	87	131	82
30	244	155	95	190	.....	2,040	685	198	161	92	105	92
31	460	.....	85	180	.....	1,500	.....	201	.....	77	92	.....

NOTE.—Stage-discharge relation affected by ice, Nov. 26 to Dec. 7, 1918, Dec. 26, 1918, to Feb. 17, 1919, Feb. 26 and Nov. 24, 1919, to Mar. 12, 1920.

Monthly discharge of Milwaukee River near Milwaukee, Wis., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 661 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	276	58	99.1	0.150	0.17
November	162	.....	129	.195	.22
December	568	.....	219	.331	.38
January	.....	.....	127	.192	.22
February	.....	.....	297	.449	.47
March	5,160	198	1,220	1.85	2.13
April	1,130	421	729	1.10	1.23
May	1,800	202	643	.973	1.12
June	335	107	183	.277	.31
July	136	62	92.9	.141	.16
August	223	48	87.8	.133	.15
September	244	38	91.0	.138	.15
The year	5,160	.....	326	.493	6.71
1919–20.					
October	460	128	209	.316	.36
November	770	155	312	.472	.53
December	170	60	116	.175	.20
January	240	80	144	.218	.25
February	220	90	157	.238	.26
March	5,160	155	1,930	2.92	3.37
April	1,400	320	669	1.01	1.13
May	568	198	305	.461	.53
June	5,630	99	686	1.04	1.16
July	194	77	132	.200	.23
August	198	65	119	.180	.21
September	148	82	106	.160	.18
The year	5,630	60	408	.617	8.41

Days of deficiency in discharge of Milwaukee River near Milwaukee, Wis., for the years ending Sept. 30, 1915–1920.

Discharge in sec.-ft.	Days of deficient discharge.							
	1914–15.	1915–16.	1916–17.	1917–18.	1918–19.	1919–20.	Oct. 1, 1914, to Sept. 30, 1920.	
							Days.	Per cent of time.
50	.....	2	.....	19	5	.....	26	1.2
75	.....	9	11	58	55	5	138	6.3
100	11	44	28	116	116	53	368	10.8
125	64	71	82	155	156	91	619	28.2
150	78	91	123	178	185	151	806	36.8
175	97	101	149	188	213	186	934	42.6
200	150	135	173	195	224	222	1,099	50.1
225	166	155	181	204	239	246	1,191	54.3
250	173	168	189	213	252	258	1,253	57.2
275	189	181	191	216	257	270	1,304	59.5
300	196	189	201	230	264	275	1,355	61.8
325	222	201	203	235	268	282	1,411	64.4
350	223	204	206	243	273	288	1,437	65.6
375	229	215	211	253	276	289	1,473	67.2
400	235	218	213	260	278	296	1,500	68.4
450	246	231	224	266	288	301	1,556	71.0
540	261	254	241	280	312	315	1,663	75.9
700	294	279	270	293	330	327	1,793	81.8
900	309	300	291	312	337	334	1,883	85.9
1,200	327	322	315	334	352	337	1,987	90.6
1,800	347	344	343	351	358	344	2,087	95.2
3,000	358	358	360	357	362	358	2,153	98.2
5,500	365	366	365	361	365	365	2,187	99.8
9,000	.....	.....	.....	363	.....	366	2,190	99.9
13,000	.....	.....	.....	365	.....	.....	2,192	100.0
Discharge (sec.-ft.):								
Mean	530	561	567	508	326	408	.....	.....
Maximum	5,310	4,130	5,160	12,100	5,160	5,630	.....	.....
Minimum	80	37	55	45	.....	60	.....	.....

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 One hundred and Forty-seventh Street, Harvey, Cook County, 11 miles above mouth of river.

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

RECORDS AVAILABLE.—Daily discharge, October 1, 1916, to September 30, 1920; 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 downstream side of bridge during medium and high stages and by wading during low stages.

CHANNEL AND CONTROL.—Bed of river composed of clay and gravel. Low-water control is at "The Rocks," about 1 mile below gage; bed of river, heavy gravel; somewhat shifting. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 10.28 feet at 9 a. m. March 18 (discharge, 3,750 second-feet); minimum stage recorded, 2.88 feet September 3, 4, 8, and 9 (discharge, 49 second-feet).

Maximum stage recorded during year ending September 30, 1920, 7.85 feet at 8 a. m. March 26 (discharge, 2,080 second-feet); minimum stage, 2.97 feet August 28 (discharge, 58 second-feet).

1907-1920: Maximum stage recorded, 13.4 feet March 6, 1908 (discharge not determined); minimum discharge since October 1, 1916, probably somewhat less than 25 second-feet occurred in January, 1918.

ACCURACY.—Stage-discharge relation changed during high water of March, 1919; affected by ice for short periods during the winter of 1918–19 and seriously affected by ice during 1919–20. Rating curves well defined above, fairly well defined below, 60 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good for open-water periods; roughly approximate for periods of ice effect.

Discharge measurements of Little Calumet River at Harvey, Ill., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 18	H. C. Beckman	10.22	3,690	June 3	Dean and Kane	4.20	351
Apr. 25	do	4.80	596				
July 9	do	3.03	68				
9	do	3.03	68				

Daily discharge, in second-feet, of Little Calumet River at Harvey, Ill., for the years endin Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	71	222	236		325	465	1,090	610	455	131	77	5
2	71	222	236		295	465	1,040	770	402	131	68	5
3	71	208	236	560	295	500	940	850	385	112	62	4
4	70	182	222		280	500	940	2,250	368	98	59	4
5	64	170	182		222	500	850	2,190	350	86	54	5
6	64	158	208		208	465	810	1,440	332	84	70	5
7	71	146	208		195	465	770	1,340	315	79	64	5
8	71	170	195	465	182	500	770	1,340	315	75	65	4
9	70	222	182		170	500	770	1,440	315	70	72	4
10	70	222	280		158	580	770	1,390	315	64	72	5
11	68	208	265		146	660	650	1,290	298	77	68	5
12	70	195	236		158	995	650	1,240	280	79	65	5
13	70	182	325	380	170	1,290	650	1,140	280	80	67	5
14	71	182	580		342	1,190	610	1,090	298	87	68	5
15	71	170	620		395	1,400	810	1,040	332	86	72	5
16	63	158	500	360	378	2,990	770	940	298	84	75	5
17	70	158	465	360	360	3,200	730	890	298	84	74	5
18	71	146	430	378	360	3,690	690	850	298	82	68	5
19	73	158	430	395	342	2,990	690	810	298	82	65	6
20	71	182	430	378	342	2,850	610	770	350	79	65	6
21	70	195	740	360	325	2,730	610	770	332	75	64	6
22	73	195	905	412	342	2,550	570	730	368	72	68	7
23	75	208	740	500	295	2,250	580	690	332	70	68	7
24	96	208	700	465	325	2,130	730	690	298	65	65	7
25	170	195	660	465	430	1,890	610	650	298	65	65	7
26	195	195	700	465	360	1,710	570	610	250	65	62	7
27	195	195	700	430	412	1,540	530	570	220	65	54	6
28	250	195	700	412	430	1,440	610	530	190	64	54	6
29	265	195	650	395	.....	1,340	650	530	165	68	54	7
30	250	250	610	378	.....	1,240	610	490	142	62	54	7
31	236	.....	580	360	.....	1,140	.....	455	.....	61	54	.....
1919-20.												
1	96	115	290				905	1,720	431	260	76	7
2	135	119				400	905	1,270	394	232	71	7
3	100	115					860	1,170	376	218	69	7
4	100	107				725	905	1,130	357	192	69	6
5	102	96	240			1,080	1,040	1,080	322	157	69	6
6	107	107				635	950	1,040	290	135	69	10
7	98	111					905	995	260	125	71	7
8	98	111				500	950	995	232	115	71	9
9	96	107				431	1,170	950	218	115	69	10
10	91	119				770	1,130	950	192	115	69	10
11	93	107			170	905	1,080	950	168	107	69	9
12	93	109				1,960	1,040	950	157	100	71	9
13	88	111				1,720	950	1,080	135	93	71	9
14	86	115				1,320	950	950	180	144	71	8
15	82	107				1,170	905	860	950	155	69	8
16	89	111		65		1,270	1,080	860	548	157	66	7
17	88	106				1,130	1,840	860	431	168	66	8
18	86	102				1,130	1,270	995	394	157	66	7
19	86	100				1,220	1,220	860	357	148	65	7
20	86	100	110			1,170	1,840	860	376	142	65	6
21	84	100				1,220	1,960	815	394	135	74	6
22	79	100				1,130	1,370	770	431	125	69	6
23	79	89				1,080	1,220	770	431	111	66	6
24	82	100				1,040	1,130	680	431	94	63	6
25	79	107			270	1,220	1,080	680	431	93	63	6
26	76	104				2,080	1,040	590	412	89	62	6
27	89	104				1,670	1,040	590	376	86	60	6
28	93	96				1,320	995	548	357	79	58	6
29	93	139				1,620	950	508	340	76	66	6
30	107	680			.....	995	1,040	468	306	73	69	6
31	113	.....			.....	950	.....	431	.....	76	71	.....

NOTE.—Stage-discharge relation affected by ice Dec. 29 and 30, 1918, Jan. 1–15, Feb. 6–10, Mar. 1–5, 7–9 1919, and Dec. 2, 1919, to Mar. 8, 1920; discharge estimated 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 years ending Sept. 30, 1919 and 1920.

[Drainage area, 570 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	265	63	105	0.184	0.21
November	250	146	190	.333	.37
December	905	182	456	.800	.92
January	.....	.....	437	.767	.88
February	430	146	294	.516	.54
March	3,690	465	1,490	2.61	3.00
April	1,090	530	722	1.27	1.42
May	2,250	455	980	1.72	1.98
June	455	142	306	.537	.60
July	131	61	80.1	.141	.16
August	77	54	64.9	.114	.13
September	75	49	58.7	.103	.11
The year	3,690	49	434	.761	10.32
1919-20.					
October	135	76	92.7	.163	.19
November	680	89	126	.221	.25
December	.....	.....	149	.261	.30
January	.....	.....	65.0	.114	.13
February	.....	.....	201	.352	.38
March	2,080	.....	1,070	1.88	2.17
April	1,960	860	1,120	1.96	2.19
May	1,720	431	883	1.55	1.79
June	950	135	356	.625	.70
July	260	73	131	.230	.26
August	76	58	67.8	.119	.14
September	104	62	77.3	.136	.15
The year	2,080	58	362	.635	8.65

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, 1920.

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 years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	566	1,300	1,480	2,150	1,600	3,330	2,655	1,300	870	540	620	440
2	561	1,270	1,985	2,125	1,235	4,250	2,400	1,377	845	540	592	416
3	566	1,235	3,430	2,100	1,200	4,750	2,190	1,600	760	529	566	416
4	566	1,235	3,860	2,150	1,170	5,275	2,150	5,940	730	513	540	392
5	540	1,270	2,250	2,200	1,146	6,360	2,190	8,190	700	513	550	416
6	540	1,300	1,830	2,190	1,825	5,000	2,190	6,787	700	529	566	344
7	566	1,340	1,522	2,150	1,062	4,250	2,270	5,275	700	513	540	368
8	550	1,377	1,677	2,132	1,038	3,780	2,570	4,250	700	513	540	392
9	550	1,410	1,656	2,105	990	2,875	3,285	3,100	700	513	540	392
10	566	1,410	1,635	2,025	960	2,400	4,000	2,400	700	523	550	416
11	566	1,300	1,600	1,969	930	1,785	3,830	2,150	700	815	550	392
12	582	1,200	1,785	1,905	930	1,270	5,180	1,985	815	540	566	392
13	592	1,110	2,190	1,945	960	1,300	4,200	1,785	786	685	566	416
14	592	1,050	2,400	1,985	990	1,600	4,050	1,600	700	760	566	416
15	582	1,020	2,965	1,985	1,945	2,315	3,760	1,450	700	760	513	416
16	566	990	2,995	2,025	2,025	15,715	3,760	1,410	675	646	465	416
17	566	960	2,965	2,065	1,985	31,950	4,500	1,745	646	620	489	416
18	566	930	2,920	2,132	1,785	49,500	4,100	1,825	646	566	513	416
19	550	960	2,270	2,190	1,600	39,600	3,520	1,985	675	550	513	416
20	566	960	2,105	2,270	1,300	26,400	3,285	2,158	675	540	489	440
21	566	990	2,400	2,400	1,200	16,350	2,835	2,150	675	540	513	540
22	566	1,020	2,920	2,835	1,020	10,520	2,355	2,025	646	513	513	675
23	566	1,050	3,955	3,150	990	8,220	2,158	1,865	592	513	540	786
24	592	1,122	5,060	3,285	990	6,930	2,150	1,705	540	489	489	845
25	658	1,140	3,760	3,760	1,635	6,200	2,025	1,600	566	489	465	760
26	845	1,200	1,930	4,100	2,416	5,275	1,865	1,520	566	646	392	646
27	1,020	1,235	1,978	4,100	1,635	4,950	1,600	1,410	540	730	368	646
28	1,110	1,249	2,050	3,955	2,440	4,250	1,480	1,300	540	786	368	675
29	1,270	1,300	2,125	3,285	.....	3,760	1,377	1,200	540	786	646	675
30	1,340	1,384	2,150	2,835	.....	3,285	1,340	1,050	540	730	930	675
31	1,340	.....	2,150	2,025	.....	3,150	.....	930	.....	646	392	.....
1919-20.												
1	675	3,760	2,835	821	787	928	4,750	1,985	730	620	540	700
2	651	5,125	5,805	787	787	1,020	4,250	1,825	675	566	540	786
3	675	4,250	5,060	750	787	1,130	4,070	1,670	646	540	513	870
4	646	3,285	2,670	735	787	1,165	3,760	1,480	620	513	489	845
5	700	1,985	2,380	735	804	1,185	3,285	1,377	592	566	440	815
6	786	1,905	2,178	750	804	1,201	2,835	1,235	592	700	465	760
7	845	1,865	2,000	750	787	1,201	2,400	1,080	566	930	440	760
8	815	1,825	1,760	770	787	1,300	2,270	990	540	1,600	440	730
9	786	1,785	1,730	770	804	1,365	2,270	930	540	1,785	440	700
10	773	1,745	1,687	787	821	1,410	2,400	815	566	1,600	620	730
11	730	1,670	1,665	804	838	1,432	2,610	815	845	1,080	700	786
12	700	1,600	1,640	787	866	3,330	2,655	1,050	675	930	730	870
13	646	1,600	1,593	787	891	5,335	2,700	1,170	1,235	700	646	960
14	675	1,450	1,570	770	910	6,460	2,700	1,110	930	675	646	930
15	646	1,270	1,522	750	910	5,790	2,570	1,020	845	675	646	870
16	620	1,235	1,500	750	910	5,945	2,520	930	930	540	620	930
17	646	1,235	1,455	750	928	6,115	2,400	815	1,600	566	592	1,050
18	675	1,200	1,365	750	928	5,335	2,025	1,110	2,190	566	566	990
19	690	1,170	1,300	770	928	4,980	1,825	1,450	2,230	540	540	960
20	700	1,200	1,244	770	910	4,730	1,600	1,985	2,190	550	513	930
21	700	1,235	1,150	787	910	7,500	1,480	2,570	2,150	540	540	870
22	730	1,235	1,093	787	928	5,640	1,450	2,270	1,985	513	675	815
23	786	1,270	1,000	787	928	5,375	1,450	2,230	1,705	540	760	845
24	845	1,235	928	787	928	5,275	3,285	1,480	1,450	646	730	815
25	815	1,235	866	787	910	5,530	3,150	1,377	1,235	592	646	815
26	815	1,200	858	804	910	5,805	2,835	1,235	1,170	566	620	845
27	845	1,235	858	804	891	6,399	2,700	1,080	1,050	540	592	845
28	990	1,270	838	804	891	6,200	2,610	990	930	513	566	870
29	990	1,270	838	787	891	5,980	2,400	930	675	513	566	900
30	1,450	1,600	821	787	.....	5,700	2,270	845	646	540	540	930
31	1,985	.....	838	787	.....	5,530	.....	760	.....	540	620	.....

Monthly discharge of Tittabawassee River at Freeland, Mich., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 2,530 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	1,340	540	683	0.270	0.31
November	1,410	930	1,180	.466	.52
December	5,060	1,480	2,450	.968	1.12
January	4,100	1,905	2,500	.988	1.14
February	2,440	930	1,390	.549	.57
March	49,500	1,270	9,240	3.65	4.21
April	5,180	1,340	2,840	1.12	1.25
May	8,190	930	2,420	.957	1.10
June	870	540	672	.266	.30
July	815	489	599	.237	.27
August	930	368	531	.210	.24
September	845	344	502	.198	.22
The year	49,500	344	2,100	.830	11.25
1919-20.					
October	1,985	620	807	.319	.37
November	5,125	1,170	1,800	.711	.79
December	5,805	821	1,710	.676	.78
January	821	735	776	.307	.35
February	928	787	868	.343	.37
March	7,500	928	4,070	1.61	1.86
April	4,750	1,450	2,650	1.05	1.17
May	2,570	760	1,310	.518	.60
June	2,230	540	1,090	.431	.48
July	1,785	513	719	.284	.33
August	760	440	580	.229	.26
September	1,050	700	851	.336	.37
The year	7,500	440	1,440	.569	7.73

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.

RECORD AVAILABLE.—January 1, 1914, to September 30, 1920.

DETERMINATION OF DISCHARGE.—Flow computed from records of operation of power plant, the flow through under-sluices 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 the year.

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

Daily discharge, in second-feet, of Huron River at Barton, Mich., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	129	184	252	555	215	341	826	1,067	420	445	124	122
2	164	160	210	591	381	380	778	1,105	373	413	91	128
3	129	159	258	365	286	346	770	1,146	330	343	128	184
4	138	183	266	345	286	354	725	1,650	307	279	166	186
5	155	182	240	340	258	381	719	2,261	268	315	340	178
6	58	188	234	424	252	395	661	1,931	277	222	240	98
7	139	162	249	381	244	378	818	1,625	271	265	235	18
8	130	182	260	383	214	338	869	1,343	232	238	218	173
9	126	247	214	296	223	398	817	1,307	285	212	207	170
10	131	293	386	317	226	351	922	1,239	253	199	168	171
11	130	241	341	390	218	402	1,063	1,148	186	204	233	141
12	151	268	406	249	211	413	1,021	1,072	172	160	125	114
13	99	293	505	294	269	791	956	1,018	197	127	141	66
14	141	228	528	295	243	665	912	973	204	194	140	24
15	129	257	650	274	277	779	1,414	927	193	184	149	140
16	139	257	593	272	253	1,936	3,087	938	280	172	182	127
17	131	240	605	273	251	2,020	2,943	946	430	153	139	148
18	132	290	562	254	241	1,959	2,416	937	306	181	151	121
19	129	301	512	265	252	1,822	2,223	780	258	99	166	149
20	103	292	537	295	254	1,773	2,167	781	258	141	159	138
21	141	297	551	263	267	1,766	2,167	747	255	164	139	126
22	137	257	690	296	277	1,700	1,999	750	209	156	147	298
23	141	335	752	299	379	1,616	1,819	729	275	150	162	253
24	146	270	796	415	400	1,448	1,926	701	322	123	121	282
25	162	224	733	364	369	1,293	1,684	631	480	125	154	235
26	154	294	747	369	319	1,216	1,495	579	769	102	150	246
27	176	201	749	370	300	1,204	1,278	583	612	105	117	207
28	221	200	659	366	331	993	1,239	488	543	124	130	159
29	164	292	552	344	.....	951	1,186	515	489	127	135	225
30	202	260	551	338	.....	950	1,084	497	456	125	106	217
31	204	.....	517	344	.....	896	.....	421	.....	123	99	.....
1919-20.												
1	196	474	490	200	161	195	841	867	262	172	56	146
2	210	490	529	195	221	283	834	874	207	175	120	151
3	210	491	488	199	184	279	802	805	251	156	110	145
4	212	479	489	170	192	321	758	734	206	127	106	137
5	218	481	481	190	193	476	769	656	203	121	111	155
6	208	479	482	184	193	514	722	614	117	165	131	112
7	216	481	387	188	190	447	716	602	203	126	123	144
8	207	370	428	180	171	362	683	566	144	239	20	140
9	216	438	396	195	223	381	643	510	146	135	125	159
10	234	388	377	219	226	597	583	503	141	55	167	148
11	231	359	316	185	208	1,068	672	483	166	57	204	195
12	227	372	379	213	223	2,396	669	440	146	141	139	127
13	233	348	460	202	240	1,847	652	463	106	164	160	132
14	230	333	233	191	220	1,643	642	437	136	152	124	141
15	233	320	272	201	199	1,719	662	413	137	159	129	141
16	222	261	305	199	218	2,485	675	350	225	153	186	144
17	218	309	307	192	220	2,363	678	360	631	119	192	122
18	220	292	305	189	224	2,208	644	385	561	162	178	136
19	192	297	313	196	213	2,096	618	398	525	171	166	38
20	204	283	298	195	204	1,932	663	401	416	155	209	134
21	207	277	281	186	200	1,799	859	407	417	159	144	127
22	208	274	274	195	199	1,689	1,024	431	342	154	151	121
23	200	247	278	185	200	1,527	1,177	412	321	152	139	125
24	195	285	267	183	207	1,380	1,086	423	281	121	138	138
25	200	266	221	133	205	1,245	963	405	264	41	138	95
26	188	285	274	189	205	1,197	945	364	302	128	134	72
27	233	222	242	188	193	1,115	785	355	110	123	196	143
28	299	271	233	187	205	1,033	944	322	228	118	77	148
29	248	393	211	182	201	1,038	865	328	189	115	117	119
30	326	489	250	180	.....	937	885	227	192	114	133	125
31	423	.....	218	193	.....	937	.....	269	.....	159	147	.....

Monthly discharge of Huron River at Barton, Mich., for the years ending Sept. 30, 1919, and 1920.

[Drainage area, 723 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	221	58	143	0.198	0.23
November	335	159	241	.333	.37
December	796	210	487	.674	.78
January	591	249	343	.474	.55
February	400	211	275	.380	.40
March	2,020	338	976	1.35	1.56
April	3,087	661	1,400	1.94	2.16
May	2,261	421	995	1.38	1.59
June	769	172	330	.456	.51
July	445	99	193	.267	.31
August	340	91	160	.221	.25
September	298	18	161	.223	.25
The year	3,087	18	476	.658	8.96
1919-20.					
October	423	188	228	.315	.36
November	491	222	358	.495	.55
December	529	211	338	.467	.54
January	219	133	190	.263	.30
February	240	161	205	.284	.31
March	2,485	195	1,210	1.67	1.92
April	1,177	583	782	1.08	1.20
May	874	227	478	.661	.76
June	631	106	252	.349	.39
July	239	41	138	.191	.22
August	209	20	138	.191	.22
September	195	38	132	.183	.20
The year	2,485	20	372	.515	6.97

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, 1920.

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

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year ending September 30, 1919, 8.20 feet, May 6; minimum stage, 1.00 foot October 2, July 22 and September 9.

Maximum stage recorded during year ending September 30, 1920, 9.80 feet, March 14; minimum stage, 1.10 feet June 8, July 13, August 3, and September 21.

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 operation of 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 considered to cause but little diurnal fluctuation of stage.

This station has not been visited by Geological Survey engineers since September 25, 1912.

Daily gage height, in feet, of Huron River at Flat Rock, Mich., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1.35	1.65	.....	3.00	1.70	2.10	4.50	5.00	.....	2.20	1.30	1.40
2	1.00	1.70	1.75	3.30	.....	.....	4.10	5.00	.....	2.10	1.40	1.10
3	1.45	.....	1.75	3.00	1.80	2.80	3.80	5.30	.....	1.90	.....	1.20
4	1.55	1.45	1.85	2.60	1.60	2.60	3.80	.....	.....	.....	1.30	1.40
5	1.45	1.60	1.85	.....	1.40	2.50	3.60	7.70	.....	1.50	1.30	1.60
6	.....	1.60	1.80	.....	1.50	2.40	.....	8.20	.....	.....	2.30	1.60
7	1.45	1.60	1.70	.....	1.50	2.40	3.50	7.90	.....	1.40	1.70	.....
8	1.10	1.55	.....	.....	1.60	1.80	4.20	7.20	.....	1.40	1.40	1.30
9	1.40	1.55	1.75	2.70	.....	.....	4.00	5.90	1.80	1.40	1.60	1.00
10	1.35	.....	1.80	.....	1.60	1.60	4.80	6.00	1.50	1.40	.....	1.50
11	1.40	2.00	2.45	2.20	1.70	2.60	5.30	.....	1.50	1 40	1.70	1.60
12	1.55	1.50	2.15	.....	1.80	2.70	5.00	5.20	1.50	1.20	1.50	1.60
13	.....	1.60	2.65	2 70	1.80	3.20	.....	5.00	1.40	.....	1.50	1.60
14	1.50	1.55	3.65	2.20	1.80	4.60	5.00	4.90	1.40	1.30	1.50	.....
15	1.60	1.45	.....	2.20	1.60	4.00	5.20	4.90	.....	1.50	1.50	1.30
16	1.60	1.45	4.00	2.10	.....	.....	6.00	4.70	1.50	1.50	1.50	1.00
17	1.55	.....	3.45	2.00	1.70	7.20	8.00	4.80	1.60	1.40	.....	1.20
18	1.45	1.65	3.20	2.40	1.80	8.00	7.80	.....	2.30	1.50	1.40	1.40
19	1.65	2.00	3.20	.....	1.80	7.60	7.60	5.00	1.80	1.80	1.50	1.30
20	.....	1.90	2.90	2.00	1.60	7.50	.....	4.60	1.70	.....	1.50	1.30
21	1.45	1.80	3.00	2.10	1.60	6.90	7.40	3.50	1.70	1.30	1.50	.....
22	1.55	1.90	.....	1.80	1.60	6.70	7.40	4.00	.....	1.00	1.50	1.40
23	1.45	1.80	5.15	1.90	.....	.....	7.30	3.80	1.50	1.70	1.50	2.20
24	1.60	.....	4.40	2.30	2.70	6.30	7.20	3.80	1.50	1.60	.....	1.50
25	1.50	1.70	.....	2.30	2.20	6.40	7.30	.....	1.60	1.40	1.50	1.60
26	1.65	1.80	4.00	.....	1.80	5.60	6.80	3.20	2.70	1.20	1.60	1.50
27	.....	1 90	4.00	2.00	1.70	5.60	.....	3.30	4.00	.....	1.60	1.50
28	1.65	.....	3.80	1.90	1.70	5.50	5.50	3.00	3.00	1.20	1.60	.....
29	1.55	1.70	.....	1 80	.....	5.10	5.70	2.70	.....	1.20	1 60	1.30
30	1.60	1.70	2.70	1.80	.....	.....	5.40	2.50	2.50	1.50	1.50	1.30
31	1.65	.....	3.00	1.60	.....	4.10	.....	2.50	.....	1.30	.....	.....
1919–20.												
1	1.30	2.20	3.00	1.80	.....	2.10	4.50	4.20	1.50	1.40	.....	1.40
2	1.40	.....	2.70	1.80	2.30	2.20	4.00	.....	1.60	1.30	1.40	1.40
3	1.40	2.40	2.40	1.80	2.20	3.00	4.00	4.10	1.60	1.30	1.10	1.30
4	1.40	2.40	2.30	.....	2.10	4.00	.....	4.00	1.60	.....	1.30	1.30
5	.....	2.10	2.30	1.70	2.10	4.50	3.80	3.50	1.50	1.30	1.30	.....
6	1.50	2.60	2.60	1.70	2.00	5.50	3.50	3.20	.....	1.30	1.40	.....
7	1.50	2.50	.....	1.80	2.00	.....	3.50	3.00	1.20	1.40	1.30	1.40
8	1.50	2.40	2.30	1.80	.....	4.50	3.20	2.80	1.10	1.60	.....	1.30
9	1.60	.....	2.30	1.60	2.10	3.50	3.20	.....	1.40	1.60	1.30	1.30
10	1 60	2.20	2.40	1.60	2.20	3.10	3 50	2.60	1.40	1.50	1.20	1.30
11	1.80	2.20	2.30	.....	2.40	5.30	.....	2.50	1.50	.....	1.30	1.30
12	.....	2.00	2.20	2.10	2.50	6.50	3.40	2.50	1.40	1.20	1.50	.....
13	1.60	1.90	2.10	1.80	2.40	8.00	3.40	2.20	.....	1.10	1.40	1.30
14	1.60	1.60	.....	1.80	2.30	9.80	3.40	2.20	1.40	1.50	1.30	1.40
15	1.70	1.60	2.10	1.80	.....	8.70	3.20	2.40	1.30	1.50	.....	1.40
16	1.70	.....	2.10	1 80	2.00	7.90	3.30	.....	1.30	1.60	1.40	1.30
17	1.60	1.40	2.30	1.80	2.20	8.40	3.30	2.20	2.70	1.60	1.60	1.30
18	1.50	1.40	2.10	.....	2.10	7 80	.....	2.20	3.00	.....	1.60	1.30
19	.....	1.60	2.20	1.60	2.10	7.20	3.20	2.00	2.90	1.40	1.60	.....
20	1.50	1.70	2.20	2.40	2.20	7.20	3.20	2.30	.....	1.30	1.60	1.20
21	1.60	1.60	.....	2.20	2 20	.....	3.40	2.20	2.00	1.40	1.40	1.10
22	1.40	1.50	2.20	2.00	.....	6 40	4.40	2.10	2.40	1.40	.....	1.20
23	1.40	.....	2.20	2.20	2.10	6.30	4.80	.....	2.20	1.40	1.40	1.30
24	1.40	1.40	2.10	2.20	2.20	5.80	5.60	1.90	2 20	1.30	1.30	1.30
25	1.40	1.40	2.10	.....	2.20	5.50	.....	2.20	2.10	.....	1.40	1.30
26	.....	1.60	1.60	2.00	2.20	5.40	4 60	2.20	1.50	.....	1.40	.....
27	1.30	1.60	1.70	2.10	2.00	5 30	4.50	1.80	.....	.....	1.40	1.20
28	1.60	1 60	.....	2.40	2.00	.....	4.50	2.00	1.40	.....	1.50	1.40
29	2.10	1.70	1 80	2.20	.....	4.90	4.30	2.00	1.30	.....	.....	1.40
30	1.70	.....	2.00	2.20	.....	4.80	4.20	.....	1.40	.....	1.60	1.40
31	1.60	.....	2.00	2.10	.....	4.80	.....	.....	.....	.....	1.40	.....

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.

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

RECORDS AVAILABLE.—September 23, 1910, to September 30, 1920.

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 rock and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 9.5 feet at 7.15 p. m. May 10 (discharge, 14,200 second-feet); minimum stage, 4.65 feet at 7 a. m. September 27 (discharge, 66 second-feet).

Maximum stage recorded during year ending September 30, 1920, 10.7 feet at 5 p. m. March 12 (discharge, about 20,000 second-feet); minimum discharge, 50 second-feet several days in January.

1910–1920: 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Apr. 2	J. W. Moulton	5.05	365	Feb. 20	Otto Lauterhahn	[a] 7.5	197
17	M. H. Carson	5.90	1,580	Mar. 28	do	5.77	1,180
May 17	J. W. Moulton	6.24	2,460	June 7	do	5.00	224
June 18	do	4.94	208	July 1	do	5.02	256
July 25	C. C. Covert	4.82	125	23	do	5.01	258
Oct. 1	A. H. Davison	4.79	95.8	23	do	4.99	250
1	B. F. Howe	4.80	108	Aug. 14	do	5.00	208
				14	do	5.00	214

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Cattaraugus Creek at Versailles, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	240	1,200	380	2,400	320	3,200	500	900	400	180	140	140
2	200	1,600	320	2,400	240	900	360	950	340	180	120	100
3	650	1,200	380	850	320	700	360	800	340	180	100	100
4	340	1,300	460	500	380	700	460	750	320	170	100	100
5	280	1,400	400	400	380	900	500	1,200	400	150	120	95
6	480	750	440	380	280	750	460	900	320	150	140	100
7	850	600	320	400	380	550	600	800	340	160	140	85
8	460	550	1,500	460	380	500	550	750	380	140	110	90
9	340	400	2,000	400	320	2,400	1,000	850	320	140	110	95
10	280	440	950	300	320	1,500	2,000	5,000	280	170	100	80
11	240	380	700	260	320	1,100	4,400	7,000	280	140	80	100
12	240	320	750	200	380	750	3,000	2,600	240	140	100	120
13	320	320	650	200	380	1,000	1,800	1,700	240	140	100	150
14	260	300	1,400	950	700	500	1,300	1,300	240	130	100	110
15	260	260	2,400	1,200	1,300	500	1,000	1,000	240	120	90	100
16	240	260	1,000	1,000	600	950	1,900	900	220	140	85	100
17	220	300	750	1,100	460	2,000	1,500	2,600	200	150	140	110
18	190	380	550	900	400	2,200	1,200	1,500	200	110	1,500	95
19	180	650	460	500	320	1,200	1,000	1,000	220	100	320	100
20	200	650	380	480	300	800	800	1,000	240	110	240	80
21	950	550	380	500	400	700	1,000	3,400	220	130	180	85
22	460	600	500	800	380	600	750	6,000	200	170	150	100
23	500	480	900	1,000	1,200	500	650	2,400	180	140	140	100
24	280	380	600	1,600	650	500	1,800	1,400	180	120	120	100
25	240	320	1,100	800	700	460	950	1,200	190	110	110	100
26	300	300	750	700	700	400	900	800	420	140	100	100
27	340	280	550	550	440	460	1,500	700	600	100	120	75
28	320	320	480	460	460	600	1,700	550	320	100	140	90
29	500	750	440	440	.....	440	1,700	500	220	95	110	75
30	550	700	460	380	.....	440	1,000	480	200	100	140	80
31	2,600	.....	500	340	.....	440	.....	440	.....	120	120	.....
1919–20.												
1	90	1,700	300	320	90	170	795	908	161	278	223	161
2	75	850	260	300	100	170	680	669	148	180	195	120
3	80	460	240	190	140	180	703	614	211	217	195	135
4	95	320	240	320	200	220	570	532	195	152	195	124
5	90	480	190	340	170	1,800	592	512	171	143	189	120
6	120	550	190	340	150	3,400	625	412	223	143	175	152
7	140	400	220	280	150	2,400	625	395	211	180	171	258
8	100	320	320	260	150	2,200	551	356	171	522	171	223
9	100	240	700	280	130	1,800	570	333	161	680	171	139
10	110	220	1,900	200	150	1,600	522	318	148	356	252	139
11	140	200	480	220	80	6,000	570	439	148	265	371	161
12	140	260	480	140	95	15,000	592	808	148	195	271	532
13	120	240	1,400	70	95	8,500	1,120	503	148	195	211	363
14	110	220	1,000	140	160	2,000	795	395	180	171	211	245
15	110	200	320	50	150	1,700	795	356	171	184	258	200
16	120	190	320	120	110	3,600	3,330	297	223	157	200	189
17	140	170	320	240	110	5,000	1,300	284	1,320	148	217	189
18	120	170	380	120	150	2,000	760	264	832	184	258	132
19	120	140	440	140	260	1,300	658	264	532	503	200	152
20	100	170	360	120	220	1,200	560	297	310	465	184	152
31	120	160	340	170	200	900	551	570	264	304	166	132
22	220	150	300	65	200	950	669	412	234	239	200	132
23	180	180	300	190	200	1,500	647	310	206	239	200	120
24	140	220	300	120	200	2,000	882	297	206	6,170	171	113
25	140	190	320	50	200	2,000	647	297	206	1,450	161	113
26	140	220	140	50	200	2,200	512	252	180	636	152	113
27	320	600	320	140	200	1,700	614	234	166	439	139	113
28	300	300	300	140	200	1,100	1,990	223	152	340	128	113
29	240	200	220	140	200	1,000	1,500	180	143	318	139	132
30	220	460	280	50	.....	900	908	180	570	271	152	161
31	440	.....	300	50	.....	800	.....	171	.....	223	161	.....

NOTE.—Discharge, Dec. 16, 1919, to Mar. 11, 1920, determined from gage heights corrected for ice effect by means of 1 discharge measurement, study of gage-height graph and weather records, and comparison with records for other streams.

Monthly discharge of Cattaraugus Creek at Versailles, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 467 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	2,600	180	436	0.934	1.08
November	1,600	260	598	1.28	1.43
December	2,400	320	737	1.58	1.82
January	2,400	200	737	1.58	1.82
February	1,300	240	479	1.03	1.07
March	3,200	400	924	1.98	2.28
April	4,400	360	1,220	2.61	2.91
May	7,000	440	1,660	3.55	4.09
June	600	180	283	.606	.70
July	180	95	136	.291	.33
August	1,500	80	173	.371	.43
September	150	75	98.5	.211	.24
The year	7,000	75	625	1.34	18.20
1919-20.					
October	320	75	151	.323	.37
November	1,700	140	339	.726	.81
December	1,900	140	425	.910	1.05
January	340	50	173	.370	.43
February	260	80	161	.344	.37
March	15,000	170	2,430	5.20	6.00
April	3,330	512	854	1.83	2.04
May	908	171	390	.835	.96
June	1,320	143	271	.580	.65
July	6,170	143	514	1.10	1.27
August	371	128	196	.420	.48
September	532	113	171	.366	.41
The year	15,000	50	509	1.09	14.84

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, 1920.

GAGE.—Vertical staff on upstream side of right abutment; lower 2 feet of enameled iron, graduated to hundredths of a foot; upper 4 feet of bronze graduated to half-tenths; read by Thomas W. Mills and C. L. Schenck.

DISCHARGE MEASUREMENTS.—Made from cable or 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. The section of the channel which formed the control since the destruction of the weir is of coarse gravel and boulders and is probably permanent between dates of shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 9.0 feet at 6 p. m. May 10 (discharge, 2,500 second-feet); minimum stage recorded −0.41 foot several times in August and September (discharge, 1.5 second-feet).

Maximum stage recorded during year ending September 30, 1920, 3.14 feet at 6 p. m. March 16 (discharge, about 535 second-feet); minimum stage recorded, −0.48 foot July 16 and 17 (discharge, 1.0 second-foot).

1912-1920: Maximum stage recorded, 9.0 feet at 6 p. m. May 10, 1919 (discharge, 2,500 second-feet); minimum discharge, 0.42 second-foot August 20, 21, September 14-16, and October 8, 1913.

ACCURACY.—Stage-discharge relation changed during the high water of May, 1919, and again during March, 1920. Rating curves used before and after the change, fairly well defined below 150 second-feet. Curve used after installation of weir well defined below 40 second-feet. Gage read to hundredths twice daily. Daily discharge not published. Records of monthly discharge, fair.

Discharge measurements of Little Tonawanda Creek at Linden, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 23	E. D. Burchard	0.22	36.8	June 30	Otto Lauterhahn	[a] -0.415	2.22
May 16	J. W. Moulton	.13	35.6	30	do	[a] -.415	2.08
June 17	do	.015	25.0	July 22	do	[a] -.40	2.64
17	do	.005	25.7	22	do	[a] -.40	2.46
July 24	C. C. Covert	[a] -.36	2.44	Aug. 24	Lauterhahn and Covert	[a] -.36	3.77
24	do	[a] -.36	1.97	Sept. 13	S. M. Currier	[a] -.34	4.23
1920.				18	Otto Lauterhahn	.48	2.08
Mar. 25	A. H. Davison	.61	93.8	19	Lamoureux and Lauterhahn	.47	2.15
June 3	Otto Lauterhahn	[a] -.31	4.86				

[a] Gage is set with zero at crest of weir. All gage readings taken after weir was destroyed have minus sign where below elevation of weir crest.

Monthly discharge of Little Tonawanda Creek at Linden, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 22.0 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	29	2.4	7.76	0.353	0.41
November	18	5.1	9.80	.446	.50
December	91	9.6	25.8	1.17	1.35
January	59	11	23.0	1.04	1.20
February	54	5	15.5	.705	.73
March	188	12	47.9	2.18	2.51
April	165	14	48.7	2.21	2.47
May	940	14	135	6.14	7.08
June	196	6.3	29.2	1.33	1.48
July	6.8	2.6	3.9	.177	.20
August	11	1.8	3.18	.145	.17
September	3.7	2.0	2.48	.113	.13
The year	940	1.8	29.5	1.33	18.23
1919–20.					
October	132	2.0	11.3	.514	.59
November	82	8.8	20.3	.923	1.03
December 1–15	132	12	44.9	2.04	1.14
March 13–31	362	30	113	5.14	3.63
April	105	10	29.4	1.34	1.50
May	26	4.4	11.4	.518	.60
June	8.9	1.8	3.88	.176	.20
July	204	1.0	12.9	.587	.68
August	16	2.1	4.48	.204	.24
September	10	2.0	2.88	.131	.15

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

LOCATION.—At by-pass around Lock 30 of Barge Canal, in Macedon, Wayne County.

RECORDS AVAILABLE.—November 1, 1919, to September 30, 1920.

GAGE.—Vertical staff bolted to retaining wall on right bank of by-pass channel about 50 feet above dam; read by H. G. O'Dea, locktender at Lock 30.

DISCHARGE MEASUREMENTS.—Made by wading.

CONTROL.—Control is crest of dam 50 feet below gage.

ACCURACY.—Stage-discharge relation probably permanent, except for possible backwater effect from weeds during summer. Rating curve fairly well defined. Gage-height record approximate only. Daily discharge through by-pass determined by applying mean daily gage height to rating table. Total discharge of canal, as shown in the following tables, determined by adding the discharge through the by-pass to the discharge through the lock, computed from the number of lockages per day, leakage through lock not included.

Discharge measurements of Barge Canal at Lock 30, Macedon, N. Y., during the period Sept. 9, 1919, to Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Sept. 9	O. W. Hartwell	.....	150	May 20	Otto Lauterhahn	1.05	163
Oct. 1	do	1.06	136	June 29	do	1.04	136
Nov. 5	A. H. Davison	1.05	144	July 20	do	1.06	141
5	do	1.05	134	Aug. 21	do	1.10	132
				23	do	1.10	133
1920.				Sept. 9	do	1.22	167
May 20	Otto Lauterhahn	1.05	151				

NOTE.—The above measurements show the discharge through the by-pass.

Daily discharge, in second-feet, of Barge Canal at Lock 30, Macedon, N. Y., for the year ending Sept. 30, 1920.

Day.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1	144	109	.....	121	141	144	144
2	144	40	.....	115	141	141	149
3	147	3	.....	115	152	144	141
4	144	.....	.....	118	135	141	147
5	144	.....	.....	118	164	147	152
6	141	.....	.....	115	144	138	147
7	141	.....	.....	121	141	135	147
8	158	.....	.....	109	141	147	147
9	155	.....	.....	112	155	155	152
10	147	.....	.....	138	144	149	141
11	141	.....	.....	118	144	141	144
12	144	.....	.....	115	158	141	135
13	144	.....	.....	118	147	135	141
14	138	.....	.....	125	135	144	135
15	141	.....	.....	135	144	147	141
16	144	.....	245	135	144	149	146
17	138	.....	181	135	144	147	138
18	132	.....	184	132	141	144	129
19	132	.....	181	138	144	149	138
20	135	.....	184	138	138	144	143
21	135	.....	178	135	144	147	143
22	143	.....	192	132	147	152	141
23	143	.....	181	135	149	161	138
24	135	.....	192	135	149	147	138
25	129	.....	158	132	141	147	143
26	129	.....	149	161	147	141	139
27	138	.....	126	146	144	141	139
28	129	.....	115	135	138	141	139
29	132	.....	121	135	147	147	139
30	129	.....	118	132	147	144	139
31	.....	.....	118	.....	135	149	.....

NOTE.—The above table shows the total discharge through the by-pass and the lock.

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Monthly discharge, in second-feet, of Barge Canal at Lock 30, Macedon, N. Y., for the year ending Sept. 30, 1920.

Month.	Maximum.	Minimum.	Mean.
November	158	129	140
December 1-3	109	3	50.7
May 16-31	245	115	164
June	161	109	128
July	164	135	145
August	161	135	145
September	152	129	142

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

LOCATION.—At by-pass around Lock 32 of Barge Canal, 5 miles east of Rochester and three-fourths mile above Pittsford, Monroe County.

RECORDS AVAILABLE.—May 17, 1919, to September 30, 1920.

GAGE.—Gurley 7-day graph water-stage recorder on left bank of by-pass, 15 feet upstream from concrete spillway dam south of the lock house. Recorder inspected by M. H. Quigley, lock tender at lock 32.

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

CONTROL.—Control is the crest of concrete spillway.

ACCURACY.—Stage-discharge relation changed in July, and again about November 9, 1919; also about June 30, 1920. Rating curves well defined between 30 and 180 second-feet. Operation of water-stage recorder satisfactory. Daily discharge through the by-pass determined by discharge integrator. Total discharge of canal is obtained by adding to flow through by-pass the flow through the lock as determined from the number of lockages a day; leakage through lock not included.

Discharge measurements of Barge Canal at Lock 32, Pittsford, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
June 8	J. W. Moulton	1.05	30.0	June 25	Otto Lauterhahn	1.43	96.4
10	do	1.28	70.9	July 13	do	1.48	84.9
20	do	1.25	62.1	13	do	1.44	87.2
Aug. 16	A. H. Davison	1.34	65.1	19	do	1.59	128
Sept. 7	do	1.23	49.4	19	do	1.58	111
29	do	1.27	54.2	19	do	1.63	114
29	do	1.21	48.8	30	do	1.34	64.6
Nov. 5	do	1.21	45.5	30	do	1.34	64.8
12	do	1.26	65.2	30	do	1.34	63.4
12	do	1.24	62.3	Aug. 5	do	1.60	123
1920.				5	do	1.59	124
May 19	Otto Lauterhahn	1.58	130	18	do	1.30	61.0
26	do	1.24	45.7	18	do	1.32	62.7
June 25	do	1.38	87.2	Sept. 2	do	1.57	108
				2	do	1.56	115

NOTE.—The above measurements show the discharge in the by-pass around lock 32.

Daily discharge, in second-feet, of Barge Canal at Lock 32, Pittsford, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1919.						1919.					
1	.....	55	65	105	79	16	.....	80	111	80	76
2	.....	77	69	108	64	17	11	81	95	78	70
3	.....	68	79	79	51	18	57	61	97	91	71
4	.....	86	72	80	59	19	71	62	113	73	63
5	.....	92	96	82	69	20	39	84	115	90	68
6	.....	107	78	78	55	21	46	68	127	94	73
7	.....	101	83	67	49	22	64	77	112	71	55
8	.....	88	89	84	53	23	40	66	119	81	77
9	.....	73	73	88	62	24	30	68	111	83	57
10	.....	88	75	92	68	25	89	72	123	79	72
11	.....	70	94	126	69	26	92	86	109	84	76
12	.....	61	97	96	50	27	82	82	110	81	87
13	.....	74	83	123	71	28	120	86	111	84	67
14	.....	84	93	105	74	29	86	81	119	85	55
15	.....	82	102	102	61	30	95	72	119	77	58
						31	59	.....	89	70	.....

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1919–20.								
1	50	89	61	.....	61	82	107	139
2	59	72	79	.....	61	78	86	132
3	63	49	66	.....	84	160	107	132
4	74	68	40	.....	113	139	125	106
5	69	56	44	.....	58	119	114	118
6	55	61	46	.....	74	80	91	149
7	70	63	50	.....	61	105	104	147
8	56	69	42	.....	54	142	127	124
9	73	84	44	.....	74	115	157	132
10	64	84	.....	.....	67	102	107	128
11	72	72	.....	.....	105	94	100	127
12	70	68	.....	.....	45	114	81	129
13	53	73	.....	.....	66	98	80	133
14	73	78	.....	.....	113	88	105	123
15	63	73	.....	30	120	105	141	171
16	72	77	.....	91	118	111	120	143
17	84	70	.....	134	117	131	83	131
18	63	63	.....	127	132	121	87	127
19	61	61	.....	132	95	104	122	129
20	83	71	.....	134	104	90	123	130
21	85	70	.....	89	137	112	125	123
22	64	88	.....	147	95	105	150	131
23	68	61	.....	142	97	94	93	162
24	54	81	.....	86	102	132	102	137
25	68	65	.....	55	131	133	135	123
26	74	57	.....	82	139	84	118	126
27	63	75	.....	112	146	107	122	110
28	59	66	.....	123	92	127	124	144
29	53	54	.....	98	139	82	135	130
30	66	64	.....	82	140	86	135	118
31	93	.....	.....	51	.....	139	130	.....

NOTE.—The above table shows the total discharge through by-pass and the lock. Discharge through by-pass estimated from recorder graph for following periods: Aug. 2–9, Nov. 1, and Dec. 4–6, 1919, July 2 and 11–13, 1920; record imperfect.

Monthly discharge, in second-feet, of Barge Canal at Lock 32, Pittsford, N. Y., for the years ending Sept. 30, 1919 and 1920.

Month.	Maximum.	Minimum.	Mean.
1919.			
May 17–31	120	11	65.4
June	107	55	77.7
July	127	65	97.7
August	126	67	87.6
September	87	49	65.3
1919–20.			
October	93	50	66.9
November	89	49	69.4
December 1–9	79	40	52.4
May 15–31	147	30	101
June	146	45	98.0
July	160	78	109
August	157	80	114
September	171	106	132

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 (revised measurement by New York State Conservation Commission).

RECORDS AVAILABLE.—June 12, 1916, to September 30, 1920.

GAGE.—Vertical staff attached to downstream face of left bridge abutment; read by Miss Retta B. Potter and 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 ending September 30, 1919, 9.1 feet at noon May 22 (discharge, 10,600 second-feet); minimum stage recorded, 0.50 foot at 9 a. m. July 20 (discharge, 25 second-feet).

Maximum stage recorded during year ending September 30, 1920, 8.16 feet at 5.30 p. m. March 12 (discharge, 8,810 second-feet); minimum discharge, 25 second-feet, October 2–4.

1916–1920: Maximum stage recorded, 9.1 feet at noon May 22, 1919 (discharge, 10,600 second-feet); minimum discharge, 25 second-feet, August 25, 26, 1916, July 20 and October 2–4, 1919.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation changed slightly during high water of July, 1920; affected by ice December, 1919, to March, 1920. Rating curves well defined between 50 and 5,500 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 23	E. D. Burchard	1.24	234	Jan. 21	Lauterhahn and Covert.	[a] 1.76	97
Apr. 3	J. W. Moulton	1.48	308	Feb. 18	Otto Lauterhahn	[a] 2.08	80
19	M. H. Carson	2.15	677	Mar. 22	do	2.10	714
May 19	J. W. Moulton	2.19	709	June 9	B. F. Howe	.905	120
June 19	do	.89	126	Sept. 11	Currier and Lamoureux.	.39	34.2

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Genesee River at Scio, N. Y., for the years ending Sept. 30. 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	238	258	218	390	164	1,150	345	336	390	99	178	211
2	218	322	218	920	200	304	332	336	318	84	99	167
3	258	345	218	518	242	258	336	287	266	66	82	262
4	218	390	218	440	154	250	440	345	234	61	69	211
5	218	415	218	415	174	345	545	345	211	57	64	164
6	440	345	218	390	122	390	465	309	181	87	336	138
7	390	336	218	465	164	345	440	345	690	79	234	116
8	322	318	258	390	128	314	1,150	368	390	55	200	87
9	258	309	218	368	440	690	1,400	440	885	41	135	82
10	218	345	218	300	254	660	1,780	2,540	390	74	116	77
11	218	258	218	440	164	518	2,660	2,210	300	74	96	87
12	218	258	218	283	164	415	2,320	2,100	234	49	87	84
13	258	258	218	345	157	415	1,490	1,310	188	41	107	82
14	218	275	258	266	234	283	1,150	990	147	39	87	77
15	258	258	258	309	292	296	920	850	104	49	64	66
16	258	258	300	318	171	292	1,150	815	87	51	61	61
17	218	345	390	218	144	750	920	1,310	180	41	1,990	57
18	218	720	440	314	171	1,310	780	920	180	38	1,490	51
19	181	3,310	390	214	238	720	660	690	120	31	780	45
20	181	2,540	390	250	226	600	600	750	309	27	490	55
21	218	720	390	327	128	572	660	4,390	238	51	368	43
22	181	600	415	181	110	518	490	8,090	138	1,310	322	71
23	147	545	490	242	116	390	465	5,300	110	345	266	55
24	141	440	545	440	113	390	490	4,110	87	211	200	59
25	147	390	490	283	122	340	490	2,780	79	300	175	57
26	196	345	440	271	171	318	440	1,680	188	119	250	51
27	188	345	390	250	104	345	415	1,230	440	258	196	45
28	181	300	345	218	147	518	390	815	254	122	178	39
29	181	258	300	218	.....	480	390	690	164	110	161	35
30	279	218	300	211	.....	500	332	572	128	84	234	31
31	300	.....	300	164	.....	465	.....	465	.....	90	279	.....
1919–20.												
1	28	1,150	390	80	70	.....	490	690	74	.....	.....	.....
2	25	2,100	327	55	80	.....	465	545	79	.....	.....	.....
3	25	920	292	42	85	.....	465	490	69	.....	.....	.....
4	25	750	266	65	100	.....	415	490	57	.....	.....	.....
5	28	990	279	70	100	.....	660	390	74	.....	.....	.....
6	51	690	287	65	90	.....	518	368	79	.....	.....	.....
7	74	572	250	70	80	.....	415	304	79	.....	.....	.....
8	53	490	238	70	80	.....	440	254	82	.....	.....	.....
9	41	440	242	65	75	.....	415	238	104	.....	.....	.....
10	43	390	600	70	75	.....	440	218	74	.....	.....	.....
11	57	368	234	75	85	.....	415	390	59	.....	.....	.....
12	60	368	345	75	80	6,630	415	490	41	.....	.....	75
13	70	336	.....	100	85	5,780	415	368	41	.....	.....	188
14	71	283	.....	70	85	2,500	345	332	41	.....	.....	88
15	66	250	.....	80	95	1,580	390	300	38	.....	.....	69
16	71	222	.....	100	100	2,320	885	287	.....	.....	.....	61
17	171	214	.....	110	100	3,020	572	266	.....	.....	.....	51
18	128	200	.....	85	75	1,400	490	246	.....	.....	.....	36
19	101	178	.....	85	60	1,070	440	230	.....	.....	.....	32
20	90	161	.....	90	.....	850	415	214	.....	.....	.....	29
21	90	147	200	95	.....	690	390	283	.....	.....	.....	33
22	132	164	160	85	.....	690	390	242	.....	.....	.....	30
23	113	167	130	100	.....	780	572	.....	.....	.....	.....	28
24	96	181	95	120	.....	1,070	545	.....	.....	.....	.....	28
25	87	171	95	110	.....	1,230	465	.....	.....	.....	.....	33
26	87	171	110	100	.....	1,400	390	.....	.....	.....	.....	30
27	93	850	65	95	.....	1,580	440	.....	.....	.....	.....	55
28	415	440	70	90	.....	1,070	690	.....	.....	.....	.....	88
29	345	390	170	95	.....	815	545	.....	.....	.....	.....	69
30	300	660	140	95	.....	660	490	.....	.....	.....	.....	200
31	332	.....	150	80	.....	572	.....	.....	.....	.....	.....	.....

NOTE.—Discharge, Dec. 21, 1919, to Feb. 19, 1920, determined from gage heights corrected for ice effect by means of two discharge measurements and study of gage-height graph and weather records. Discharge for following periods when gage was not read, estimated by comparison with records for the station at St. Helena: Mar. 29 and 30, June 17–19, Aug. 24–26, Oct. 12 and 13, 1919, as shown in table; Dec. 13–20, 300 second-feet; Feb. 20–29, 1920, 66 second-feet; Mar. 1–11, 270 second-feet; May 23–31, 120 second-feet; July 1–31, 460 second-feet; Aug. 1–31, 200 second-feet; Sept. 1–11, 60 second-feet; Mar. 14, Sept. 26, 27, and 30, 1920, estimated as shown in table. Discharge, June 16–30, 1920, estimated at 100 second-feet by comparison with St. Helena records; gage readings of doubtful accuracy.

Monthly discharge of Genesee River at Scio, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 288 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	440	141	231	0.802	0.92
November	3,310	218	534	1.85	2.06
December	545	218	313	1.09	1.26
January	920	164	334	1.16	1.34
February	440	104	179	.622	.65
March	1,310	250	488	1.69	1.95
April	2,660	332	815	2.83	3.16
May	8,090	287	1,540	5.35	6.17
June	885	79	254	.882	.98
July	1,310	27	134	.465	.54
August	1,990	61	303	1.05	1.21
September	262	31	88.9	.309	.34
The year	8,090	27	437	1.52	20.58
1919–20.					
October	415	25	109	.378	.44
November	2,100	147	480	1.67	1.86
December	.....	65	243	.844	.97
January	120	42	83	.288	.33
February	100	.....	78	.271	.29
March	6,630	.....	1,250	4.34	5.00
April	885	345	481	1.67	1.90
May	690	.....	281	.976	1.13
June	104	38	83.0	.288	.32
July	.....	.....	460	1.60	1.84
August	.....	.....	200	.695	.80
September	200	28	62.8	.218	.24
The year	6,630	25	319	1.11	15.12

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 (revised measurement by Conservation Commission).

RECORDS AVAILABLE.—August 14, 1908, to September 30, 1920.

GAGE.—Stevens continuous water-stage recorder on left bank just below bridge, installed September 28, 1917, and a chain gage on upstream side of the bridge, installed August 14, 1908. Recording gage installed primarily to define fluctuations in medium and high stages. 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 by C. S. DeGolyer. Chain gage read by Herman Piper.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 11.35 feet at 4.30 p. m. May 22 (discharge, 32,800 second-feet); minimum stage from water-stage recorder 2.30 feet at 7 a. m. September 30 (discharge, 60 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 12.3 feet at 3 a. m. March 13 (discharge, 39,700 second-feet); minimum stage (chain gage) 2.10 feet at 7 a. m. October 5 (discharge, about 25 second-feet).

1908–1920: 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 slightly affected by ice during 1919, but seriously affected by ice during 1920.

ACCURACY.—Stage-discharge relation not permanent. Rating curve used for chain gage well defined between 50 and 2,000 second-feet. Gage read to quarter-tenths twice daily. Curve used for recording gage fairly well defined between 400 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 rating table except for days of great range in stage, when it was determined by averaging hourly discharge. Records for 1919 good; for 1920 fair.

Discharge measurements of Genesee River at St. Helena, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Nov. 23	C. S. DeGolyer	3.86	1,280	Jan. 5	C. S. DeGolyer	[a]5.33	200
Dec. 26	do	4.30	1,780	19	do	5.28	[b]129
1919.				Feb. 2	do	4.96	[b]141
Jan. 11	do	3.14	574	17	do	[a]4.92	189
Apr. 11	do	6.47	5,920	Mar. 1	do	[a]4.80	217
May 12	do	6.34	5,980	13	do	11.05	28,500
15	J. W. Moulton	4.52	2,070	24	A. H. Davison	5.67	4,280
22	C. S. DeGolyer	11.03	32,000	June 2	B. F. Howe	2.82	294
June 16	J. W. Moulton	3.05	470	15	C. S. DeGolyer	2.64	187
July 23	C. C. Covert	3.72	1,030	30	Otto Lauterhahn	2.52	106
Sept. 10	A. H. Davison	2.76	219	July 22	do	3.00	376
10	do	2.74	202	Aug. 10	do	2.83	324
				25	Covert and Lauterhahn	2.74	253
				Sept. 12	Lauterhahn and Lamoureux	3.68	1,180
				23	do	2.29	55.8

[a] Stage-discharge relation affected by ice.
[b] Measured discharge probably too low because of anchor and slush ice in measuring section.

Daily discharge, in second-feet, of Genesee River at St. Helena, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	348	2,470	748	985	336	2,300	860	1,300	1,200	203	193	465
2	450	1,840	470	5,360	348	1,370	772	1,300	1,050	157	274	367
3	470	1,500	540	2,140	342	906	730	1,200	906	215	203	312
4	540	1,310	662	1,090	436	772	860	1,100	838	119	157	381
5	403	1,560	580	885	410	1,000	1,250	1,540	748	119	172	312
6	423	1,560	620	748	354	1,360	1,250	1,360	705	183	238	299
7	705	1,140	540	790	342	1,050	1,150	1,100	1,200	132	620	249
8	620	885	662	985	354	953	1,200	1,200	1,200	157	381	193
9	470	790	3,650	790	342	2,140	2,600	1,200	1,800	193	312	215
10	403	748	1,700	540	366	3,320	4,750	10,400	1,540	119	215	193
11	348	790	1,200	505	203	2,290	9,000	15,000	1,000	119	261	215
12	342	705	1,090	838	354	1,600	9,800	6,350	748	162	209	339
13	331	620	1,200	885	342	1,660	3,700	4,620	662	162	162	261
14	403	540	2,140	790	372	906	3,320	3,110	465	144	249	198
15	331	443	3,650	790	1,140	816	2,440	2,290	465	144	119	226
16	366	470	2,650	885	662	1,300	2,950	2,000	430	274	136	255
17	320	416	1,560	748	416	3,510	2,950	3,100	465	238	395	162
18	257	1,500	1,200	705	354	4,970	2,290	3,500	395	162	2,290	152
19	277	3,220	935	705	292	2,440	1,930	2,140	312	193	1,480	136
20	211	1,990	838	540	309	1,860	1,540	2,390	261	111	1,050	162
21	257	1,630	790	580	391	1,540	1,600	11,100	953	238	772	119
22	360	1,370	885	620	366	1,360	1,420	23,800	540	339	620	172
23	309	1,200	1,920	790	379	1,100	1,150	15,600	339	1,300	540	183
24	277	985	1,990	1,770	410	906	1,660	8,980	238	540	465	193
25	277	838	2,060	1,310	457	816	1,800	8,340	238	339	395	193
26	257	620	1,840	985	457	772	1,540	4,730	367	274	620	152
27	540	662	1,090	838	430	730	1,860	3,410	860	238	381	127
28	540	457	885	705	348	953	2,000	2,440	816	339	299	105
29	505	580	705	620	.....	1,000	2,140	2,000	540	193	465	127
30	705	705	580	580	.....	906	1,600	1,660	381	193	360	78
31	5,710	.....	580	457	.....	1,000	.....	1,360	.....	183	339	.....

Daily discharge, in second-feet, of Genesee River at St. Helena, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	56	3,660	1,100	240	240	220	1,420	1,930	226	193	377	212
2	78	3,780	816	220	240	220	1,250	1,480	209	312	384	114
3	60	2,380	540	220	240	220	1,200	1,250	249	203	330	82
4	78	1,860	580	200	240	260	1,000	1,100	215	193	292	136
5	56	2,290	465	200	240	440	1,030	953	267	157	292	201
6	162	1,730	540	200	240	1,500	1,480	860	287	215	268	91
7	144	1,300	620	220	280	1,900	1,250	620	274	226	232	133
8	127	1,100	839	220	300	1,300	1,100	620	255	215	195	190
9	144	906	3,840	240	260	1,000	1,100	540	232	325	190	136
10	172	816	1,800	240	240	950	1,100	580	267	293	304	167
11	215	906	1,030	240	300	2,000	1,100	620	215	255	428	61
12	144	906	1,890	240	280	10,000	1,200	1,700	193	193	357	798
13	209	816	4,180	240	300	28,800	1,360	1,090	183	209	292	560
14	193	772	1,940	220	340	8,100	1,200	800	162	162	250	481
15	198	730	864	220	240	4,310	1,140	620	157	162	871	406
16	226	689	700	200	200	5,720	3,080	540	215	183	640	280
17	215	465	600	200	220	11,800	2,000	465	540	119	520	233
18	274	540	550	200	190	5,060	1,480	465	800	144	1,410	181
19	198	395	500	200	170	3,510	1,150	465	620	1,520	1,000	136
20	198	339	480	220	140	2,770	1,000	465	381	967	520	181
21	287	287	440	240	200	2,140	1,000	710	287	540	406	195
22	430	339	400	240	260	2,140	1,150	620	226	381	317	100
23	465	287	440	240	220	3,130	1,300	540	226	395	292	114
24	430	502	480	240	200	3,900	1,360	620	198	17,400	233	114
25	312	620	480	240	220	4,100	1,050	620	193	5,440	195	114
26	312	1,310	440	240	160	4,530	906	430	162	2,230	217	72
27	430	1,500	380	240	130	4,310	2,000	367	119	1,360	153	121
28	620	953	340	280	180	2,890	2,770	274	148	950	136	136
29	540	2,140	320	280	160	2,290	2,290	312	136	680	181	114
30	710	1,700	300	240	.....	2,000	1,600	287	132	520	125	745
31	1,280	.....	280	240	.....	1,600	.....	274	.....	481	172	.....

NOTE.—Discharge, Dec. 16, 1919, to Mar. 12, 1920, determined from gage heights corrected for ice effect by means of five discharge measurements and study of gage-height graph and weather records. Discharge for following periods when stage was below 3.3 feet, or when recorder was not in operation determined from chain gage heights: Oct. 1, 1918, to Mar. 2, 1919, June 4–6, 12–20, 22–26, June 29 to July 22, July 24 to Aug. 17, Aug. 22 to Oct. 30, Nov. 17–25, Dec. 3–7, Dec. 25, 1919, to Jan. 4, 1920, Feb. 3–29, May 7 to July 18, July 21–23, July 29 to Aug. 14, Aug. 16–17, Aug. 20 to Sept. 11, and Sept. 13–29, 1920.

Monthly discharge of Genesee River at St. Helena, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 992 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	5,710	211	573	0.578	0.67
November	3,220	416	1,120	1.13	1.26
December	3,650	470	1,290	1.30	1.50
January	5,360	457	999	1.01	1.16
February	1,140	203	404	.407	.42
March	4,970	730	1,540	1.55	1.79
April	9,800	730	2,400	2.42	2.70
May	23,800	1,100	4,830	4.87	5.62
June	1,800	238	722	.728	.81
July	1,300	111	242	.243	.28
August	2,290	119	464	.468	.54
September	465	78	218	.220	.25
The year	23,800	78	1,240	1.25	17.00
1919–20.					
October	1,280	56	289	.291	.34
November	3,780	287	1,200	1.21	1.35
December	4,180	280	909	.916	1.06
January	280	200	226	.228	.26
February	340	130	229	.231	.25
March	28,800	220	3,970	4.00	4.61
April	3,080	906	1,400	1.41	1.57
May	1,930	274	717	.723	.84
June	800	119	259	.261	.29
July	17,400	119	1,180	1.19	1.37
August	1,410	125	374	.377	.43
September	798	61	220	.222	.25
The year	28,800	56	920	.927	12.62

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 (revised measurement by New York State Conservation Commission).

RECORDS AVAILABLE.—May 22, 1903, to April 30, 1906; August 12, 1908, to December 31, 1913; July 12, 1915, to September 30, 1920.

GAGE.—Gurley 7-day graph 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 on upstream side of bridge.

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

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 24.45 feet at 2 a. m. May 23 (discharge, 32,000 second-feet); minimum stage from water-stage recorder, 0.95 foot at 5 p. m. September 29 (discharge, 165 second-feet).

Maximum open-water stage during year ending September 30, 1920, from water-stage recorder, 22.90 feet, 7 to 8 p. m. July 24 (discharge, 20,700 second-feet); minimum stage from water-stage recorder, 0.38 foot at 11 a. m. October 4 (discharge, 54 second-feet).

1903–1920 (not including periods of no record; see "Records available"): 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 during the year except as affected by ice. Rating curve well defined between 150 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 24	E. D. Burchard	3.83	1,510	Jan. 6	Otto Lauterhahn	[a]2.61	342
Mar. 4	do	2.96	1,060	23	do	[a]2.70	367
Apr. 14	J. W. Moulton	7.93	4,130	Feb. 21	do	[a]2.87	378
May 13	O. W. Hartwell	13.86	7,960	Mar. 12	C. C. Covert		[b]11,300
14	do	10.50	5,930	16	Otto Lauterhahn	[a]20.91	9,820
24	J. W. Moulton	21.98	14,300	25	do	9.29	5,680
26	do	15.36	8,960	Apr. 15	do	3.45	1,350
June 14	do	2.42	808	15	do		[b]1,380
Aug. 18	A. H. Davison	6.12	3,350	May 30	B. F. Howe	1.50	343
20	do	3.62	1,650	July 15	Otto Lauterhahn	1.26	258
Sept. 10	do	1.37	311	25	do	15.16	8,480
				Sept. 23	do	1.06	189

[a] Stage-discharge relation affected by ice.
[b] Measurement made from highway bridge at Geneseo, 8½ miles by river below the gage.

Daily discharge, in second-feet, of Genesee River at Jones Bridge, near Mount Morris, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	560	3,310	815	1,110	615	1,250	1,220	1,720	1,720	590	265	565
2	545	2,150	790	4,470	603	2,200	1,030	1,720	1,540	506	260	515
3	535	1,780	665	2,970	637	1,360	1,030	1,540	1,330	448	312	438
4	565	1,420	615	1,480	615	1,080	1,140	1,300	1,170	399	298	403
5	565	2,210	665	1,200	615	1,220	1,540	1,660	1,080	349	268	443
6	590	1,840	665	1,000	590	1,600	1,720	1,660	1,030	312	264	434
7	865	1,300	590	1,000	465	1,360	1,540	1,300	1,360	310	303	361
8	892	1,110	665	1,100	448	1,300	1,480	1,300	1,720	300	515	353
9	715	975	3,040	1,100	443	2,040	2,800	1,300	2,820	300	399	323
10	615	865	1,960	1,000	461	4,830	5,380	8,580	2,480	300	337	295
11	540	892	1,300	950	445	3,100	12,400	20,500	1,600	300	312	285
12	506	840	1,170	850	365	2,220	15,800	13,500	1,170	305	292	305
13	484	765	1,200	850	394	2,150	8,920	8,630	948	530	284	380
14	540	690	1,800	1,000	456	1,360	5,010	5,420	790	570	258	330
15	525	640	3,100	1,100	966	1,170	3,280	3,780	690	600	241	312
16	506	590	2,820	1,100	1,060	1,250	3,440	2,890	665	415	235	305
17	470	555	1,900	1,100	765	4,350	3,680	3,640	665	312	364	288
18	421	992	1,480	1,100	615	5,930	2,890	5,070	640	302	1,990	278
19	403	3,380	1,220	1,000	535	4,190	2,410	2,940	565	281	1,850	264
20	385	2,480	1,060	1,000	413	2,480	2,020	2,890	525	270	1,380	271
21	416	1,990	975	950	515	2,080	1,900	13,200	484	264	948	280
22	530	1,660	920	1,000	540	1,840	1,840	22,000	815	410	750	271
23	488	1,420	1,720	1,200	545	1,540	1,480	23,800	615	800	655	251
24	421	1,220	1,720	1,660	590	1,250	2,020	14,400	474	1,830	560	258
25	385	1,060	2,310	1,900	565	1,140	2,480	12,700	425	600	520	254
26	399	948	2,280	1,360	615	1,030	2,080	8,860	461	460	550	248
27	565	840	1,540	1,140	615	975	2,410	5,630	665	381	535	226
28	665	765	1,220	975	615	1,110	2,540	3,910	1,200	353	470	204
29	690	740	1,080	865	.....	1,300	2,820	2,820	865	394	474	187
30	892	815	920	815	.....	1,170	2,220	2,220	715	323	470	201
31	3,710	.....	865	740	.....	1,280	.....	2,020	.....	300	448	.....

Daily discharge, in second-feet, of Genesee River at Jones Bridge, near Mount Morris, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	181	4,100	2,150	360	340	240	1,840	1,900	502	238	665	219
2	181	4,240	1,300	320	340	240	1,660	2,080	360	268	615	216
3	160	3,700	920	320	360	240	1,540	1,660	350	291	565	192
4	117	2,150	840	320	360	280	1,360	1,420	300	261	506	235
5	133	2,390	765	320	380	1,100	1,250	1,250	350	248	457	213
6	213	2,380	765	300	380	2,800	1,540	1,110	385	258	407	207
7	219	1,780	765	320	380	4,600	1,660	1,000	425	274	369	232
8	207	1,420	765	340	400	3,800	1,480	948	403	271	334	238
9	219	1,220	1,010	360	400	3,400	1,360	865	377	268	319	258
10	238	1,080	4,640	380	400	3,200	1,330	815	369	407	341	261
11	281	948	2,390	420	400	4,600	1,360	815	369	373	555	207
12	201	1,030	1,660	440	380	9,000	1,330	1,450	319	316	550	381
13	274	1,030	1,730	420	420	13,000	1,480	1,660	281	274	457	892
14	298	920	4,280	400	440	12,000	1,540	1,200	291	254	615	525
15	291	825	2,350	340	440	11,000	1,360	1,030	288	254	975	457
16	285	760	1,100	320	360	10 000	1 250	920	278	245	1,000	357
17	298	710	900	340	320	17,700	3,170	840	435	241	790	312
18	302	665	800	360	340	11,200	2,080	765	1,080	210	1,450	268
19	349	615	700	340	380	5,700	1,660	715	920	1,380	1,170	190
20	337	590	650	340	400	3,680	1,360	690	640	1,520	765	198
21	316	530	600	320	360	2,750	1,200	815	510	815	530	216
22	420	515	550	340	340	2,750	1,250	920	421	560	461	201
23	615	525	550	340	340	3,600	1,420	840	369	506	430	166
24	515	590	550	340	320	4,810	1,660	765	337	14,500	381	181
25	425	615	600	360	300	5,130	1,540	765	334	14,300	334	178
26	403	615	600	360	280	5,370	1,250	715	302	5,110	305	165
27	656	1,220	600	360	260	5,450	1,250	640	251	2,540	278	182
28	665	1,900	550	400	260	3,830	3,250	565	261	1,660	254	209
29	715	1,170	500	380	240	2,820	3,240	470	268	1,110	226	222
30	1,000	2,090	500	400	.....	2,540	2,410	381	254	865	213	307
31	2,000	.....	450	380	.....	2,150	.....	434	.....	740	226	.....

NOTE.—Stage-discharge relation affected by ice Jan. 5-22, 1919, Dec. 16, 1919, to Mar. 16, 1920; discharge determined from gage heights corrected for ice effect by means of discharge measurements and study of gage-height graph and weather records. Discharge for following periods estimated from hydrograph in comparison with records for other stations on Genesee River: Dec. 1-7 and 14-16, 1918, July 7-11, 13-16, 20, 22-26, 31, Aug. 1, 2, 7, 17, 18, Sept. 13, 14, 21, Oct. 30, 31, Nov. 1, 15-17, Dec. 6, 13, and 14, 1919. Gage heights, May 29 and 30, 1920, estimated for part of day.

Monthly discharge of Genesee River at Jones Bridge, near Mount Morris, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, [a]1,400 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	3,710	385	658	0.470	0.54
November	3,380	555	1,340	.956	1.07
December	3,100	590	1,390	.992	1.14
January	4,470	740	1,260	.900	1.04
February	1,060	365	575	.411	.43
March	5,930	975	1,970	1.41	1.63
April	15,800	1,030	3,350	2.39	2.67
May	23,800	1,300	6,550	4.68	5.40
June	2,820	425	1,040	.743	.83
July	1,830	270	446	.319	.37
August	1,990	235	542	.398	.46
September	565	187	318	.227	.25
The year	23,800	187	1,620	1.16	15.83

[a] Supersedes figure published in previous reports.

Monthly discharge of Genesee River at Jones Bridge, near Mount Morris, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919–20.					
October	2,000	117	404	0.289	0.33
November	4,240	515	1,410	1.01	1.13
December	4,640	450	1,180	.843	.97
January	440	300	356	.254	.29
February	440	240	356	.254	.27
March	17,700	240	5,130	3.66	4.22
April	3,250	1,200	1,670	1.19	1.33
May	2,080	381	982	.701	.81
June	1,080	254	401	.286	.32
July	14,500	210	1,630	1.16	1.34
August	1,450	213	534	.381	.44
September	892	165	270	.193	.22
The year	17,700	117	1,200	.86	11.67

GENESEE RIVER AT ROCHESTER, N. Y.

LOCATION.—At Elmwood Avenue Bridge at north end of South Park, 3¼ miles below mouth of Black Creek, 3½ miles above center of city of Rochester, Monroe County, and 7½ miles above mouth of river.

DRAINAGE AREA.—2,440 square miles (revised measurement by engineers of the New York State Conservation Commission).

RECORDS AVAILABLE.—Discharge records February 9, 1904, to September 30, 1918. Fragmentary records prior to this period published in Water-Supply Papers 24, 65, and 97. Gage-height records October 1 to 10, 1918, and March 3 to June 7, 1919. Rating does not apply for these periods on account of Barge Canal construction operations in progress in river channel.

GAGE.—Gurley water-stage recorder installed in December, 1910, in the pump house, on the right bank immediately below the bridge. Recorder inspected by George A. Bailey. Prior to December, 1910, a staff gage bolted to the downstream end of the first pier from the right abutment. Elevation of zero of gage 506.848 feet, Barge Canal datum, and 245.591 feet, city of Rochester datum. Record suspended October 11, 1918, on account of dredging operations in river channel.

Vertical enamel staff gage installed March 3, 1919, above site of temporary dam, giving elevations referred to Barge Canal datum; record obtained March 3 to June 7, 1919. Gage read by J. Bendon.

DISCHARGE MEASUREMENTS.—Made from downstream side of Elmwood Avenue Bridge.

Discharge measurements of Genesee River at Rochester during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	E. D. Burchard	0.77	1,050	Apr. 8	J. W. Moulton	[a]508.60	2,210
Nov. 9	do	1.07	1,540	15	C. C. Covert	[a]510.79	5,830
Mar. 3	do	[a]508.61	2,300	16	J. W. Moulton	[a]509.86	4,130
4	do	[a]508.37	1,830	17	do	[a]510.52	5,390
Apr. 5	J. W. Moulton	[a]508.34	1,740	May 14	do	[ab]514.6	16,100
7	do	[a]508.58	2,240				

[a] Barge Canal datum.
[b] Débris on control.

Daily gage height, in feet, of Genesee River at Rochester, N. Y., for the year 1919.

Day.	Oct.	Mar.	Apr.	May.	June.	Day.	Oct.	Mar.	Apr.	May.	June.
1	0.98	.....	508.40	509.30	509.32	16	.....	508.33	509.83	513.20	.....
2	.84	.....	508.27	508.83	509.20	17	.....	509.15	510.48	311.57	.....
3	.55	508.69	508.20	508.93	508.67	18	.....	511.37	510.13	511.70	.....
4	.55	508.25	508.18	508.78	508.52	19	.....	511.45	509.45	512.93	.....
5	.60	508.17	508.17	509.00	509.15	20	.....	510.10	509.12	511.23	.....
6	.56	508.33	508.47	508.57	510.45	21	.....	509.17	508.85	513.97	.....
7	.51	508.47	508.58	509.03	511.47	22	.....	508.83	508.73	517.22	.....
8	.89	508.18	508.60	508.83	.....	23	.....	508.65	508.63	520.00	.....
9	1.05	508.55	508.65	508.72	.....	24	.....	508.47	508.43	520.70	.....
10	.86	510.80	509.83	510.03	.....	25	.....	508.15	509.23	520.92	.....
11	.....	510.73	512.77	516.65	.....	26	.....	508.20	509.35	519.15	.....
12	.....	509.80	514.60	519.17	.....	27	.....	508.13	509.42	516.95	.....
13	.....	509.17	514.47	520.+	.....	28	.....	508.23	509.73	513.50	.....
14	.....	508.90	512.20	518.87	.....	29	.....	508.23	509.83	511.10	.....
15	.....	508.32	510.53	515.23	.....	30	.....	508.32	509.78	509.72	.....
						31	.....	508.30	.....	509.62	.....

NOTE.—Owing to construction operations on the Barge Canal discharge records ceased September 30, 1918, and station was officially discontinued. Gage heights obtained after that date can not be applied to rating table to give accurate estimates of discharge.

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 below center of city of Rochester, Monroe County, and 5 miles above mouth of river.

DRAINAGE AREA.—2,460 square miles.

RECORDS AVAILABLE.—December 25, 1919, to September 30, 1920.

GAGE.—Gurley 7-day water-stage recorder installed in northwest corner of power house. Chain gage at same location from April 5 to June 30. Recorder inspected by C. M. Hawkins.

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

CHANNEL AND CONTROL.—Coarse gravel and large broken rock.

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

REGULATION.—Flow of river regulated by gates in Station No. 5, at gage, and at other points upstream.

Data inadequate for determination of discharge.

Discharge measurements of Genesee River at Driving Park Avenue, Rochester, N. Y., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 18[a]	A. H. Davison	[b]508.3	23,400	May 4[a]	Otto Lauterhahn	[b]505.36	2,260
19[a]	do	[b]507.4	17,500	June 5	Lauterhahn and Howe.	[c]3.80	1,800
20[a]	do	[b]505.95	8,570	26	Otto Lauterhahn	[c]3.80	1,850
22[a]	do	[b]505.17	5,150	July 21	do	[c]3.97	2,120
Apr. 12[a]	Otto Lauterhahn	[b]504.12	1,840	Aug. 17	do	[c]3.72	1,710
14[a]	do	[b]504.25	2,210	19	do	[c]3.77	2,480

[a] Measurement made at Clarissa Street Bridge.
[b] Barge Canal datum.
[c] Gage height read on chain gage and reduced to datum of water-stage recorder.

Daily gage height, in feet, of Genesee River at Driving Park Avenue, Rochester, N. Y., for the year ending Sept. 30, 1920.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	2.2	.....	.....	.....	5.2	3.4	3.1	3.2
2	.....	2.4	.....	2.35	.....	4.7	3.2	3.2	3.3
3	.....	2.4	2.25	2.3	.....	4.9	3.4	3.0	3.4
4	.....	2.2	2.25	.....	.....	4.4	3.3	2.8	3.4
5	.....	1.98	2.2	2.35	4.2	3.8	2.95	2.75	3.1
6	.....	2.1	2.25	2.75	3.9	3.5	2.75	2.8	2.95
7	.....	2.1	2.35	4.25	3.8	3.6	3.1	2.7	3.4
8	.....	2.1	2.3	.....	4.1	3.4	3.3	3.1	2.95
9	.....	2.25	2.45	.....	4.0	3.2	2.95	2.75	2.9
10	.....	1.89	2.35	.....	3.8	3.6	3.3	2.95	3.2
11	.....	2.15	2.4	.....	4.1	3.4	3.2	2.85	3.1
12	.....	2.15	2.45	.....	4.0	3.4	3.2	2.85	3.0
13	.....	2.3	2.5	.....	3.7	3.1	2.7	2.8	3.3
14	.....	2.05	2.45	.....	3.8	2.8	3.2	2.75	3.5
15	.....	2.3	2.5	.....	3.9	2.8	3.0	2.6	2.85
16	.....	2.1	2.5	.....	3.9	2.95	2.95	2.65	3.8
17	.....	2.2	2.4	.....	5.2	3.6	3.0	2.65	3.6
18	.....	2.1	2.3	.....	5.3	3.0	3.1	2.8	3.6
19	.....	2.1	2.35	.....	4.8	3.6	3.4	2.65	3.7
20	.....	2.15	2.4	.....	3.9	3.3	3.6	2.9	3.8
21	.....	2.0	2.45	.....	3.7	3.6	3.7	4.2	3.5
22	.....	2.1	2.3	.....	3.5	3.6	3.5	3.5	3.3
23	.....	2.1	2.55	.....	3.5	3.6	3.3	3.3	3.1
24	.....	2.1	2.35	.....	3.9	4.0	3.2	3.4	2.65
25	2.8	2.05	2.35	.....	4.1	3.6	3.2	7.2	2.95
26	2.75	.....	2.3	.....	4.3	3.7	3.4	8.7	1.97
27	2.5	.....	.....	.....	3.5	3.4	2.85	7.5	2.9
28	2.45	.....	2.35	.....	3.6	3.4	2.85	4.9	1.87
29	2.35	.....	.....	.....	5.3	3.4	2.8	4.6	1.82
30	2.4	2.3	.....	.....	5.7	2.95	3.1	3.7	2.6
31	2.55	2.4	.....	.....	.....	3.0	.....	3.4	2.45

NOTE.—No gage-height record Jan. 26–29, Feb. 1–2, 27, 29, Mar. 1, 4; water-stage recorder out of order Mar. 8 to Apr. 4 and Sept. 1–30, no gage in operation.

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 (revised measurement by engineers of New York State Conservation Commission).

RECORDS AVAILABLE.—July 21, 1910, to December 31, 1912; July 10, 1915, to June 30, 1917; March 10, 1919, to June 17, 1919; March 17, 1920, to September 30, 1920.

GAGE.—Vertical staff at downstream side of left abutment; read by C. W. Maloney and F. S. Fox.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record for year ending September 30, 1919, 12 feet at 8 a. m. May 22 (discharge, 3,500 second-feet); minimum discharge, 87 second-feet June 14.

Maximum stage recorded during period of record for year ending September 30, 1920, 11.50 feet at 7 a. m. July 24 (discharge, 3,950 second-feet); minimum stage recorded, 6.00 feet several times in July (discharge, 23 second-feet).

1910–1912, 1915–1917, and 1919–1920: 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 stage recorded, 5.2 feet several times during October and November, 1916 (discharge, about 15 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation not permanent. Rating curves fairly well defined between 30 and 1,500 second-feet; gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of Canaseraga Creek at Dansville, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Apr. 12	J. W. Moulton	8.04	943	Mar. 14	Otto Lauterhahn	7.71	608
12	do	7.82	837	15	do	a 7.19	286
15	do	6.70	262	15	do	7.50	515
May 13	do	7.48	595	17	do	8.27	946
23	C. C. Covert	9.08	1,610	19	do	7.12	309
27	J. W. Moulton	7.42	462	20	do	6.98	246
June 12	do	6.68	135	26	do	7.35	400
Aug. 20	A. H. Davison	6.31	57.1	June 1	Lauterhahn and Howe.	6.17	39.7
20	do	6.33	64.7	July 14	Otto Lauterhahn	6.26	52.3
Sept. 11	do	6.12	30.7	Aug. 25	Lauterhahn and Covert	6.21	34.8
1920.				25	do	6.205	35.2
Mar. 13	Covert and Lauterhahn	a 9.10	1,480	Sept. 24	Lauterhahn and Lamoureux.	6.08	24.2
14	do	a 7.52	410				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Canaseraga Creek at Dansville, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	1919				1920					
	Mar.	Apr.	May.	June.	Mar.	Apr.	May.	July.	Aug.	Sept.
1	.....	155	260	162	.....	128	168	.....	65	25
2	.....	180	210	162	.....	122	128	.....	54	25
3	.....	139	175	148	.....	122	109	.....	49	25
4	.....	210	a 178	122	.....	109	96	23	44	25
5	.....	260	180	a 122	.....	128	92	23	40	25
6	.....	210	151	122	.....	122	74	23	40	30
7	.....	210	145	193	.....	117	74	25	34	30
8	.....	180	139	134	.....	92	65	31	44	25
9	.....	280	210	592	.....	92	60	53	44	25
10	320	792	2,070	483	.....	85	70	33	54	27
11	240	1,400	1,680	162	.....	92	128	31	54	32
12	195	930	930	122	.....	85	178	29	46	96
13	155	450	614	122	.....	96	128	25	40	65
14	135	340	403	87	.....	85	96	36	40	46
15	135	260	320	98	.....	74	85	33	46	36
16	240	280	280	98	.....	300	70	31	46	32
17	450	240	476	.....	720	192	65	27	61	27
18	586	210	340	.....	390	146	65	25	151	25
19	320	180	240	.....	390	117	56	300	75	25
20	210	155	280	.....	240	96	65	96	54	25
21	180	160	1,490	.....	192	92	92	60	46	30
22	168	139	a 2,630	.....	228	96	70	49	46	27
23	135	132	1,710	.....	368	146	65	53	44	25
24	131	360	1,620	.....	368	137	65	2,740	40	25
25	119	280	856	.....	390	96	85	653	34	25
26	115	210	536	.....	440	85	65	289	34	25
27	115	210	410	.....	345	128	56	181	34	27
28	119	240	301	.....	220	345	49	124	30	34
29	125	340	263	.....	192	252	49	96	30	25
30	131	280	227	.....	178	168	42	75	25	96
31	151	.....	193	.....	152	.....	42	61	25	.....

a Estimated by comparison with discharge at Cumminsville.

NOTE.—Discharge, June 1-30, 1920, estimated at 53 second-feet and July 1-3, 1920, at 30 second-feet on basis of records of Canaseraga Creek at Shaker's Crossing and Keshequa Creek at Sonyea; no gage-height record.

Monthly discharge of Canaseraga Creek near Dansville, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, [a] 158 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919.					
March 10–31	586	115	203	1.28	1.05
April	1,400	132	314	1.99	2.22
May	2,630	139	630	3.99	4.60
June 1–16	592	87	183	1.16	.69
1920.					
March 17–31	720	152	321	2.03	1.13
April	345	74	132	.835	.93
May	178	42	82.3	.521	.60
June			53.0	.336	.37
July	2,740	23	171	1.08	1.24
August	151	25	47.4	.300	.35
September	96	25	33.7	.213	.24

[a] Supersedes figure published in previous reports.

CANASERAGA CREEK AT CUMMINSVILLE, N. Y.

LOCATION.—At bridge on State road in Cumminsville, Livingston County, 1 mile downstream from station maintained as "Canaseraga Creek near Dansville," 1½ miles below Mill Brook, and 21 miles above mouth of creek.

DRAINAGE AREA.—160 square miles (revised measurement by New York State Conservation Commission).

RECORDS AVAILABLE.—October 23, 1917, to September 30, 1919, at this station; and at station near Dansville July 21, 1910, to December 31, 1912, and July 10, 1915, to December 29, 1917.

GAGE.—Vertical staff gage in three sections on downstream face of bridge pier graduated from 0 to 10.0 feet. Read by George Freed.

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

CHANNEL AND CONTROL.—Bed of stream composed of fairly well compacted gravel and small boulders; subject to shift during severe floods.

EXTREMES OF DISCHARGE.—1917–1919: Maximum stage recorded 6.8 feet at 8.30 a. m. May 22, 1919 (discharge, 6,540 second-feet); minimum discharge, 21 second-feet, several days in August and September, 1918, and September, 1919.

ICE.—Stage-discharge relation affected by ice.

Owing to uncertainty as to accuracy of gage readings, the records for 1920 are withheld from publication.

Discharge measurements of Canaseraga Creek at Cumminsville, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Jan. 25	E. D. Burchard	1.07	61.0	Sept. 11	A. H. Davison	0.82	46.8
Mar. 31	J. W. Moulton	1.39	138	11	do	.73	38.1
June 13	do	1.17	116	1920.			
13	do	1.16	121	Mar. 17	Otto Lauterhahn	2.60	838
23	do	1.00	80.6	18	do	1.80	425
Aug. 19	A. H. Davison	1.00	70.7	19	do	1.6	314
19	do	.97	66.2	24	do	1.7	352
Sept. 11	do	.72	41.8	June 1	do	.63	19.6

Daily discharge, in second-feet, of Canaseraga Creek at Cumminsville, N. Y., for the years ending Sept. 30, 1918 and 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917-18.												
1	.....	324	82	140	40	520	153	71	116	36	36	21
2	.....	286	82	140	34	491	153	68	90	36	36	21
3	.....	222	82	200	34	462	153	66	66	32	36	21
4	.....	196	86	140	40	378	145	66	66	27	27	21
5	.....	201	84	120	40	406	122	66	66	27	32	24
6	.....	196	82	120	34	645	122	66	66	27	27	27
7	.....	184	82	90	46	434	138	63	66	27	27	27
8	.....	141	80	55	40	491	157	122	66	27	27	27
9	.....	141	100	55	40	406	157	90	66	32	27	27
10	.....	130	85	65	40	1,080	130	116	66	49	27	27
11	.....	126	85	55	120	434	116	142	58	49	49	27
12	.....	123	80	100	700	925	119	122	161	36	42	27
13	.....	116	75	90	650	815	142	122	106	36	27	36
14	.....	110	110	55	580	2,190	350	122	90	36	27	27
15	.....	113	90	55	1,170	815	491	100	66	36	27	27
16	.....	104	85	55	462	406	406	90	49	36	27	36
17	.....	104	85	45	294	378	294	76	49	32	27	49
18	.....	104	85	30	294	245	434	76	49	36	27	36
19	.....	107	160	34	1,080	245	305	73	36	36	27	27
20	.....	95	150	40	2,080	265	224	103	36	36	27	161
21	.....	89	116	38	350	279	289	122	36	27	21	66
22	.....	107	116	40	294	367	241	122	49	27	21	42
23	.....	110	110	40	294	279	173	122	49	27	21	36
24	.....	101	126	40	294	224	153	161	49	27	21	36
25	.....	92	172	55	322	165	153	138	49	49	21	36
26	.....	86	150	46	1,130	130	122	122	42	42	21	36
27	.....	86	190	40	678	126	109	122	36	36	21	36
28	852	86	140	32	350	122	90	112	36	36	21	36
29	1,060	82	160	30	.....	145	90	122	36	36	21	36
30	1,060	82	190	34	.....	145	80	138	36	49	21	36
31	658	.....	160	40	.....	153	.....	122	.....	36	27	.....
1918-19.												
1	36	58	27	90	49	550	122	202	207	71	56	56
2	36	36	27	460	66	294	122	198	165	56	56	44
3	32	36	27	202	49	224	142	194	165	56	44	44
4	27	36	27	49	36	161	245	194	128	56	44	40
5	27	36	27	49	36	161	250	190	128	44	40	35
6	36	36	27	49	36	122	250	161	128	44	35	27
7	36	36	36	49	36	122	236	153	128	44	35	27
8	36	36	66	49	27	122	194	142	161	44	35	27
9	36	36	202	66	36	430	339	126	470	44	35	27
10	36	36	90	106	36	294	1,000	1,350	378	44	27	27
11	27	36	49	122	32	245	1,350	1,080	278	71	27	27
12	27	36	49	90	27	202	1,000	780	212	56	27	50
13	36	32	36	90	27	161	645	520	146	56	27	44
14	36	27	36	142	36	161	350	322	115	56	27	44
15	36	27	42	122	36	161	250	241	96	50	27	44
16	27	27	49	90	36	200	284	241	96	44	27	44
17	27	32	36	90	36	400	265	250	91	44	146	35
18	27	224	36	90	32	580	202	211	112	44	112	35
19	27	182	36	66	27	350	173	186	94	44	112	35
20	27	122	36	66	32	220	161	169	88	50	71	31
21	36	90	36	66	36	160	165	1,450	71	84	56	27
22	32	90	36	66	36	122	153	3,210	71	207	64	21
23	27	49	106	66	49	122	122	1,550	71	128	71	27
24	27	49	142	49	49	122	460	1,190	71	84	56	27
25	27	49	106	42	49	130	322	940	65	71	64	27
26	27	36	122	36	49	130	245	755	96	64	56	21
27	27	36	90	36	49	103	270	470	230	56	44	21
28	27	36	90	36	49	106	250	345	146	56	44	21
29	27	36	90	36	.....	100	274	303	112	50	44	21
30	32	36	78	36	.....	119	232	263	84	44	44	21
31	142	.....	66	36	.....	165	.....	239	.....	44	56	.....

NOTE.—Discharge, Dec. 9-20, 1917, and Dec. 26, 1917, to Feb. 13, 1918, estimated because of ice; Mar. 16-21, 1919, estimated on basis of discharge of Canaseraga Creek at Dansville, and at Groveland Station.

Monthly discharge of Canaseraga Creek at Cumminsville, N. Y., for the years ending Sept. 30, 1918 and 1919.

[Drainage area, 160 square miles.[a]]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1917–18.					
November	324	82	135	0.844	0.94
December	190	75	112	.700	.81
January	200	30	68.4	.428	.49
February	2,080	34	412	2.58	2.69
March	2,190	122	457	2.86	3.30
April	491	80	194	1.21	1.35
May	161	63	104	.650	.75
June	161	36	61.7	.386	.43
July	49	27	34.9	.218	.25
August	49	21	27.3	.171	.20
September	161	21	36.4	.228	.25
1918–19.					
October	142	27	34.4	.215	.25
November	224	27	54.5	.341	.38
December	202	27	62.0	.388	.45
January	460	36	85.2	.532	.61
February	66	27	39.1	.244	.25
March	580	100	211	1.32	1.52
April	1,350	122	336	2.10	2.34
May	3,210	126	569	3.56	4.10
June	470	65	147	.919	1.03
July	207	44	61.5	.384	.44
August	146	27	51.9	.324	.37
September	56	21	32.6	.204	.23
The year	3,210	21	141	.881	11.97

[a] Supersedes figure published in previous reports.

CANASERAGA CREEK AT GROVELAND STATION, N. Y.

LOCATION.—At highway bridge at Groveland Station, Livingston County, 6 miles by creek above mouth of Keshequa Creek.

DRAINAGE AREA.—184 square miles (revised measurement by engineers of New York State Conservation Commission).

RECORDS AVAILABLE.—August 5, 1915, to September 30, 1916; February 28, 1917, to March 31, 1920, when station was discontinued.

GAGE.—Chain gage near center of downstream side of bridge. Prior to March 30, 1916, inclined staff on right bank about 400 feet above bridge, at practically same datum (560 feet, Conservation Commission datum). Gage read by Thomas Maimone, October 1 to November 15, 1919, and by Herbert Gardner after March 11, 1920.

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

CHANNEL AND CONTROL.—Creek flows through improved channel which is in gravel and is likely to shift.

EXTREMES OF DISCHARGE.—1915–1920: Maximum stage recorded, 18.05 feet at 9.20 a. m. May 22, 1919 (discharge, 4,380 second-feet); minimum stage recorded, 6.3 feet at 7 a. m. November 12, 1918, and at 6 p. m. November 16, 1918 (discharge, 19 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation changed during the high water in March, 1920. Rating curve used before the change well defined between 35 and 3,000 second-feet; curve used after the change fairly well defined between 40 and 250 second-feet and well defined between 250 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 fair.

Discharge measurements of Canaseraga Creek at Groveland Station, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Jan. 25	E. D. Burchard	7.32	102	Aug. 19	A. H. Davison	7.31	97.3
Mar. 31	J. W. Moulton	7.80	167	Sept. 10	do	6.80	49.5
Apr. 12	do	12.23	1,020				
12	do	11.62	893	1920.			
13	do	10.01	557	Jan. 22	Covert and Lauterhahn.	[a] 7.63	42.3
May 13	O. W. Hartwell	10.71	680	Mar. 13	do	13.45	1,320
23	do	13.76	1,610	17	Otto Lauterhahn	11.44	781
24	do	12.80	1,190	18	do	9.69	446
25	J. W. Moulton	12.27	1,080	19	do	8.95	330
26	do	10.55	649	20	do	8.71	288
27	do	9.84	510	26	do	9.62	438
June 11	do	8.16	192	Apr. 15	do	7.47	89.6
23	do	7.19	82.0	16	do	8.59	277
July 21	C. C. Covert	7.34	109	June 1	do	6.94	48.6
23	do	7.32	104				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Canaseraga Creek at Groveland Station, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	39	196	48	196	54	429	152	275	227	79	42	58
2	33	138	63	341	70	138	132	275	211	67	52	52
3	42	106	54	174	50	112	188	243	196	83	60	52
4	34	100	48	112	65	112	275	211	174	54	65	44
5	33	106	52	94	56	125	243	196	152	55	58	44
6	65	100	63	112	52	138	196	181	188	76	52	44
7	88	112	63	125	63	145	227	166	275	63	50	44
8	65	106	63	132	67	152	196	166	324	56	54	42
9	54	65	259	118	54	500	291	166	325	50	44	46
10	46	52	181	70	52	375	835	1,680	307	65	44	46
11	39	33	166	88	46	291	1,480	1,740	227	100	44	58
12	34	25	138	106	50	211	1,060	1,020	181	76	50	65
13	34	25	112	138	48	227	411	660	152	63	42	58
14	32	25	211	138	60	112	370	466	112	48	34	50
15	29	25	307	181	90	132	300	358	125	52	33	54
16	32	25	196	138	56	196	340	307	125	76	30	46
17	34	40	145	138	56	485	300	560	166	54	145	50
18	32	166	112	112	58	580	240	375	125	60	106	58
19	36	243	100	100	76	393	210	291	100	88	100	50
20	35	152	88	106	82	358	227	358	112	56	76	57
21	40	138	76	88	54	181	196	1,950	100	100	65	46
22	40	112	70	76	54	138	181	2,790	94	259	60	44
23	45	88	145	112	65	125	145	1,950	88	100	52	42
24	45	65	240	196	58	112	485	1,350	88	82	56	40
25	45	76	340	112	50	100	291	970	152	76	58	42
26	45	63	180	106	46	100	275	680	181	56	63	36
27	45	58	140	112	54	112	307	525	125	48	54	34
28	50	50	110	76	70	125	324	411	112	48	65	34
29	115	50	100	76	.....	138	375	375	100	42	65	34
30	250	58	100	76	.....	138	291	324	76	43	76	34
31	341	.....	112	54	.....	159	.....	259	.....	42	63	.....

Daily discharge, in second-feet, of Canaseraga Creek at Groveland Station, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Mar.	Day.	Oct.	Nov.	Mar.	Day.	Oct.	Nov.	Mar.
1919–20.				1919–20.				1919–20.			
1	34	291	.....	11	34	65	.....	21	42	.....	220
2	32	275	.....	12	40	65	.....	22	54	.....	252
3	33	211	.....	13	44	70	1,500	23	52	.....	332
4	32	227	.....	14	39	58	500	24	48	.....	398
5	34	196	.....	15	40	58	800	25	48	.....	415
6	39	152	.....	16	42	.....	1,200	26	58	.....	449
7	36	152	.....	17	42	.....	879	27	63	.....	381
8	39	112	.....	18	40	.....	467	28	63	.....	252
9	39	88	.....	19	34	.....	332	29	54	.....	236
10	36	76	.....	20	39	.....	268	30	76	.....	174
								31	132	.....	167

NOTE.—Discharge for following periods estimated from records of flow of Canaseraga Creek at Cumminsville: Oct. 20–30, 1918, Nov. 12–16, Dec. 7, 24–28, Feb. 12–15, 1919, Mar. 9, Apr. 14–19, July 1–5, 29–31, Aug. 1, 2, Sept. 20, 21, and Oct. 12, 1919. Discharge Mar. 14–16, 1920, estimated by comparison with records for Keshequa Creek at Sonyea. No gage-height record, Nov. 16, 1919, to Mar. 12, 1920.

Monthly discharge of Canaseraga Creek at Groveland Station, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 184 square miles.[a]]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	341	29	61.2	0.333	0.38
November	243	25	86.6	.471	.53
December	340	48	132	.718	.83
January	341	54	123	.668	.77
February	90	46	59.1	.321	.33
March	580	100	214	1.16	1.34
April	1,480	132	351	1.90	2.12
May	2,790	166	686	3.73	4.30
June	525	76	171	.930	1.04
July	259	42	71.5	.389	.45
August	145	30	59.9	.326	.38
September	65	34	46.8	.254	.28
The year	2,790	25	173	.940	12.75
1919–20.					
October	132	32	46.4	.252	.29
November 1–15	291	58	140	.761	.42
December	.....	.....	.....	.....	.....
January	.....	.....	.....	.....	.....
February	.....	.....	.....	.....	.....
March 13–31	1,500	167	485	2.64	1.87

[a] Supersedes figure published in previous reports.

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 (revised measurement by engineers of New York State Conservation Commission).

RECORDS AVAILABLE.—Occasional current-meter measurements 1904–1915. Continuous record of gage height July 13, 1915, to September 30, 1920.

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 the 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 DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder 27.2 feet at 3 a. m. May 23; minimum stage, 7.95 feet at midnight September 30.

Maximum open-water stage during year ending September 30, 1920, from water-stage recorder, 25.20 feet at 7 p. m. July 24; minimum stage from water-stage recorder, 7.84 feet during most of October 4 and 5.

1915–1920: Maximum stage from water-stage recorder, 28.92 feet at 1 p. m. May 17, 1916; minimum stage from water-stage recorder that of October 4 and 5, 1919.

Data on extent and duration of backwater from Genesee River too meager to permit accurate determination of discharge.

Discharge measurements of Canaseraga Creek at Shakers Crossing, N. Y., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 4	E. D. Burchard	9.19	256	May 13	J. W. Moulton	[a] 17.22	3,180
Apr. 1	J. W. Moulton	9.38	301	23	C. S. DeGolyer	[a] 16.88	6,360
14	do	12.87	1,100	26	J. W. Moulton	19.18	3,720
16	do	11.30	719	June 13	do	9.32	316

[a] Considerable backwater from Genesee River.

NOTE.—No discharge measurements were made during the year ending Sept. 30, 1920.

Daily gage height, in feet, of Canaseraga Creek at Shakers Crossing, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	8.64	10.98	8.80	9.06	8.76	9.75	9.45	10.07	9.83	.....	.....	8.57
2	8.64	.....	8.76	12.36	8.84	9.75	9.37	10.15	9.41	.....	.....	8.54
3	8.64	.....	8.76	10.25	9.00	9.12	9.49	9.80	9.59	.....	.....	8.53
4	8.65	.....	8.81	9.18	8.94	9.14	9.83	9.53	9.46	.....	.....	8.48
5	8.50	.....	8.93	9.59	8.80	9.30	10.21	9.87	9.45	.....	.....	8.48
6	8.90	.....	8.94	9.85	8.75	9.47	10.03	9.72	9.49	.....	.....	8.48
7	9.27	.....	9.00	9.46	8.85	9.26	9.94	9.47	10.13	.....	.....	8.40
8	9.11	.....	9.06	9.34	8.84	9.33	9.81	9.43	9.84	.....	.....	8.47
9	8.99	.....	10.94	9.57	8.76	10.32	10.87	9.60	11.97	.....	.....	8.43
10	8.96	.....	9.79	9.97	8.71	10.91	13.41	17.08	10.78	.....	.....	8.37
11	8.92	.....	9.16	10.06	8.81	11.19	19.18	25.07	9.72	.....	.....	8.38
12	8.88	.....	9.16	.....	8.75	10.28	21.57	21.88	9.51	.....	.....	8.50
13	8.87	8.70	9.16	.....	8.76	10.15	16.25	18.01	9.38	.....	.....	8.62
14	8.82	8.55	9.64	.....	8.76	9.41	13.60	14.65	9.19	.....	.....	8.52
15	8.78	8.90	10.80	.....	9.11	9.49	11.33	12.33	9.12	.....	.....	8.47
16	8.83	8.89	10.55	.....	8.85	9.75	11.46	11.27	9.09	.....	.....	8.45
17	8.83	8.85	9.66	.....	8.85	12.66	11.48	12.09	9.26	.....	9.07	8.42
18	8.74	9.55	9.32	.....	8.79	14.01	10.70	12.84	9.07	.....	9.76	8.43
19	8.76	11.08	9.13	9.23	8.84	12.10	10.25	10.95	8.99	.....	9.18	8.36
20	8.90	10.01	9.03	9.15	9.00	10.47	9.68	11.09	9.02	.....	8.73	8.23
21	8.86	9.59	8.98	9.08	8.84	10.10	9.85	19.68	8.96	.....	8.50	8.26
22	8.76	9.37	8.94	9.12	8.82	9.77	9.65	25.63	8.90	.....	8.46	8.26
23	8.74	9.20	9.50	9.30	8.81	9.42	9.37	26.48	8.73	.....	8.40	8.29
24	8.70	9.05	9.46	9.75	8.82	9.34	.....	24.52	8.82	.....	8.38	8.33
25	8.70	8.95	10.45	9.50	8.91	9.21	.....	22.61	8.81	.....	8.46	8.33
26	8.75	8.89	10.16	9.26	8.83	9.22	.....	18.67	8.91	.....	8.50	8.29
27	8.86	8.83	9.41	9.01	8.82	9.24	10.49	14.93	9.21	.....	8.42	8.20
28	8.87	8.80	9.18	8.88	9.16	9.45	10.66	12.56	9.20	.....	8.43	8.22
29	8.84	8.80	9.12	8.91	.....	9.58	11.15	11.12	.....	.....	8.52	8.01
30	8.89	8.87	8.98	8.82	.....	9.38	10.46	10.51	.....	.....	8.57	8.04
31	11.67	.....	8.85	8.80	.....	9.70	.....	10.15	.....	.....	8.60	.....

Daily gage height, in feet, of Canaseraga Creek at Shakers Crossing, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	7.96	.....	.....	.....	9.06	9.27	9.61	9.73	8.56	8.04	9.03	8.37
2	7.95	.....	8.94	.....	9.11	9.27	9.43	9.70	8.20	8.35	8.92	8.30
3	7.92	.....	8.46	.....	9.23	9.30	9.24	9.34	8.57	8.28	8.82	8.13
4	7.87	.....	8.64	9.04	9.29	9.49	9.09	9.26	8.82	8.00	8.78	8.06
5	7.84	.....	8.68	9.00	9.30	11.88	9.11	9.15	8.64	8.00	8.72	8.01
6	8.10	.....	8.62	8.97	9.36	13.22	9.38	9.00	8.72	8.20	8.70	8.05
7	7.98	9.13	8.48	9.00	9.40	14.14	9.26	8.87	8.77	8.32	8.53	8.06
8	8.00	8.85	8.55	9.02	9.38	12.93	9.07	8.80	8.72	8.32	8.32	8.18
9	8.05	8.82	.....	9.10	9.40	12.40	9.05	8.76	8.68	8.35	8.48	8.30
10	8.12	8.58	.....	.....	9.39	12.41	9.15	8.72	8.63	8.48	8.78	8.25
11	8.25	8.58	.....	9.16	9.39	14.78	9.06	9.00	8.55	8.38	9.00	8.12
12	8.03	8.75	9.61	9.16	9.35	24.00	9.11	10.02	8.53	8.32	8.80	8.75
13	8.16	8.7	.....	9.15	9.44	28.48	9.25	9.47	8.49	8.16	8.82	9.05
14	8.27	8.66	.....	9.08	9.45	27.10	9.12	9.14	8.50	8.04	9.69	8.80
15	8.24	8.59	.....	9.03	9.50	24.95	9.06	9.03	8.46	8.10	10.04	8.71
16	8.22	8.54	9.07	9.03	9.26	22.55	10.65	8.86	8.44	8.07	9.20	8.68
17	8.42	8.5	.....	9.06	9.35	22.86	10.97	8.75	8.99	8.06	9.04	8.59
18	8.44	8.47	.....	9.07	9.47	18.28	9.86	8.61	9.42	8.08	10.00	8.48
19	8.40	8.37	.....	9.02	9.48	13.99	9.47	8.61	9.06	9.86	9.03	8.25
20	8.41	8.52	.....	9.05	.....	11.72	9.26	8.67	8.74	9.25	8.87	8.14
21	8.40	8.49	9.86	9.09	.....	10.76	9.18	9.07	8.65	8.90	8.72	8.18
22	8.53	8.52	9.66	9.14	9.40	10.81	9.23	9.01	8.65	8.73	8.70	8.00
23	8.57	8.57	9.40	9.19	9.38	11.56	9.41	8.77	8.61	8.82	8.74	8.01
24	8.43	8.6	9.23	9.22	9.39	12.75	9.64	8.77	8.69	21.93	8.69	7.93
25	8.57	8.6	9.13	.....	9.35	12.96	9.26	8.90	8.70	20.35	8.63	7.89
26	8.47	8.61	9.07	.....	9.30	13.20	8.94	8.72	8.55	14.25	8.60	7.91
27	8.73	.....	9.08	.....	.....	13.18	9.60	8.56	8.39	11.80	8.58	7.93
28	8.70	.....	9.14	.....	.....	11.50	11.58	8.46	8.40	10.38	8.53	8.03
29	8.67	8.75	.....	.....	9.27	10.55	11.16	8.37	8.29	9.58	8.36	8.06
30	8.7	.....	.....	.....	.....	10.36	10.20	8.36	8.12	9.26	8.34	8.59
31	9.2	.....	.....	.....	.....	9.82	.....	8.81	.....	9.10	8.38	.....

NOTE.—Water-stage recorder not in operation Nov. 2–12, 1918, Jan. 12–18, Apr. 24–26, Nov. 1–6, 27, 28, 30, Dec. 1, 9–11, 13–15, 17–20, 29–31, 1919, Jan. 1–3, 10, 25–31, Feb. 20, 21, 27 and 28, 1920. Intake to gage well obstructed by silt, June 29 to Aug. 16, 1919; gage-height record uncertain.

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

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

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

RECORDS AVAILABLE.—October 31, 1917, to September 30, 1920, at present site; July 22, 1910, to December 31, 1912, at a site about 200 feet upstream. August 29, 1915, to October 31, 1917, at a station 1 mile downstream near the Delaware, Lackawanna & Western Railroad bridge.

GAGE.—Vertical staff gage in three sections on retaining wall on left bank just above the concrete dam for pumping plant of Craig Colony; read by A. J. Porter.

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

CONTROL.—Double-crested concrete weir built by Craig Colony for maintaining water level for their pumping plant; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.9 feet at 10 a. m. May 22 (discharge, 5,940 second-feet); minimum stage recorded 0.22 foot several times in August and September (discharge, 1.78 second-feet).

Maximum stage recorded during year ending September 30, 1920, 4.5 feet at 11.15 a. m. March 12 (discharge, 3,310 second-feet); minimum discharge, about 1 second-foot during periods in December, January, and February.

1917–1920: Maximum stage recorded, 5.9 feet at 10 a. m. May 22, 1919 (discharge, 5,940 second-feet); 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 the control, August 3 to September 30, 1920. Rating curve used before installation of flashboards well defined below 450 second-feet. Backwater effect, August 3 to September 30, 1920, well defined for low stages; approximate above 20 second-feet.

Discharge measurements of Keshequa Creek at Craig Colony, Sonyea, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 25	E. D. Burchard	0.72	28.1	Mar. 6	Otto Lauterhahn	[b] 1.57	113
Apr. 1	J. W. Moulton	[a] .60	16.5	Apr. 16	do	1.31	150
14	do	1.60	251	May 31	Howe and Lauterhahn	.52	12.9
15	do	.99	67.8	Aug. 9	Otto Lauterhahn	[c] 2.24	7.5
May 13	do	1.45	205	9	do	[c] 2.24	7.7
23	O. W. Hartwell	1.74	317	25	Lauterhahn and Covert	[c] 2.28	9.1
27	J. W. Moulton	1.07	86.1				
June 11	do	.84	45.3				
13	do	.68	24.9				
23	do	.45	10.0				

[a] Some shore ice.
[b] Stage-discharge relation affected by ice.
[c] Stage-discharge relation affected by flashboards on dam.

Daily discharge, in second-feet, of Keshequa Creek at Craig Colony, Sonyea, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	5.6	33	8.6	20	9.6	56	18	56	28	7.8	4.1	12
2	5.9	24	15	88	8.2	21	23	54	26	7.4	7.4	6.3
3	7.0	22	11	34	9.6	22	25	40	23	7.0	3.0	7.8
4	7.8	18	9.6	11	12	21	33	37	19	6.6	2.0	6.6
5	6.3	35	12	26	11	33	45	51	30	6.3	4.1	7.0
6	4.5	23	12	35	9.6	26	34	38	22	5.2	5.2	6.3
7	30	17	8.6	38	10	16	40	30	97	6.3	7.4	3.4
8	18	15	13	30	9.6	17	36	28	90	5.6	2.0	2.6
9	11	13	48	23	8.6	142	90	37	290	5.6	2.8	3.4
10	8.6	13	22	18	5.6	102	234	1,080	70	4.8	2.0	3.4
11	7.8	12	18	15	7.8	77	660	590	40	7.0	2.0	3.8
12	7.4	10	17	16	9.1	54	258	325	33	7.0	2.2	8.6
13	8.2	11	20	17	8.2	56	142	176	25	4.8	4.1	17
14	8.6	10	41	23	12	20	100	95	21	4.5	3.4	7.8
15	8.2	8.6	70	30	25	28	68	70	26	5.2	2.8	6.3
16	7.8	8.6	43	21	11	47	110	60	20	14	2.4	7.4
17	7.0	8.6	28	21	11	164	79	120	18	7.8	37	6.3
18	6.6	17	23	20	8.6	187	61	86	15	7.0	22	6.3
19	4.8	33	19	23	9.6	72	48	56	13	5.6	25	5.6
20	6.3	19	15	17	8.6	50	51	154	10	4.1	11	5.9
21	9.1	16	17	18	13	45	45	660	12	7.0	9.6	6.3
22	9.1	16	16	21	13	36	33	1,850	9.1	15	7.0	3.2
23	8.6	15	26	30	17	28	28	362	10	8.6	4.1	5.9
24	8.6	13	22	58	15	35	128	263	7.4	6.3	5.6	5.6
25	8.6	12	79	34	14	24	77	204	9.6	4.5	6.3	4.5
26	7.0	11	40	23	13	23	72	105	12	5.6	9.6	4.1
27	9.6	9.1	25	19	9.6	23	90	86	17	3.0	6.3	4.1
28	9.6	6.6	20	16	11	33	77	63	14	4.1	9.1	2.8
29	14	10	17	17	.....	25	110	50	11	4.5	9.6	4.8
30	50	12	14	13	.....	30	65	40	11	3.4	8.2	1.8
31	86	.....	15	12	.....	37	.....	35	.....	2.8	10	.....

Daily discharge, in second-feet, of Keshequa Creek at Craig Colony, Sonyea, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	1.8	95	25	2	2	4	30	43	7.8	6.3	16	7
2	6.3	88	20	1	2	3	28	30	7.0	6.6	12	7
3	4.1	38	15	2	1	3	26	28	7.8	6.3	8	7
4	2.6	28	15	1	2	2	20	25	9.1	5.6	12	7
5	2.6	63	12	1	1	240	26	20	10	5.9	15	7
6	5.9	35	11	1	3	120	26	18	13	4.8	12	7
7	10	25	15	1	2	55	22	16	11	4.8	8	7
8	8.6	22	17	1	2	51	20	13	10	6.3	8	7
9	6.3	20	100	1	1	51	20	14	11	9.1	8	7
10	5.6	22	118	1	1	65	19	16	11	7.8	18	7
11	7.8	15	28	2	1	1,080	20	34	7.8	6.3	26	8
12	7.8	18	37	1	1	2,310	18	54	5.9	4.8	24	34
13	7.8	15	123	1	2	378	21	30	6.3	6.6	20	14
14	8.2	16	68	1	2	131	20	26	5.9	5.6	55	11
15	4.8	13	18	1	1	200	17	25	5.6	5.6	28	9
16	5.6	11	15	1	1	335	142	18	7.0	5.6	18	9
17	9.6	11	15	2	2	250	58	18	50	4.8	22	8
18	6.6	13	12	1	5	102	36	14	65	7.0	18	7
19	5.9	11	15	1	2	77	28	15	34	92	14	7
20	6.3	11	11	1	1	68	26	13	20	25	10	6
21	7.4	9.6	9	1	1	53	23	36	14	17	9	7
22	26	10	6	1	1	61	26	28	13	8.2	10	7
23	11	10	5	1	1	90	36	17	9.6	11	11	7
24	11	12	4	1	1	102	35	30	12	1,130	9	6
25	11	12	3	1	1	100	28	26	17	163	8	6
26	13	12	3	1	1	105	26	17	11	72	8	7
27	20	17	3	1	3	81	70	15	7.8	43	9	7
28	21	17	3	2	6	51	134	12	7.4	33	7	9
29	15	15	1	1	5	44	86	12	7.0	20	7	8
30	20	61	3	2	.....	38	48	10	5.2	18	7	40
31	65	.....	2	1	.....	35	.....	12	.....	15	7	.....

NOTE.—Discharge, Oct. 24, 30, Dec. 1-3, 1918, Jan. 25, 26, Mar. 30, Nov. 8, 1919, and Aug. 12, 1920, determined by comparison with records of flow of Canaseraga Creek at Cumminsville and at Groveland Station. Discharge, Dec. 16, 1919, to Mar. 7, 1920, determined from gage-heights corrected for ice effect by means of one discharge measurement, and study of gage-height graph and weather records.

Monthly discharge of Keshequa Creek at Craig Colony, Sonyea, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 70 square miles. [a]]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	86	4.5	12.8	0.183	0.21
November	35	6.6	15.7	.224	.25
December	79	8.6	24.0	.343	.40
January	88	11	25.4	.363	.42
February	25	5.6	11.1	.159	.17
March	187	16	50.0	.714	.82
April	660	18	96.0	1.37	1.53
May	1,850	28	223	3.19	3.68
June	290	7.4	34.3	.490	.55
July	15	2.8	6.27	.088	.10
August	37	2.0	7.65	.109	.13
September	17	1.8	5.90	.084	.09
The year	1,850	1.8	43.0	.614	8.36

[a] Supersedes figure published in previous reports.

Monthly discharge of Keshequa Creek at Craig Colony, Sonyea, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919-20.					
October	65	1.8	11.1	0.159	0.18
November	95	9.6	24.9	.356	.40
December	123	1	23.6	.337	.39
January	2	1	1.19	.017	.02
February	6	1	1.90	.027	.03
March	2,310	2	203	.540	3.34
April	142	17	37.8	2.90	.60
May	54	10	22.1	.316	.36
June	65	5.2	13.6	.194	.22
July	1,130	4.8	56.8	.810	.93
August	55	7	14.3	.204	.24
September	40	6	9.57	.137	.15
The year	2,310	1	35.3	.504	6.86

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 (measured by New York State Conservation Commission).

RECORDS AVAILABLE.—November 13, 1919, to September 30, 1920.

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

DISCHARGE MEASUREMENTS.—Made from bridge one-fourth mile below gage 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.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.1 feet at 8 a. m. March 17 (discharge, 159 second-feet); minimum stage recorded, 0.79 foot in morning December 12, July 17 and 18 (discharge, about 11 second-feet).

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.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. No ice effect except occasionally for short periods. Rating curve well defined between 10 and 60 second-feet. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Conesus Creek near Lakeville, N. Y., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 14	A. H. Davison	0.89	15.6	May 5	Otto Lauterhahn	1.47	71.5
14	do	.89	15.0	28	do	1.27	48.2
Dec. 12	B. F. Howe	.80	14.3	June 28	do	.96	18.6
12	do	.81	14.2	July 17	do	.78	10.0
Mar. 23	A. H. Davison	1.97	139	26	do	1.175	38.8
Apr. 20	Otto Lauterhahn	1.50	82.1	Aug. 20	do	1.345	56.0
29	do	1.53	80.5				

Daily discharge, in second-feet, of Conesus Creek near Lakeville, N. Y., for the year ending Sept. 30, 1920.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	18	21	20	20	115	75	40	17	34	37
2	.....	21	21	20	20	115	75	40	17	34	36
3	.....	15	23	20	18	108	68	40	17	32	34
4	.....	13	20	19	20	101	73	38	15	30	32
5	.....	13	20	19	32	101	70	36	15	28	32
6	.....	15	20	20	27	101	70	36	14	28	33
7	.....	15	20	20	28	101	68	36	14	30	33
8	.....	15	20	20	28	94	63	30	14	27	32
9	.....	18	20	20	28	94	64	32	13	28	30
10	.....	18	20	20	38	88	63	32	12	28	30
11	.....	21	20	20	59	88	63	30	13	28	32
12	.....	13	20	20	129	88	63	30	13	27	32
13	15	21	20	20	115	82	61	30	12	26	32
14	16	21	20	20	122	82	61	28	12	28	30
15	15	17	20	20	122	82	58	28	12	36	28
16	15	20	20	17	144	82	58	28	11	47	28
17	15	21	19	18	151	82	56	30	11	53	27
18	14	20	19	19	151	82	61	28	11	56	26
19	14	17	20	20	144	75	53	28	13	53	25
20	14	17	20	21	144	75	52	27	13	56	24
21	14	17	16	20	144	75	56	27	13	56	24
22	14	20	19	21	144	73	56	25	12	53	23
23	14	20	20	20	136	75	55	25	12	51	22
24	14	22	20	20	144	73	52	24	25	49	23
25	14	21	21	21	144	70	52	24	36	49	22
26	14	21	21	21	136	75	51	24	39	47	21
27	14	21	20	21	144	74	49	22	36	44	21
28	15	21	18	21	136	82	47	20	39	42	21
29	18	22	20	20	129	82	45	19	36	41	21
30	15	22	20	.....	129	82	44	18	35	40	24
31	.....	21	20	.....	122	.....	40	.....	34	40	.....

NOTE.—Stage-discharge relation affected by ice Jan. 15, 18, 19, Feb. 17–19, 26, and 27; discharge estimated.

Monthly discharge of Conesus Creek near Lakeville, N. Y., for the year ending Sept. 30, 1920.

[Drainage area, 71 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
November 13–30	18	14	14.7	0.207	0.14
December	22	13	18.6	.262	.30
January	23	16	19.9	.280	.32
February	21	17	19.9	.280	.30
March	151	18	98.3	1.38	1.59
April	115	70	86.6	1.22	1.36
May	75	40	58.8	.828	.95
June	40	18	29.2	.411	.46
July	39	11	18.9	.266	.31
August	56	26	39.4	.555	.64
September	37	21	27.8	.392	.44
The period	151	11	40.3	.568	6.81

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, 1920.

GAGE.—Hook gage, in channel above weir.

CHANNEL AND CONTROL.—Outflow is measured over a standard thin-edged weir with a 5-foot crest and two end contractions so arranged with needle timbers at the ends that the length may be increased to 14.96 feet. No end contractions during high water. The weir crest stands 3.14 feet above the stream channel, which is artificial with a plank bottom and vertical sides, and the crest is never submerged by backwater. Two additional rectangular gates, each 1 foot square with three complete contractions and a fourth incomplete contraction at the bottom.

ICE.—Stage-discharge relation not affected by ice as the pool above the weir is free from ice throughout the winter.

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

REGULATION.—Outflow of lake is regulated by bulkhead and gates at dam above weir.

ACCURACY.—Stage-discharge relation permanent. Rating curve used is expressed by Francis formula. Corrections are made for velocity of approach for high stages. Gage read to hundredths once daily. Records good.

COOPERATION.—Data collected, computed, and furnished for publication by the city engineer of Rochester.

Monthly discharge of Canadice Lake outlet, near Hemlock, N. Y., for the years ending Sept. 30, 1918–1920.

Month.	1917–18.		1918–19.		1919–20.	
	Mean discharge.	Mean elevation of lake above low-water mark.	Mean discharge.	Mean elevation of lake above low-water mark.	Mean discharge.	Mean elevation of lake above low-water mark.
	Sec.-ft.	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*
October	14.273	2.059	1.816	0.869	14.145	0.811
November	20,781	2.236	2.170	.993	6.448	.367
December	4.930	2.096	2.427	1.278	6.786	.367
January	4.827	2.052	5.387	1.656	3.946	.228
February	16.156	2.285	15.671	1.158	3.468	.041
March	41.474	2.774	16.927	.778	15.000	1.618
April	12.377	2.057	16.156	1.674	9.736	2.721
May	9.232	2.103	48.847	3.239	4.136	2.919
June	6.475	2.091	8.578	2.953	1.573	3.054
July	3.530	1.779	3.341	2.910	27.968	1.870
August	2.779	1.376	.801	2.802	14.726	.907
September	2.168	.992	9.920	2.616	2.991	.190
The year	11.584	1.992	11.003	1.910	9.243	1.258
Net change in elevation of water surface during year (feet)		−.74		+.80		−1.34
Gain or loss in storage during year (cubic feet)		−21,854,923		+23,652,034		−39,238,917
Mean discharge corrected for storage (second-feet)		10.891		11.753		8.002

OWASCO LAKE OUTLET NEAR AUBURN, N. Y.

LOCATION.—On the farm of Charles H. Pearce, 2 miles below center of Auburn, Cayuga County, and 3¾ 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, 1920.

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

DISCHARGE MEASUREMENTS.—Made from cable directly opposite the gage or by wading.

CHANNEL AND CONTROL.—A low concrete control has been constructed about 15 feet below the 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 the bed of the 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 ending September 30, 1919, from water-stage recorder, 3.55 feet at 9. a. m. April 12 (discharge, 1,160 second-feet); minimum stage from recorder, 1.47 feet at 9.45 p. m. September 2 (discharge, 10.6 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 3.84 feet at 7 a. m. March 29 (discharge, 1,520 second-feet); minimum stage from water-stage recorder, 1.38 (effective) feet at 7 p. m. August 21 (discharge, 3.8 second-feet).

1912–1920: 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 at 7 p. m. August 21, 1920 (discharge, 3. 8 second-feet).

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

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

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

ACCURACY.—Stage-discharge relation permanent except as affected by aquatic growth, May to September; not affected by ice during year. Rating curve well defined between 1 and 1,700 second-feet. Operation of the water-stage recorder fairly satisfactory throughout year. Daily discharge ascertained by averaging the hourly discharge. Records excellent except for periods of no gage-height records.

Discharge measurements of Owasco Lake outlet near Auburn, N. Y.; during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
July 28	C. C. Covert	[a] 2.45	268	Aug. 3	Otto Lauterhahn	2.28	174
1920.				26	do	1.68	31.7
May 25	B. F. Howe	2.40	232	Sept. 5	do	1.57	19.0
July 9	Otto Lauterhahn	2.38	225	5	do	1.57	18.8
9	do	2.21	150	25	Lauterhahn and Lamoureux	2.07	112
Aug. 3	do	2.24	140				

[a] Some moss on crest of dam. Channel cleared at measuring point before making measurements.

Daily discharge, in second-feet, of Owasco Lake outlet near Auburn, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	129	.....	139	360	201	201	374	559	280	170	182	83
2	123	.....	156	368	189	171	384	582	250	182	183	144
3	125	.....	157	383	198	196	394	539	230	184	176	160
4	141	.....	154	372	189	187	390	528	220	136	175	163
5	145	.....	151	383	190	192	445	544	210	183	172	163
6	106	.....	152	388	190	191	519	456	200	132	175	159
7	144	.....	150	384	190	208	688	381	190	171	179	158
8	138	.....	146	371	197	196	663	367	180	178	178	171
9	136	.....	154	368	185	204	641	375	180	173	174	166
10	131	.....	154	377	209	214	698	461	190	193	155	162
11	131	.....	150	371	199	217	881	639	200	163	191	157
12	113	.....	142	373	194	219	1,000	772	200	166	188	159
13	71	.....	152	377	194	221	925	826	200	148	187	153
14	134	.....	189	336	190	223	941	776	208	180	191	135
15	142	.....	174	290	190	228	908	738	194	198	192	162
16	146	.....	172	292	198	276	897	726	193	181	195	162
17	139	.....	169	259	209	380	864	749	181	173	177	148
18	143	.....	170	263	200	390	799	725	181	171	206	151
19	154	.....	173	243	181	390	738	709	171	180	184	156
20	98	.....	168	236	98	398	702	700	163	169	191	142
21	96	.....	167	223	192	392	649	650	206	195	183	127
22	141	.....	177	234	192	386	620	540	171	182	174	134
23	162	165	209	230	181	378	580	700	175	168	164	131
24	167	147	236	238	193	382	550	720	189	172	159	135
25	153	161	234	237	198	375	540	728	165	162	186	135
26	136	168	292	218	194	368	520	743	197	178	177	127
27	101	155	374	210	193	368	508	591	133	189	179	105
28	162	142	379	200	194	371	500	451	178	184	170	33
29	171	151	364	195	.....	379	492	370	185	172	176	122
30	193	149	376	189	.....	380	493	330	176	162	133	141
31	140	.....	365	194	.....	389	.....	300	.....	164	77	.....
1919–20.												
1	137	142	.....	225	136	114	1,100	491	207	168	28	87
2	135	174	.....	145	138	121	1,000	.....	209	164	88	74
3	124	191	.....	172	136	165	1,010	.....	193	160	85	71
4	140	230	.....	151	148	148	944	.....	182	131	77	49
5	115	241	.....	138	130	140	912	.....	175	144	76	20
6	133	252	.....	124	94	165	836	.....	157	160	79	25
7	124	187	.....	118	131	143	776	.....	178	175	49	102
8	124	140	.....	136	127	146	738	.....	178	166	15	78
9	122	139	153	88	132	176	705	.....	182	157	93	70
10	117	151	143	127	124	393	633	.....	182	131	79	78
11	110	146	147	130	124	682	560	.....	186	131	84	72
12	109	142	114	138	126	893	510	.....	193	147	82	53
13	129	128	146	146	122	957	505	.....	157	138	82	119
14	118	141	113	162	152	1,040	508	.....	182	157	52	81
15	111	128	134	145	148	1,130	467	.....	184	141	20	72
16	122	132	163	149	133	1,210	466	.....	182	144	96	84
17	123	123	146	199	82	1,220	454	.....	160	141	85	82
18	103	140	158	187	136	1,220	438	.....	164	144	78	78
19	120	136	144	165	126	1,190	443	.....	166	166	80	29
20	135	139	170	148	127	1,160	432	.....	128	158	86	79
21	124	132	127	152	141	1,140	432	.....	164	144	59	82
22	119	133	123	142	140	1,090	423	.....	175	96	25	85
23	115	.....	119	150	138	1,070	364	.....	160	92	98	84
24	119	.....	138	154	134	1,110	332	.....	175	80	86	82
25	113	.....	141	162	173	1,170	341	205	175	32	84	55
26	129	.....	94	142	135	1,230	316	213	168	124	81	28
27	129	.....	142	140	42	1,340	310	205	153	82	80	81
28	117	.....	149	130	126	1,380	430	201	182	93	71	92
29	120	.....	156	140	126	1,350	505	195	176	83	42	79
30	117	.....	128	164	.....	1,260	498	186	175	82	124	106
31	123	.....	165	156	.....	1,190	.....	193	.....	68	84	.....

NOTE.—Discharge for following periods, when gage did not operate, estimated from precipitation and temperature records, and observer's weekly readings of gage height: Oct. 31, 1918, Jan. 27, 28, Feb. 5–7, 14 15, Apr. 22–26, May 20–24, 29–31, June 1–13, July 31, Aug. 1, 5–8, and Sept. 3–6, 1919, as shown in table; Nov. 1–22, 1918, 150 second-feet; Nov. 23–30, 1919, 136 second-feet; Dec. 1–8, 144 second-feet; May 2–24, 1920, 255 second-feet.

Monthly discharge of Owasco Lake outlet at Auburn, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 206 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	193	71	136	0.660	0.76
November	.....	.....	151	.733	.82
December	379	139	205	.995	1.15
January	388	189	296	1.44	1.66
February	209	98	190	.922	.96
March	398	171	293	1.42	1.64
April	1,000	374	643	3.12	3.48
May	826	[a] 300	590	2.86	3.30
June	[a] 280	133	193	.937	1.05
July	198	132	173	.840	.97
August	206	77	175	.850	.98
September	171	33	142	.689	.77
The year	1,000	33	266	1.29	17.54
1919–20.					
October	140	103	122	.592	.68
November	252	123	152	.738	.82
December	170	94	141	.685	.79
January	225	88	149	.723	.83
February	173	42	128	.621	.67
March	1,380	114	830	4.03	4.65
April	1,100	310	580	2.82	3.15
May	491	186	250	1.21	1.40
June	209	128	175	.850	.95
July	175	32	129	.626	.72
August	124	15	72.5	.352	.41
September	119	20	72.6	.352	.39
The year	1,380	15	234	1.14	15.46

[a] Estimated.

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 downstream from Hawkinsville.

DRAINAGE AREA.—303 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 16, 1911, to September 30, 1920.

GAGE.—Chain near center of left span, downstream side of bridge; staff gage on right abutment used for high-water readings; read by W. D. Charbonneau.

DISCHARGE MEASUREMENTS.—Made from a cable about half a mile above gage or by wading near the gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 10.2 feet at 8 a. m. April 13 (discharge, 5,810 second-feet); minimum stage recorded, 3.0 feet at 5 p. m. June 10 (discharge, 27 second-feet).

Maximum stage recorded during year ending September 30, 1920, 8.60 feet at 5 p. m. April 21 (discharge, 3,620 second-feet); minimum stage recorded, 3.05 feet at 5 p. m. June 4 (discharge, 30 second-feet).

1911–1920: 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, 2.40 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, entering Black River at the foot of Lyons Falls. A spillway from the basin overflows into Mill Creek, a tributary of Black River. Water flowing through these two channels returns to the river below the gaging station, thus passing around it. The Black River canal also flows south from Boonville, passing out of the Black River drainage and entering the summit level of the Erie Canal (or Barge Canal) at Rome.

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 flowing 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. 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet*	*Sec.-ft.*
Jan. 7	M. H. Carson	5.49	608	Jan. 18	Howe and Davison	[a] 5.28	201
June 7	do	3.50	66.8	Feb. 15	B. F. Howe	[a] 4.90	219
8	do	3.44	61.4	Mar. 14	do	[a] 8.00	1,000
Dec. 18	Davison and Lauterhahn.	[a] 5.35	462	July 24	S. M. Currier	4.02	146

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Black River near Boonville, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	305	2,270	512	630	490	855	1,140	735	320	53	194	119
2	335	2,160	535	795	450	795	1,460	920	227	46	184	111
3	352	1,640	605	1,370	430	795	1,210	1,140	184	53	111	111
4	335	1,140	580	1,640	410	680	1,140	1,370	84	40	90	145
5	470	680	535	1,060	410	630	920	1,460	42	41	72	164
6	680	630	535	580	335	490	1,060	1,640	38	63	78	119
7	920	535	630	605	335	490	1,370	1,740	31	66	63	104
8	1,060	558	630	630	320	735	1,740	2,050	33	57	104	84
9	920	580	735	580	335	1,140	1,740	1,740	36	49	84	90
10	855	490	735	605	305	1,140	1,740	1,540	28	72	62	127
11	795	390	735	535	335	1,290	2,160	1,290	33	205	60	111
12	795	512	795	470	410	1,060	3,880	990	41	227	78	97
13	605	605	855	430	450	630	5,520	855	53	154	72	104
14	490	580	855	430	795	490	4,960	735	49	111	72	145
15	238	580	920	450	990	535	4,280	795	49	97	97	145
16	184	558	1,060	450	920	1,210	3,490	680	46	119	111	136
17	145	558	920	470	735	2,160	2,620	680	46	145	104	127
18	119	430	855	470	580	1,940	1,940	795	66	194	104	111
19	164	470	920	430	450	1,460	1,370	1,060	59	205	97	97
20	275	680	855	430	390	1,460	1,140	1,060	46	205	90	127
21	735	630	920	512	335	1,140	1,060	680	51	238	78	111
22	795	490	795	535	335	795	920	680	66	216	97	145
23	580	450	1,940	580	352	990	920	535	59	194	97	127
24	535	335	2,620	512	335	1,290	795	490	49	184	111	119
25	630	194	2,270	490	335	1,060	795	558	71	194	136	97
26	855	630	1,940	450	370	920	795	580	97	227	127	111
27	990	990	1,460	535	535	855	795	680	72	305	145	104
28	795	490	1,290	580	680	855	795	605	66	630	145	111
29	680	262	1,060	630	.....	680	680	580	63	680	84	111
30	990	290	735	680	.....	680	680	580	56	430	97	111
31	1,940	.....	580	558	.....	735	.....	535	.....	250	111	.....
1919–20.												
1	111	1,460	1,640	300	80	200	1,940	2,620	111	72	119	72
2	127	1,540	1,460	320	130	200	1,940	2,380	46	59	238	72
3	111	1,540	1,210	300	190	190	1,940	2,270	33	78	127	90
4	104	1,370	990	300	190	180	1,740	1,940	31	111	104	84
5	174	1,210	735	360	160	190	2,050	1,540	40	104	111	145
6	335	795	735	320	190	480	2,500	1,370	49	164	90	227
7	320	795	680	260	190	500	2,620	1,460	49	164	84	238
8	335	795	795	260	190	360	2,270	1,370	70	305	90	275
9	490	450	680	320	190	500	2,160	1,640	59	580	59	250
10	795	335	795	300	180	800	1,540	1,540	40	535	78	227
11	855	352	990	300	160	900	1,540	1,540	36	410	70	205
12	855	290	1,060	260	160	950	1,740	855	46	450	56	227
13	558	335	1,060	220	180	900	1,740	580	44	855	84	194
14	370	450	920	160	190	1,100	2,050	580	40	1,060	174	227
15	320	490	900	110	200	1,100	2,160	470	63	605	227	290
16	290	470	750	110	200	1,000	2,380	490	66	305	111	275
17	335	390	650	110	200	950	2,380	370	61	410	154	227
18	410	512	480	220	180	850	2,380	320	49	535	205	320
19	370	558	400	200	180	1,100	2,160	410	46	490	205	410
20	305	630	480	190	180	1,000	3,240	335	46	580	275	275
21	290	735	440	180	180	900	3,620	335	66	630	275	238
22	275	605	440	160	200	700	3,490	370	72	410	305	227
23	335	490	400	130	190	800	3,360	370	66	227	305	250
24	490	580	360	150	190	990	2,980	262	59	184	250	205
25	630	680	480	140	220	1,060	2,380	335	59	154	227	227
26	1,290	680	550	120	200	1,540	2,500	250	56	97	194	250
27	1,540	735	500	100	200	2,860	2,380	275	51	104	145	250
28	1,640	735	360	90	220	2,500	2,270	238	59	90	174	305
29	1,540	990	360	80	200	2,500	2,620	194	70	70	127	370
30	1,540	1,290	380	85	.....	2,050	2,500	174	66	59	56	490
31	1,640	.....	340	70	.....	1,640	.....	145	.....	63	51	.....

NOTE.—Stage-discharge relation not affected by ice during winter, 1918–19. Discharge, Dec. 15, 1919, to Mar. 23, 1920, determined from gage heights corrected for ice effect by means of four discharge measurements, and study of gage-height graph and weather records.

Monthly discharge of Black River near Boonville, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 303 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	1,940	119	631	2.08	2.40
November	2,270	194	694	2.29	2.56
December	2,620	512	981	3.24	3.74
January	1,640	430	617	2.04	2.35
February	990	305	469	1.55	1.61
March	2,160	490	967	3.19	3.68
April	5,520	680	1,770	5.89	6.52
May	2,050	490	961	3.17	3.66
June	320	28	72	.238	.27
July	680	40	185	.611	.70
August	194	60	102	.337	.39
September	164	84	117	.386	.43
The year	5,520	28	632	2.09	28.31
1919-20.					
October	1,640	194	606	2.00	2.31
November	1,540	290	743	2.45	2.73
December	1,640	340	710	2.34	2.70
January	360	70	201	.663	.76
February	220	80	183	.604	.65
March	2,860	180	1,000	3.30	3.80
April	3,620	1,540	2,350	7.76	8.66
May	2,620	145	872	2.88	3.32
June	111	31	55	.182	.20
July	1,060	59	321	1.06	1.22
August	305	51	154	.508	.59
September	490	72	238	.785	.88
The year	3,620	31	620	2.05	27.82

NOTE.—Water diverted past this station by the Forestport feeder is not included in the above table.

BLACK RIVER AT BLACK RIVER, N. Y.

LOCATION.—One-fourth mile below concrete-arch highway bridge and power plant of Northern New York Utilities Co. and three-fourths mile below village of Black River, Jefferson County.

DRAINAGE AREA.—1,870 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 24, 1917, to July 17, 1920, when the station was discontinued and re-established at Watertown.

GAGE.—Vertical staff, in two sections, spiked to large cedar tree on left bank about one-fourth mile below highway bridge; read by Erwin W. Hart.

DISCHARGE MEASUREMENTS.—Made from cable about 100 yards above gage.

CHANNEL AND CONTROL.—Solid rock.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 12.7 feet at 8.30 a. m. and 6.20 p. m. April 14 (discharge, 17,300 second-feet); minimum stage recorded, 2.8 feet at 8.40 a. m. July 5 (discharge, 457 second-feet).

Maximum stage recorded Oct. 1, 1919, to July 17, 1920, 12.6 feet at 6.25 a. m. March 29 (discharge, 17,900 second-feet); minimum stage recorded, 2.05 feet at 6.45 a. m. July 5 (discharge, 138 second-feet).

1917-1920: Maximum stage recorded, 13.4 feet from 6 p. m. April 4 to 7 p. m. April 5, 1917 (discharge, 19,300 second-feet); minimum stage recorded, 1.05 feet at 2.45 p. m. July 29, 1917 (discharge, about 16 second-feet).

ICE.—Stage-discharge relation not affected by ice except during extremely cold periods.

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 station.

DIVERSIONS.—Water is diverted from Black River into Forestport feeder at Forestport. Part of this water returns to river through various spillways and through Black River canal (flowing north). The remainder passes out of the drainage basin through 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 practically permanent, not affected by ice. Rating curve well defined between 500 and 18,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for days of low discharge, for which they may be poor.

Discharge measurements of Black River at Black River, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
June 8	M. H. Carson	3.98	1,370	Mar. 13	B. F. Howe	8.34	7,500
9	do	3.90	1,360	Apr. 8	do	10.14	11,600
Aug. 28	C. C. Covert	3.70	1,110	29	do	9.25	9,890
Nov. 21	A. H. Davison	5.01	2,500	May 13	Covert and Howe	5.62	3,210
21	B. F. Howe	5.12	2,620	July 15	Covert and Currier	2.52	296
				20	S. M. Currier	4.31	1,850

Daily discharge, in second-feet, of Black River at Black River, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	2,990	7,610	3,250	5,510	2,730	1,900	8,770	5,190	3,830	2,030	1,220	1,040
2	2,860	6,880	2,600	6,180	1,900	2,120	8,180	5,520	3,410	1,920	1,130	1,500
3	2,120	7,610	2,860	6,880	1,470	2,360	7,990	5,520	2,740	1,500	1,040	1,220
4	2,240	6,880	3,390	4,870	1,470	2,860	7,240	6,390	2,620	960	920	1,040
5	2,480	6,350	2,860	3,950	1,570	3,120	7,990	6,030	2,030	764	840	1,220
6	2,730	5,190	2,600	3,670	1,680	3,120	7,990	6,570	1,400	1,600	519	1,400
7	4,870	4,710	2,240	4,100	1,470	3,670	9,370	6,390	1,700	2,140	654	920
8	5,840	3,950	2,360	3,670	1,270	3,810	9,570	6,030	1,600	2,620	801	726
9	5,350	3,670	2,860	3,950	680	3,390	9,780	5,520	1,400	2,260	879	801
10	4,550	3,120	3,250	4,100	590	4,550	10,200	4,720	1,700	1,810	879	960
11	3,810	3,390	3,120	2,730	590	6,180	11,100	4,270	1,040	1,310	1,040	1,040
12	3,120	3,530	2,730	1,790	950	6,520	12,600	4,120	960	1,400	879	1,220
13	2,600	3,670	2,600	1,790	1,470	5,670	14,600	5,860	1,130	1,500	960	1,400
14	2,360	4,250	3,670	1,900	1,790	5,840	17,300	5,350	960	2,030	801	1,600
15	2,360	4,400	4,100	2,240	1,900	5,190	16,800	4,870	879	1,700	690	1,600
16	2,240	4,100	4,250	2,120	2,360	4,400	16,200	4,570	1,220	1,130	879	960
17	2,600	3,810	3,950	2,240	2,600	4,550	12,400	4,120	1,310	1,220	840	1,130
18	2,120	4,870	3,670	2,360	2,600	5,030	10,600	4,870	1,220	1,920	726	960
19	2,240	6,180	3,250	2,120	2,360	10,400	10,200	6,210	1,310	1,700	726	585
20	2,010	7,240	2,990	2,010	2,240	10,200	9,120	7,120	1,040	1,700	879	654
21	3,670	6,880	2,860	2,240	1,680	10,400	7,900	6,570	960	1,810	1,220	654
22	4,550	6,520	2,360	1,900	1,470	10,400	7,900	6,750	960	1,810	2,030	1,400
23	4,100	4,550	3,390	2,120	1,900	9,780	7,500	7,310	1,130	1,600	1,600	1,810
24	3,530	3,250	4,550	3,120	2,240	9,990	7,500	6,390	840	1,700	1,130	2,260
25	2,990	3,250	5,670	4,550	2,010	8,770	7,310	5,350	1,040	1,130	1,310	2,620
26	3,390	3,390	8,570	4,870	2,120	8,370	6,030	5,190	1,220	1,700	960	2,870
27	4,870	3,390	7,990	5,350	1,680	7,990	6,030	4,870	1,310	1,310	1,220	3,130
28	5,510	3,670	7,060	4,550	1,470	8,370	5,350	4,570	2,030	1,040	1,130	2,260
29	5,350	3,250	5,840	3,950	.....	8,570	5,350	3,830	1,600	1,600	1,220	2,030
30	6,180	3,670	6,180	3,120	.....	8,180	4,870	3,410	1,810	1,920	1,810	2,140
31	7,060	.....	5,030	2,860	.....	8,770	.....	3,830	.....	1,600	1,500	.....

Daily discharge, in second-feet, of Black River at Black River, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	1,500	5,690	6,210	3,410	1,600	1,700	14,300	10,800	726	764	.....	.....
2	1,920	6,750	7,120	3,270	840	2,030	13,800	10,800	1,130	620	.....	.....
3	1,600	6,750	6,750	3,000	552	2,260	12,900	9,750	1,310	879	.....	.....
4	1,600	6,390	4,870	2,030	879	1,810	11,500	8,700	1,220	654	.....	.....
5	1,400	6,210	3,690	2,380	1,040	2,030	14,300	8,100	1,040	164	.....	.....
6	1,600	5,690	3,830	2,740	690	2,030	15,100	6,930	372	1,600	.....	.....
7	3,550	5,350	3,410	2,140	372	1,920	13,400	6,570	764	1,920	.....	.....
8	3,830	4,570	3,970	1,810	488	2,260	11,500	5,350	920	1,920	.....	.....
9	3,690	3,550	4,120	2,030	920	1,810	10,400	5,030	1,130	2,140	.....	.....
10	3,130	2,870	5,190	1,920	764	2,260	9,750	5,190	960	1,130	.....	.....
11	2,870	3,550	6,210	1,920	764	2,260	8,300	3,830	960	1,310	.....	.....
12	2,380	3,270	4,870	1,600	1,810	2,870	7,900	3,270	726	764	.....	.....
13	2,030	3,830	5,030	1,700	2,030	6,930	7,700	3,550	620	1,040	.....	.....
14	1,400	4,420	6,750	1,810	2,030	7,120	7,700	3,270	1,130	1,040	.....	.....
15	1,310	4,870	7,310	1,920	1,810	6,390	8,700	3,000	1,130	1,400	.....	.....
16	1,040	5,030	7,700	2,260	2,030	6,930	9,960	1,600	1,130	1,800	.....	.....
17	488	4,570	8,300	2,260	1,920	8,700	10,600	1,220	1,220	2,000	.....	.....
18	519	3,270	7,500	2,740	2,140	9,120	10,200	1,130	1,310	.....	.....	.....
19	585	2,380	6,030	3,270	2,030	8,910	10,200	2,140	1,700	.....	.....	.....
20	1,220	2,140	5,030	2,740	2,260	8,300	10,200	2,030	1,600	.....	.....	.....
21	2,140	2,500	4,120	2,030	2,030	6,750	9,960	2,030	1,700	.....	.....	.....
22	3,130	1,810	3,690	1,920	1,810	6,210	9,750	2,140	1,220	.....	.....	.....
23	4,270	2,030	3,130	2,260	1,600	6,570	9,960	2,260	1,040	.....	.....	.....
24	4,270	3,550	3,000	2,500	1,600	8,100	10,400	2,380	1,040	.....	.....	.....
25	3,410	4,120	3,000	2,620	1,700	10,200	12,200	3,030	1,220	.....	.....	.....
26	3,130	3,130	3,550	2,140	1,500	12,000	13,100	1,810	1,220	.....	.....	.....
27	2,870	3,000	3,410	1,920	1,500	15,100	13,400	1,810	764	.....	.....	.....
28	4,720	2,620	2,870	2,030	2,030	16,800	13,400	1,500	920	.....	.....	.....
29	5,690	3,000	2,030	2,500	1,810	17,300	12,400	1,130	620	.....	.....	.....
30	5,860	4,720	1,920	2,740	.....	16,200	10,400	879	960	.....	.....	.....
31	5,690	.....	2,030	2,260	.....	15,400	.....	295	.....	.....	.....	.....

NOTE.—Discharge July 15–17, 1920, estimated from gage heights and record of operation of new power plant of the Northern New York Utilities Co.

Monthly discharge of Black River at Black River, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 1,870 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	7,060	2,010	3,640	1.94	2.24
November	7,610	3,120	4,770	2.55	2.84
December	8,570	2,240	3,940	2.11	2.43
January	6,880	1,790	3,450	1.84	2.12
February	2,730	590	1,720	.920	.96
March	10,400	1,900	6,270	3.35	3.86
April	17,300	4,870	9,460	5.06	5.64
May	7,310	3,410	5,400	2.89	3.33
June	3,830	840	1,550	.829	.92
July	2,620	764	1,630	.872	1.00
August	2,030	519	1,050	.560	.65
September	3,130	585	1,440	.770	.86
The year	17,300	519	3,700	1.98	26.85
1919–20.					
October	5,860	488	2,670	1.43	1.65
November	6,750	1,810	4,050	2.17	2.42
December	8,300	1,920	4,730	2.53	2.92
January	3,410	1,600	2,320	1.24	1.43
February	2,260	372	1,470	.786	.85
March	17,300	1,700	7,040	3.76	4.34
April	15,100	7,700	11,100	5.94	6.63
May	10,800	295	3,890	2.08	2.40
June	1,700	372	1,060	.567	.63
July 1–17	2,140	164	1,240	.663	.42

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

BLACK RIVER AT WATERTOWN, N. Y.

LOCATION.—150 feet below Vanduzee Street Bridge in Watertown, Jefferson County. No important tributary enters river below this point.

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

RECORDS AVAILABLE.—July 18 to September 30, 1920, 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; read 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 period of record, 2.99 feet at 8.25 a. m. July 21 (discharge, 3,980 second-feet); minimum stage recorded, 0.46 foot at 8.40 a. m. September 7 (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 fairly well defined between 1,000 and 20,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

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

Daily discharge, in second-feet, of Black River at Watertown, N. Y., for the year ending Sept. 30, 1920.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	1,020	1,140	11	.....	960	1,350	21	3,790	1,350	1,210
2	.....	960	1,080	12	.....	1,140	1,210	22	3,580	1,210	1,280
3	.....	1,280	1,210	13	.....	1,420	1,210	23	2,460	960	1,280
4	.....	1,350	1,280	14	.....	1,920	2,000	24	1,920	1,140	1,210
5	.....	1,350	1,080	15	.....	2,180	1,740	25	1,740	1,210	1,140
6	.....	1,080	650	16	.....	2,370	1,830	26	1,210	1,280	1,020
7	.....	1,210	700	17	.....	2,000	1,350	27	1,350	1,080	1,080
8	.....	750	1,140	18	1,580	1,830	1,500	28	1,280	1,080	1,210
9	.....	1,020	960	19	1,420	1,740	960	29	1,420	700	1,350
10	.....	1,280	1,140	20	3,370	1,420	1,210	30	960	905	1,660
								31	1,140	1,140	.....

Monthly discharge of Black River at Watertown, N. Y., for the year ending Sept. 30, 1920.

[Drainage area, 1,890 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
July 18–31	3,790	960	1,940	1.03	0.54
August	2,370	700	1,300	.688	.79
September	2,000	650	1,240	.656	.73

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, 1920.

GAGE.—Two Gurley 7-day graph 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 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 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 gaging station. Therefore, this station indicates the total amount of water diverted past the gaging station on Black River near Boonville, and the sum of this record and the record for the 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 no flow in the canal during the winter. Water was observed in the canal several times during the winters of 1917–1918, 1918–1919, and 1919–1920, 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height (feet).		Discharge (second-feet).	Date.	Made by—	Gage height (feet).		Discharge (second-feet).
		Gage No. 1.	Gage No. 2.				Gage No. 1.	Gage No. 2.	
1918.					1919.				
Oct. 18	E. D. Burchard	2.961	1.704	215	Oct. 15	A. H. Davison	3.224	1.965	235
18	do	2.964	1.713	216	15	do	3.232	1.965	235
Nov. 10	do	3.242	1.970	258	31	do	3.375	1.830	275
10	do	3.248	1.967	259	Nov. 20	Howe and Davison	3.12	1.81	247
Dec. 14[a]	do			66.7	1920.				
1919.					Jan. 18[a]	A. H. Davison			37.2
Jan. 7[a]	M. H. Carson			53	Feb. 16[a]	B. F. Howe			49.2
Feb. 18[a]	E. D. Burchard			53.2	Mar. 14[a]	do			17.1
Mar. 9[a]	do			57.8	Apr. 6	do			13.9
June 6	M. H. Carson	2.919	1.58	246	28	do			8.6
8	do	3.020	1.648	257	June 22	C. C. Covert	2.867	1.714	210
13	do	2.696	1.587	204	July 16	Howe and Currier	2.825	1.552	205
27	J. W. Moulton	3.226	1.916	268	26	S. M. Currier	2.805	1.530	194
July 18	M. H. Carson	3.115	1.953	224	Aug. 18	C. C. Covert	2.85	1.403	203
Aug. 11	C. C. Covert	3.063	1.760	209	Sept. 6	do	2.830	1.510	196
29	do	3.21	1.962	196	27[b]	Lamoureux and Lauterhahn	2.996	1.841	200
Sept. 23	do	3.26	1.95	217					

[a] Measurement made through complete ice cover. [b] Measurement made at gage No. 2.

Daily discharge, in second-feet, of Forestport feeder near Boonville, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	1918–19						1919–20					
	Oct.	Nov.	June.	July.	Aug.	Sept.	Oct.	Nov.	June.	July.	Aug.	Sept.
1	199	205	.....	245	205	196	218	248	.....	198	208	207
2	217	197	.....	233	199	194	222	246	239	200	198	202
3	203	218	.....	230	201	201	229	248	227	223	198	210
4	194	216	.....	239	203	198	226	248	226	213	202	202
5	192	219	.....	247	208	196	233	258	217	205	203	199
6	199	215	.....	267	206	195	238	256	227	201	203	207
7	196	211	264	234	200	198	228	255	224	211	198	224
8	203	209	248	235	206	198	227	250	198	198	189	224
9	208	218	227	249	211	201	229	251	198	203	163	228
10	257	255	216	253	196	201	226	260	225	196	160	220
11	275	257	213	248	195	199	233	273	229	212	213	218
12	254	257	216	251	197	200	231	280	226	202	201	212
13	221	257	205	244	194	201	232	282	222	209	200	209
14	194	252	204	248	194	203	231	275	228	214	207	209
15	194	250	205	243	194	203	234	268	235	211	209	210
16	205	248	206	244	193	202	238	264	209	206	206	209
17	217	244	233	240	194	200	238	260	190	204	197	210
18	222	268	240	230	195	203	236	268	196	201	199	210
19	237	256	235	235	196	212	236	269	208	211	209	203
20	223	232	231	224	194	216	226	254	206	201	212	207
21	235	227	230	220	192	217	225	253	213	193	210	207
22	224	222	228	216	193	211	247	252	214	206	214	208
23	217	215	241	212	191	218	234	262	212	204	212	205
24	215	207	229	219	191	227	233	255	192	192	209	207
25	213	194	236	220	188	214	220	240	200	192	204	199
26	243	180	263	215	195	212	242	236	155	194	201	195
27	245	160	281	222	197	219	253	.....	160	198	200	197
28	224	140	275	223	194	220	247	.....	166	212	208	216
29	218	100	267	217	197	217	241	.....	169	223	210	202
30	228	50	261	211	196	221	242	.....	192	214	211	189
31	264	.....	.....	209	195	.....	255	.....	.....	207	203	.....

NOTE.—Discharge for following periods estimated by comparing gage-height hydrographs of gages Nos. 1 and 2 in connection with Black River canal, from study of gage-height graphs, and by estimates of probable slope between gages: Nov. 26–30, 1918, Aug. 15 and 16, 1919, Sept. 11–13, 15–20, 26, 27, Oct. 9–15, Nov. 1, 25–26, 1919, June 6–19, 29–30, and Aug. 9–10, 1920. Discharge, Nov. 21, 1919, interpolated.

Monthly discharge, in second-feet, of Forestport feeder near Boonville, N. Y., for the years ending Sept. 30, 1919 and 1920.

Month.	Maximum.	Minimum.	Mean.	Month.	Maximum.	Minimum.	Mean.
1918-19.				1919-20.			
October	275	192	221	October	255	218	234
November	268	.....	213	November 1-26	282	236	258
June	281	204	236	June 2-30	239	155	207
July	267	209	235	July	223	192	205
August	211	188	197	August	214	160	262
September	227	194	206	September	228	189	208

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

LOCATION.—Slope station in 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, 1920.

GAGES.—Two Gurley 7-day graph water-stage recorders with natural scale for gage heights, 1.81 miles apart. Gage No. 1 is on right bank (opposite towpath) about 50 feet downstream from collector's office in Boonville; gage No. 2 is on right bank (opposite towpath) about 300 yards above Lock 70 and 50 yards above spillway from the canal into Lansing Kill. These gages and the two gages in the Forestport feeder near Boonville are set to the same datum. Recorders inspected by Charles Nugent and Fred Kesauer.

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

DETERMINATION OF DISCHARGE.—Daily discharge determined by use of Chezy formula. The coefficient "C" computed from each current-meter measurement is plotted with reference to date of measurement. A smooth curve drawn through the plotted points shows the variation of "C" through the season, and the 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 season.

ACCURACY.—Records good, except when either recorder is out of commission. At such times estimates of missing gage heights are made from gage-height hydrograph 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 years ending Sept. 30, 1919 and 1920.

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.	
1918.					1919.				
Oct. 16	E.D. Burchard	1.286	1.059	137	Oct. 15	A. H. Davison	1.668	1.258	176
16	.....do	1.286	1.062	136	15	.....do	1.658	1.248	176
Nov. 10	.....do	1.632	1.404	174	31	.....do	1.655	1.24	210
10	.....do	1.634	1.403	178	Nov. 20	Howe and Davison.	1.52	1.269	175
1919.					1920.				
June 7	M. H. Carson	1.399	1.144	197	June 22	C. C. Covert	1.515	1.302	158
13	.....do	1.354	1.201	143	July 15	B. F. Howe	1.285	1.079	142
26	J.W. Moulton	1.634	1.308	228	24	S. M. Currier	1.147	.863	146
July 18	O.W. Hartwell	1.688	1.412	180	Aug. 18	C. C. Covert	.917	.468	138
Aug. 12	C. C. Covert	1.316	.868	166	Sept. 6	.....do	1.192	.866	115
29	.....do	1.70	1.29	166	27	Lamoureux and Lauterhahn.	1.527	1.238	129
Sept. 23	.....do	1.631	1.196	164					

Daily discharge, in second-feet, of Black River canal (flowing south) at Boonville, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	1918–19						1919–20					
	Oct.	Nov.	June.	July.	Aug.	Sept.	Oct.	Nov.	June.	July.	Aug.	Sept.
1	138	149	.....	193	162	160	162	189	.....	137	146	134
2	151	151	.....	184	166	175	170	192	146	145	135	115
3	132	162	.....	187	158	175	167	193	151	132	145	118
4	136	158	.....	177	157	178	170	176	151	164	142	115
5	133	156	.....	210	164	186	168	196	152	137	143	115
6	138	155	.....	184	171	187	173	190	144	173	146	97
7	123	153	167	168	169	164	161	187	159	154	142	92
8	133	151	172	165	168	160	162	180	175	168	138	93
9	127	157	183	170	162	152	166	187	144	124	120	111
10	144	175	174	178	158	164	173	191	151	148	115	135
11	152	149	152	177	164	166	182	215	147	146	150	132
12	150	166	161	177	166	160	187	221	165	133	146	128
13	137	160	144	164	162	153	191	185	157	150	137	135
14	131	152	154	163	158	163	181	203	164	145	138	114
15	133	153	157	166	159	166	186	186	167	141	151	130
16	142	155	157	158	164	167	186	195	150	151	133	130
17	66	162	183	177	168	166	189	198	144	153	131	122
18	62	168	188	182	169	174	191	188	146	160	138	107
19	151	165	185	183	170	174	181	201	148	167	144	124
20	159	151	177	177	158	170	187	176	153	155	141	121
21	155	148	163	185	160	172	179	179	160	158	143	116
22	145	137	164	176	160	172	207	195	154	150	141	110
23	134	146	181	169	167	171	198	197	127	159	122	104
24	144	159	161	175	163	185	199	203	158	147	137	105
25	146	105	201	174	164	171	186	193	151	150	132	117
26	146	75	227	175	169	174	189	187	109	152	141	123
27	135	0	226	174	171	161	203	236	110	169	127	128
28	156	0	218	180	164	165	204	.....	126	150	127	123
29	146	0	205	176	166	171	206	.....	158	162	123	118
30	147	0	203	172	169	165	203	.....	132	148	130	134
31	152	.....	.....	168	162	.....	205	.....	.....	150	127	.....

NOTE.—Discharge for following periods estimated by comparison of gage-height graphs for gages Nos. 1 and 2, in connection with gage No. 2 of Forestport feeder, and from study of recorder graphs: Nov. 26–30, 1918, Aug. 13–16, 20–23, 28, 29, Sept. 1–6, 16–20, 26, 27, Oct. 10–11, 21–31, Nov. 1, 20, 1919; June 6–9, 23–26, 28–30, July 4, 7, 13, 22–23, 27–28, Aug. 9–14, 18–19, 22–23, 25, 29–30, Sept. 6–25, 28 and 29, 1920.

Monthly discharge, in second-feet, of Black River canal (flowing south) near Boonville, N. Y., for the years ending Sept, 30, 1919 and 1920.

Month.	Maximum.	Minimum.	Mean.	Month.	Maximum.	Minimum.	Mean.
1918–19.				1919–20.			
October	159	62	137	October	207	161	184
November	175	0	131	Nov. 1–27	236	176	194
June 7–30	227	144	179	June 2–30	175	103	148
July	210	158	176	July	173	124	151
August	171	158	164	August	151	115	136
September	187	152	169	September	135	92	118

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 nearly 20 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, 1920.

GAGE.—Staff in two sections on left bank a short distance above the cable; read by H. W. Hoch October 1 to December 31, 1919, and by W. D. Rinkle May 13 to September 30, 1920. 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 ending September 30, 1919, 14.5 feet at 8 a. m. April 12 (discharge, 10,400 second-feet); minimum stage recorded, 5.25 feet at 8 a. m. June 27 (discharge, 93 second-feet).

Maximum stage for year ending September 30, 1920, not recorded; minimum stage recorded, 5.2 feet on morning of June 29 (discharge, 83 second-feet).

1900–1920: 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 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; for low stages records are fair.

Discharge measurements of Moose River at Moose River, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1919.			
Oct. 17	E. D. Burchard	7.35	850	July 18	M. H. Carson	5.44	120
1919.				1920.			
Jan. 8	do	[a] 7.15	603	Jan. 17	Davison and Howe	[a] 7.37	308
Feb. 19	do	[a] 6.59	472	July 23	S. M. Currier	6.40	407

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Moose River at Moose River, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	715	2,660	580	760	500	1,020	1,590	1,260	670	259	151	259
2	625	1,910	760	965	460	1,140	1,380	1,260	500	189	164	274
3	625	1,590	670	965	500	965	1,320	1,670	441	320	151	289
4	760	1,450	670	1,020	422	1,080	1,320	1,320	164	151	151	320
5	860	1,320	670	715	422	910	1,380	1,450	422	176	151	289
6	1,380	1,200	580	600	404	910	910	1,590	500	176	151	259
7	2,460	860	625	650	386	965	2,090	1,450	202	230	114	320
8	1,750	965	540	700	422	1,020	2,460	1,320	259	202	151	320
9	1,670	965	580	650	422	1,080	2,860	1,200	259	176	138	352
10	1,140	860	625	650	422	1,200	3,060	1,020	230	230	138	500
11	1,020	715	670	650	422	1,590	3,060	1,020	230	230	126	580
12	1,020	760	625	600	441	1,260	9,250	1,140	189	500	114	540
13	910	760	580	600	422	1,080	3,620	1,020	176	202	103	580
14	1,080	760	540	600	500	965	2,960	910	138	202	114	422
15	1,080	670	1,080	550	580	715	2,660	860	202	259	114	441
16	910	670	1,910	500	625	810	2,360	760	259	304	189	336
17	860	404	1,320	480	580	715	2,270	910	352	289	386	320
18	810	580	1,140	460	550	1,450	2,270	2,090	352	259	460	369
19	715	910	1,020	440	500	2,460	1,910	2,090	304	274	441	404
20	760	1,320	860	440	480	2,180	1,450	1,380	259	138	460	369
21	1,080	1,080	670	440	420	2,270	1,450	1,260	259	176	386	386
22	1,200	965	580	422	400	2,460	1,670	1,080	230	176	441	625
23	1,020	860	1,750	422	420	2,000	1,450	1,260	230	176	386	580
24	965	625	2,660	1,020	420	2,090	1,320	1,200	189	202	352	625
25	860	715	1,670	1,380	420	2,180	1,590	1,080	320	189	386	670
26	965	670	1,260	1,450	440	1,750	1,380	1,200	176	176	441	670
27	1,140	580	1,260	965	500	2,360	860	1,080	320	151	460	625
28	1,140	580	1,020	760	670	2,960	1,140	760	540	274	404	540
29	1,020	670	760	760	.....	3,060	1,200	715	422	500	320	625
30	1,320	860	860	580	.....	2,090	1,260	760	189	369	202	540
31	2,460	.....	810	500	.....	1,830	.....	860	.....	202	230	.....
1919–20.												
1	386	1,260	1,910	.....	.....	.....	.....	.....	441	138	289	274
2	500	1,200	1,830	.....	.....	.....	.....	.....	352	146	274	320
3	336	1,320	1,020	.....	.....	.....	.....	.....	369	114	289	274
4	460	1,320	965	.....	.....	.....	.....	.....	386	103	295	230
5	460	1,200	910	.....	.....	.....	.....	.....	320	274	304	259
6	715	1,380	965	.....	.....	.....	.....	.....	189	202	289	202
7	1,520	1,200	500	.....	.....	.....	.....	.....	460	386	259	230
8	1,260	965	860	.....	.....	.....	.....	.....	189	460	259	216
9	860	760	670	.....	.....	.....	.....	.....	386	625	289	216
10	715	965	860	.....	.....	.....	.....	.....	202	441	274	216
11	715	965	1,020	.....	.....	.....	.....	.....	164	164	289	244
12	625	1,080	1,140	.....	.....	.....	.....	.....	230	138	580	259
13	670	1,380	1,080	.....	.....	.....	.....	965	131	352	810	352
14	580	1,830	1,670	.....	.....	.....	.....	760	244	352	715	460
15	320	1,380	1,590	.....	.....	.....	.....	760	176	460	715	320
16	540	1,020	1,140	.....	.....	.....	.....	500	138	670	670	244
17	580	965	910	.....	.....	.....	.....	715	176	352	580	240
18	670	965	800	.....	.....	.....	.....	580	202	146	540	230
19	715	910	800	.....	.....	.....	.....	670	336	625	500	369
20	422	860	700	.....	.....	.....	.....	580	320	965	369	352
21	580	965	600	.....	.....	.....	.....	625	336	760	336	336
22	965	860	800	.....	.....	.....	.....	715	189	500	336	230
23	965	860	650	.....	.....	.....	.....	760	176	460	320	289
24	860	965	600	.....	.....	.....	.....	910	176	386	289	216
25	760	910	500	.....	.....	.....	.....	910	99	176	244	259
26	760	760	650	.....	.....	.....	.....	715	202	386	202	244
27	1,830	810	650	.....	.....	.....	.....	670	136	965	202	230
28	1,830	1,020	460	.....	.....	.....	.....	580	164	289	202	320
29	1,670	1,020	550	.....	.....	.....	.....	540	131	289	202	336
30	1,450	1,140	460	.....	.....	.....	.....	151	112	244	202	386
31	1,140	.....	460	.....	.....	.....	.....	460	.....	244	230	.....

NOTE.—Discharge, Jan. 6–21, Feb. 18–26, and Dec. 18–31, 1919, estimated because of ice, by comparison with records for streams in adjacent drainage basins. Discharge, May 1–12, 1920, estimated at 2,100 second-feet by comparison with record of Black River near Boonville; also Aug. 4 and Sept. 17, 1920.

Monthly discharge of Moose River at Moose River, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 370 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	2,460	625	1,110	3.00	3.46
November	2,660	404	964	2.61	2.91
December	2,660	540	947	2.56	2.95
January	1,450	422	700	1.89	2.18
February	670	400	470	1.27	1.32
March	3,060	715	1,570	4.24	4.89
April	9,250	860	2,120	5.73	6.39
May	2,090	715	1,190	3.22	3.71
June	670	138	299	.808	.90
July	500	138	237	.641	.74
August	460	103	257	.695	.80
September	670	259	448	1.21	1.35
The year	9,250	103	861	2.33	31.60
1919–20.					
October	1,830	320	834	2.25	2.59
November	1,830	760	1,070	2.89	3.22
December	1,910	460	894	2.42	2.79
January	.....	.....	320	.865	1.00
February	.....	.....	300	.811	.87
March	.....	.....	1,200	3.24	3.74
April	.....	.....	2,600	7.03	7.84
May	.....	151	1,220	3.30	3.80
June	460	99	238	.643	.72
July	965	103	381	1.03	1.19
August	810	202	366	.989	1.14
September	460	202	278	.751	.84
The year	.....	99	809	2.19	29.74

NOTE.—Mean discharge for January, February, March, and April, 1920, estimated by comparison with Black River near Boonville, also from study of distribution of run-off of Black River basin, based on records of Black River at Black River and near Boonville, Beaver River at State dam, and Moose River.

MIDDLE BRANCH OF MOOSE RIVER AT OLD FORGE, N. Y.

LOCATION.—About 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, 1920.

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 near gage.

CHANNEL AND CONTROL.—Bed near gage composed of stone and gravel. Control is rock ledge about 200 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.1 feet at 8 a. m. April 13 (discharge, 557 second-feet); minimum stage 0.98 foot from 8 a. m. August 30 to 8 a. m. September 3 (discharge, 26 second-feet).

Maximum stage recorded during year ending September 30, 1920, 3.1 feet at 5 p. m. April 25 and 8 a. m. April 26 (discharge, 311 second-feet); minimum discharge, 16 second-feet, October 18 to November 3.

1911–1920: Maximum stage recorded, 6.3 feet March 28, 1913; stage-discharge relation affected by backwater from Moose River; discharge computed from record at dam, 760 second-feet. 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 from log jams; not affected by ice. Rating curve well defined between 20 and 400 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height. For days on which gates at dam were changed mean daily gage height was weighted on basis of record of gate openings. Records good; fair for days on which gate opening at the dam were changed.

Discharge measurements of Middle Branch of Moose River at Old Forge, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
July 19	O. W. Hartwell	1.14	32.1	May 19	B. F. Howe	1.41	52.1
Oct. 31	A. H. Davison	1.19	16.3	19	do	1.44	51.6
				July 22	Currier and Howe	1.14	30.5
1920.				23	S. M. Currier	1.12	32.0
Jan. 17	Howe and Davison	1.29	45.3				

Daily discharge, in second-feet, of Middle Branch of Moose River at Old Forge, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	98	214	116	80	56	70	290	189	31	34	36	26
2	98	232	116	80	58	75	280	189	29	32	35	26
3	116	232	116	80	60	75	270	189	29	31	34	50
4	165	232	116	80	60	75	260	189	29	31	32	65
5	181	232	116	80	60	75	260	189	29	31	32	86
6	214	232	116	80	60	80	250	189	43	32	33	165
7	214	223	116	80	60	86	232	181	40	32	32	158
8	241	214	116	80	60	86	220	143	40	31	32	158
9	270	214	116	80	60	92	220	65	40	32	33	165
10	280	181	116	80	60	110	220	65	40	32	33	173
11	260	150	116	60	60	123	220	65	39	33	32	214
12	260	150	110	40	60	130	220	49	37	33	32	206
13	260	150	98	43	60	130	220	46	36	33	33	197
14	250	150	75	45	61	123	220	45	34	33	86	197
15	241	150	75	45	63	116	220	40	39	33	197	197
16	241	116	75	43	65	104	220	40	39	33	197	197
17	241	98	75	43	65	104	220	44	39	33	197	197
18	241	104	75	43	65	123	200	49	45	33	197	206
19	232	104	75	43	65	130	200	55	48	33	189	206
20	232	116	75	43	65	136	200	58	48	33	189	197
21	223	123	75	45	65	150	200	54	48	33	181	197
22	214	123	75	45	65	165	200	53	45	33	181	189
23	206	123	75	45	65	165	200	50	40	33	181	189
24	206	116	75	48	65	158	197	48	33	32	181	189
25	214	116	80	53	65	158	197	53	32	31	181	189
26	214	116	86	53	65	150	197	48	33	31	181	181
27	214	116	86	54	65	150	197	50	35	32	130	173
28	214	116	86	56	65	150	197	50	39	35	110	165
29	214	116	86	56	.....	173	197	50	39	38	75	165
30	214	116	86	56	.....	181	189	48	39	38	26	165
31	214	.....	80	56	.....	260	.....	42	.....	37	26	.....

Daily discharge, in second-feet, of Middle Branch of Moose River at Old Forge, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	158	16	33	40	173	33	143	280	57	28	60	65
2	158	16	33	40	165	33	150	270	73	28	65	65
3	158	16	36	40	165	33	181	250	63	28	80	70
4	150	49	36	40	165	33	189	241	49	32	105	70
5	150	104	36	42	165	33	189	241	59	49	105	65
6	150	123	36	42	165	33	181	232	59	45	105	65
7	150	136	36	42	165	33	181	206	45	38	131	65
8	104	143	36	43	158	33	206	189	48	51	132	65
9	86	165	37	43	158	33	189	189	49	47	132	65
10	86	173	37	43	150	33	181	114	46	29	132	65
11	75	173	37	42	158	33	181	131	45	29	139	64
12	60	173	37	43	150	34	173	109	43	29	170	158
13	53	173	37	44	150	34	173	72	41	35	194	158
14	53	173	37	43	150	34	189	83	40	39	194	116
15	51	165	37	45	150	34	206	54	41	31	186	86
16	51	165	37	46	150	34	250	50	42	35	187	86
17	26	165	39	46	150	34	250	50	46	34	187	110
18	16	165	39	48	150	35	241	46	48	32	179	158
19	16	165	39	48	150	36	250	54	43	36	110	173
20	16	165	39	116	150	36	270	54	42	39	110	150
21	16	45	40	206	130	36	270	54	41	39	104	130
22	16	47	37	206	33	36	290	58	42	33	104	136
23	16	48	37	214	33	37	280	83	45	31	98	130
24	16	44	37	197	33	39	290	88	46	35	75	130
25	16	44	38	181	33	39	311	58	44	34	75	123
26	16	40	39	181	33	50	290	77	44	32	75	123
27	16	34	39	181	33	63	280	56	43	31	70	123
28	16	33	39	181	33	80	260	62	41	60	65	123
29	16	33	39	173	33	98	250	53	28	60	65	123
30	16	33	40	173	.....	136	290	83	28	60	65	123
31	16	.....	40	173	.....	165	.....	67	.....	60	65	.....

NOTE.—Stage-discharge relation affected by backwater from logs on control, Apr. 8-23, 1919, and by backwater from Moose River Oct. 26 to Nov. 3, 1919; discharge estimated. Discharge, May 10 to Aug. 18, 1920, determined by indirect method on account of backwater, on basis of four discharge measurements.

Monthly discharge of Middle Branch of Moose River at Old Forge, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 51.5 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	280	98	216	4.20	4.84
November	232	98	156	3.03	3.38
December	116	75	93.5	1.82	2.10
January	80	40	58.6	1.14	1.31
February	65	56	62.2	1.21	1.26
March	260	70	126	2.45	2.82
April	290	189	220	4.27	4.76
May	189	40	84.7	1.64	1.89
June	48	29	37.9	.736	.82
July	38	31	32.9	.639	.74
August	197	26	101	1.96	2.26
September	214	26	163	3.17	3.54
The year	290	26	113	2.20	29.72
1919-20.					
October	158	16	62.7	1.22	1.41
November	173	16	101	1.96	2.19
December	40	33	37.4	.726	.84
January	214	40	96.8	1.88	2.17
February	173	33	122	2.37	2.56
March	165	33	46.9	.911	1.05
April	311	143	226	4.39	4.90
May	280	46	118	2.29	2.64
June	73	28	46.0	.893	1.00
July	60	28	38.3	.744	.86
August	194	60	115	2.23	2.57
September	173	64	106	2.06	2.30
The year	311	16	92.5	1.80	24.49

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, 1920.

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. Widths of sluice gate openings determined by measuring on the gate stems the distance they have been raised.

DISCHARGE MEASUREMENTS.—Current-meter measurements made from a temporary footbridge at 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 circular sluice gates, the logway at the west end of the spillway, and over 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 stage of reservoir recorded during the year ending September 30, 1919, 18.9 feet at 7.15 a. m. April 12; minimum stage recorded, 7.0 feet at 4.05 p. m. September 19.

Maximum stage of reservoir recorded during year ending September 30, 1920, 18.55 feet at 8.30 a. m. June 3; minimum stage recorded 3.4 feet at 7.05 a. m. March 13.

1908–1920: Maximum elevation of water surface in reservoir 19.46 feet, March 29, 1913; minimum stage, 2.9 feet, September 29 and October 1, 1913.

EXTREMES OF DISCHARGE.—Maximum daily discharge during year ending September 30, 1919, 2,700 second-feet, April 12; minimum discharge about 4 second-feet, March 22, when gates were closed.

Maximum daily discharge during year ending September 30, 1920, 1,640 second-feet, April 4; minimum discharge, zero, several days in November, March, and July, when gates were closed.

1908–1920: Maximum discharge, 3,300 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. Gage on lake read to half-tenths once daily. The accuracy of computations depends on the care with which the gates were set to the recorded openings. Records fair.

No discharge measurements were made during the years ending September 30, 1919 and 1920.

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

Monthly discharge of Beaver River at State dam, near Beaver River, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 176 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	265	222	242	1.38	1.59
November	809	293	475	2.70	3.01
December	714	265	417	2.37	2.73
January	463	252	299	1.70	1.96
February	309	248	282	1.60	1.67
March	1,110	4	418	2.38	2.74
April	2,700	535	1,040	5.91	6.59
May	835	280	552	3.14	3.62
June	280	139	233	1.32	1.47
July	245	220	232	1.32	1.52
August	218	181	196	1.11	1.28
September	180	149	166	.943	1.05
The year	2,700	4	379	2.16	29.23
1919–20.					
October	226	163	194	1.10	1.27
November	457	0	175	.994	1.11
December	650	173	375	2.13	2.46
January	305	139	220	1.25	1.44
February	412	204	284	1.61	1.74
March	351	0	215	1.22	1.41
April	1,640	5	1,020	5.81	6.48
May	1,270	24	449	2.55	2.94
June	483	160	316	1.79	2.00
July	427	0	169	.960	1.11
August	302	151	240	1.36	1.57
September	302	18	238	1.35	1.51
The year	1,640	0	324	1.84	25.04

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

STREAMS TRIBUTARY TO ST. LAWRENCE RIVER.

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

LOCATION.—About 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 the New York State Conservation Commission).

RECORDS AVAILABLE.—October 6, 1912, to September 30, 1920.

GAGE.—Vertical staff on left bank 600 feet above lower dam; read by Henry VanWaldick. Datum lowered 1 foot on July 28, 1920.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year ending September 30, 1919, 5.23 feet at 6.20 p. m. April 13 (discharge, 1,630 second-feet); minimum stage is reached nearly every Sunday during low-water period when paper mills shut down.

Maximum stage recorded during year ending September 30, 1920, 5.5 feet at 6.15 p. m. April 30 (discharge, 1,800 second-feet); minimum stage is reached nearly every Sunday during low-water period when paper mills shut down.

1912–1920: 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 rating table. Records only fair, as mean daily gage heights are obtained from only two readings, and may be considerably in error on account of artificial regulation.

Discharge measurements of East Branch of Oswegatchie River at Newton Falls, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
1919.			
June 9	M. H. Carson	1.71	252
1920.			
Jan. 14	B. F. Howe	2.13	328
July 28	do	1.99	334
Sept. 29	Currier and Covert	2.08	322

Daily discharge, in second-feet, of East Branch of Oswegatchie River at Newton Falls, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	445	338	282	490	315	272	810	588	252	315	338	338
2	430	376	430	475	293	272	770	571	144	293	293	402
3	460	282	315	460	554	350	894	538	293	315	40	315
4	282	402	460	445	304	338	982	350	293	50	293	402
5	475	389	460	282	363	350	938	658	326	50	376	350
6	852	402	282	445	252	326	658	658	304	60	363	304
7	770	430	402	506	293	350	810	694	293	402	315	40
8	658	304	57	460	272	293	810	694	272	326	326	326
9	506	326	416	460	293	293	810	732	242	262	460	363
10	326	57	430	460	315	389	982	658	272	293	50	445
11	293	272	460	522	338	363	1,170	658	293	272	430	402
12	252	293	430	252	315	338	1,330	252	315	326	363	376
13	315	326	430	538	326	326	1,500	475	326	304	304	363
14	326	315	460	363	363	272	1,440	460	272	326	160	40
15	338	282	202	363	315	315	1,330	538	103	293	416	588
16	363	315	658	445	282	252	1,270	506	272	262	376	350
17	252	137	538	445	350	376	1,220	522	416	402	85	326
18	272	338	506	252	304	363	1,070	490	293	363	293	376
19	282	554	571	338	252	430	1,070	658	262	402	326	326
20	338	658	445	430	262	338	938	506	272	60	350	282
21	475	571	445	445	262	350	852	402	293	260	363	40
22	402	506	57	363	252	272	694	522	232	293	389	376
23	445	430	622	376	315	293	588	506	130	376	445	490
24	338	262	588	252	304	363	588	658	304	350	80	40
25	416	588	588	445	389	293	571	460	326	376	363	252
26	363	475	658	338	315	293	588	571	363	338	416	252
27	326	419	571	460	272	272	554	554	522	50	350	40
28	338	460	622	389	252	242	622	430	460	430	376	40
29	338	460	538	402	.....	262	522	460	363	460	293	40
30	376	490	694	430	.....	137	554	416	326	363	293	40
31	282	.....	506	315	.....	810	.....	363	.....	350	80	.....

Daily discharge, in second-feet, of East Branch of Oswegatchie River at Newton Falls, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	232	338	430	326	50	293	293	1,170	293	282	110	232
2	242	262	350	326	282	315	272	1,030	293	242	232	262
3	293	293	402	315	363	315	315	1,070	293	282	304	232
4	402	304	376	50	363	326	90	982	315	252	171	272
5	338	338	315	402	293	350	163	938	315	293	171	198
6	571	338	338	293	338	326	252	894	171	338	272	315
7	293	293	293	326	326	73	214	810	315	326	262	304
8	282	315	293	282	50	304	171	522	315	338	163	272
9	326	272	304	304	293	293	242	326	304	363	163	232
10	304	282	326	326	293	338	272	506	315	315	214	143
11	460	262	363	50	338	326	87	522	293	50	376	293
12	315	272	338	338	262	326	242	506	326	326	171	242
13	252	272	326	282	338	326	272	460	120	304	315	363
14	262	376	293	326	315	97	315	445	315	272	363	174
15	282	315	416	304	144	402	338	506	315	282	205	315
16	282	50	338	262	293	363	315	155	338	315	293	315
17	272	376	376	293	315	376	326	389	338	252	315	363
18	293	363	338	97	304	338	93	389	315	232	304	262
19	60	293	363	262	293	350	338	416	326	80	293	223
20	262	315	252	293	326	350	242	416	272	315	272	272
21	282	338	196	293	315	50	445	430	293	389	232	315
22	350	363	363	326	109	304	338	376	282	338	133	293
23	376	50	338	293	326	338	338	262	315	315	252	315
24	430	350	326	293	293	338	402	326	376	315	304	214
25	338	402	70	50	338	350	232	304	338	262	262	272
26	272	376	282	282	293	272	894	338	315	80	232	272
27	376	338	376	293	293	389	982	350	163	262	232	293
28	376	338	50	282	338	304	1,030	304	120	214	252	242
29	402	376	338	315	109	363	1,070	282	326	232	205	282
30	338	350	326	326	.....	389	1,380	252	326	293	214	282
31	376	.....	338	304	.....	350	.....	304	.....	350	223	.....

NOTE.—Discharge for following periods estimated by comparison with records for West Branch at Harrisville and Oswegatchie River at Heuvelton: July 4-6, 20, 21, 27, Aug. 3, 10, 14, 24, 31, Sept. 7, 14, 21, 24, 27-30, Oct. 19, Nov. 16, 23, Dec. 25 and 28, 1919, Jan. 4, 11, 25, Feb. 1, 8, Mar. 21, Apr. 4, June 13, 28, July 11, 19, 26, and Aug. 1, 1920. Water shut off at Cranberry Lake during repairs to dam, Sept. 27-30, 1919.

Monthly discharge of East Branch of Oswegatchie River at Newton Falls, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 166 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	852	252	398	2.40	2.77
November	658	57	332	2.30	2.57
December	694	57	456	2.75	3.17
January	538	252	408	2.46	2.84
February	554	252	312	1.88	1.96
March	810	137	329	1.98	2.28
April	1,500	522	898	5.41	6.04
May	732	252	534	3.22	3.71
June	522	103	294	1.77	1.98
July	460	50	291	1.75	2.02
August	460	40	303	1.83	2.11
September	588	40	277	1.67	1.86
The year	1,500	40	407	2.45	33.31

Monthly discharge of East Branch of Oswegatchie River at Newton Falls, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919–20.					
October	571	a 60	321	1.93	2.22
November	402	a 50	307	1.85	2.06
December	430	a 50	317	1.91	2.20
January	402	a 50	275	1.66	1.91
February	363	a 50	276	1.66	1.79
March	402	a 50	311	1.87	2.16
April	1,380	87	399	2.41	2.69
May	1,170	155	515	3.11	3.58
June	376	a 120	291	1.75	1.95
July	389	a 50	274	1.65	1.90
August	376	a 110	242	1.46	1.68
September	363	143	269	1.62	1.81
The year	1,380	a 50	317	1.91	25.95

a Estimated for days when gates at dam were closed.

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

OSWEGATCHIE RIVER NEAR HEUVELTON, N. Y.

LOCATION.—About 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, 1920.

GAGE.—Gurley 7-day graph water-stage recorder on the right bank, about 2½ miles above Heuvelton, 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.

CHANNEL AND CONTROL.—Solid rock.

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

EXTREME OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.94 feet at 1.30 a. m. March 21 (discharge, 7,760 second-feet); minimum stage, 1.07 feet at 7 p. m. August 15 (discharge, 404 second-feet).

Maximum open-water stage during the year ending September 30, 1920, from water-stage recorder, 6.03 feet at 4 a. m. March 29 (discharge, 7,950 second-feet); minimum stage from water-stage recorder, 0.99 foot, noon to 8 p. m. October 5 (discharge, 360 second-feet).

1916–1920: Maximum stage from water-stage recorder, 7.6 feet from 9 a. m. to noon March 30, 1917 (discharge, 11,700 second-feet); minimum stage from water-stage recorder, 0.91 foot at 11 p. m. October 16, 1916 (discharge, 320 second-feet).

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

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

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined between 400 and 15,000 second-feet. Operation of water-stage recorder 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.

Discharge measurements of Oswegatchie River near Heuvelton, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 18	E. D. Burchard	2.13	1,320	Feb. 13	B. F. Howe	[b] 1.71	688
June 12	C. C. Covert	1.63	846	Mar. 11	do	[b] 2.43	1,300
				Apr. 10	do	3.14	2,620
1920.				10	do	3.12	2,620
Jan. 13	Davison and Howe	[a] 1.48	745	July 29	S. M. Currier	1.52	725

[a] Measurement made from ice; control open about three-fourths the width of river.
[b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Oswegatchie River near Heuvelton, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	1,370	3,530	2,460	2,820	1,460	1,520	2,250	2,820	1,300	2,750	694	570
2	1,260	3,530	2,320	2,820	1,120	2,180	2,530	3,050	1,160	1,980	646	555
3	1,190	3,370	2,250	2,820	947	2,460	2,600	3,130	1,070	1,510	646	630
4	1,080	2,900	2,180	2,980	956	2,600	2,600	3,050	947	1,210	615	615
5	1,100	2,600	1,910	3,050	966	2,900	2,980	3,870	909	1,000	570	585
6	2,690	2,390	1,550	2,460	976	2,750	3,620	4,830	863	918	578	541
7	5,100	2,110	1,720	2,040	947	2,390	4,470	4,920	1,090	818	570	541
8	6,050	1,980	1,720	1,750	836	2,110	5,290	4,650	1,490	702	555	541
9	6,050	1,840	1,800	1,720	719	1,910	5,480	4,040	1,120	662	541	710
10	5,100	1,650	1,900	2,040	686	2,320	5,670	3,450	1,110	615	499	827
11	4,120	1,590	1,800	1,980	755	3,210	5,860	2,980	966	600	485	872
12	3,290	1,510	1,780	1,780	686	3,370	6,450	2,750	827	592	433	985
13	2,600	1,390	1,780	1,410	622	3,050	7,050	2,600	755	562	452	1,180
14	2,110	1,370	2,580	1,200	740	2,750	7,470	2,460	654	578	452	1,280
15	1,910	1,310	4,720	1,260	1,850	2,600	7,260	2,180	638	670	446	1,210
16	1,730	1,230	6,050	1,290	2,040	2,180	7,050	2,040	622	686	466	1,020
17	1,540	1,190	6,250	1,270	1,510	3,730	6,850	1,910	646	728	485	863
18	1,430	1,630	5,860	1,270	1,300	6,250	7,050	2,110	670	845	485	818
19	1,320	3,390	4,740	1,260	1,200	7,260	6,450	2,320	615	854	472	737
20	1,290	4,920	3,780	1,100	1,100	7,470	5,480	2,320	570	755	513	728
21	1,410	5,670	3,050	1,020	985	7,260	4,650	2,390	592	654	513	719
22	1,680	5,860	2,600	1,080	938	5,860	4,040	2,750	600	686	478	694
23	1,910	5,670	2,980	1,090	890	4,830	3,370	2,750	555	678	472	719
24	1,840	4,830	3,210	1,750	1,190	3,960	2,900	2,980	527	746	555	818
25	1,750	3,960	2,980	2,460	1,280	3,210	2,600	2,750	562	872	694	1,000
26	1,780	3,130	2,750	2,250	1,270	2,820	2,460	2,530	600	791	773	928
27	2,180	2,600	2,680	2,040	1,220	2,600	2,390	2,390	4,120	773	694	791
28	2,460	2,180	2,180	1,980	1,070	2,600	2,250	2,180	5,670	670	662	755
29	2,320	2,180	2,180	1,780	.....	2,600	2,390	1,910	5,100	686	670	694
30	2,180	2,460	2,110	1,630	.....	2,250	2,680	1,660	3,870	694	646	662
31	2,680	.....	2,600	1,460	.....	2,040	.....	1,470	.....	702	630	.....

Daily discharge, in second-feet, of Oswegatchie River near Heuvelton, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	622	2,320	1,580	719	900	550	6,650	3,700	654	520	608	459
2	562	2,320	1,680	719	800	600	5,860	3,780	646	499	678	513
3	520	2,180	1,730	764	600	600	4,920	3,780	592	513	678	570
4	452	1,910	1,640	728	650	600	4,560	3,870	520	592	622	764
5	365	1,840	1,470	662	600	600	4,300	3,780	499	854	592	719
6	440	1,840	1,490	646	600	950	4,120	3,530	506	1,240	585	630
7	787	1,750	1,390	630	700	1,300	4,040	3,210	513	1,540	548	600
8	1,760	1,720	1,380	592	650	1,400	3,620	2,900	570	1,470	570	548
9	2,250	1,610	1,200	638	650	1,400	3,130	2,600	570	1,330	555	499
10	2,040	1,450	1,300	694	700	1,300	2,600	2,180	568	1,370	513	520
11	1,750	1,360	1,910	710	600	1,300	2,320	1,910	565	1,300	499	499
12	1,660	1,280	2,040	662	600	2,500	2,180	1,780	562	1,110	452	513
13	1,700	1,340	2,180	670	650	7,000	1,770	1,630	562	890	466	608
14	1,470	1,400	2,320	622	750	.....	3,210	1,590	562	872	520	670
15	1,210	1,400	2,390	562	800	.....	3,620	1,630	534	890	472	854
16	1,190	1,300	2,320	555	750	.....	3,700	1,460	507	827	478	1,030
17	1,170	1,280	1,730	555	750	.....	2,980	1,310	480	890	485	918
18	1,110	1,190	1,530	555	650	.....	3,870	1,170	452	782	513	782
19	985	1,080	1,390	555	550	.....	3,700	1,120	485	827	485	678
20	938	1,150	1,170	555	600	.....	3,210	1,140	499	1,480	485	600
21	995	1,180	1,050	555	650	5,670	2,820	1,080	520	1,780	466	570
22	995	1,120	995	555	700	4,650	2,900	1,080	555	1,650	440	585
23	1,310	1,170	976	555	650	4,380	3,050	1,060	578	1,300	433	555
24	1,730	1,320	900	570	650	4,830	3,210	1,040	548	1,120	420	513
25	1,770	1,510	1,040	646	550	5,480	3,450	976	520	1,090	459	499
26	1,700	1,600	900	773	500	6,450	3,450	872	555	1,020	472	527
27	1,650	1,570	890	863	600	7,470	3,290	900	570	938	459	499
28	1,640	1,550	800	938	500	7,680	3,370	863	541	818	440	513
29	1,910	1,290	854	900	600	7,890	3,450	800	513	719	433	592
30	2,110	1,490	854	900	.....	7,680	3,530	764	485	654	420	622
31	2,250	.....	755	850	.....	7,260	.....	686	.....	608	394	.....

NOTE.—Discharge Jan. 29 to Mar. 13, 1920, determined from gage heights corrected for ice effect by means of two discharge measurements and study of gage-height graph and weather records; Jan. 1–3, 1919, estimated as shown in table; and Mar. 14–20, 1920, estimated at 4,800 second-feet by comparison with records for East and West branches; June 10–11 and 15–17, 1920, interpolated. Gage-height graph estimated for following periods: Jan. 19–23, May 14, 21, June 2–5, 12, 14, and 18, 1920.

Monthly discharge of Oswegatchie River near Heuvelton, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 961 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	6,050	1,080	2,400	2.50	2.88
November	5,860	1,190	2,800	2.91	3.25
December	6,250	1,550	2,850	2.97	3.42
January	3,050	1,020	1,830	1.90	2.19
February	2,040	622	1,080	1.12	1.17
March	7,470	1,520	3,390	3.53	4.07
April	7,470	2,250	4,470	4.65	5.19
May	4,920	1,470	2,810	2.92	3.37
June	5,670	527	1,340	1.39	1.55
July	2,750	562	871	.906	1.04
August	773	433	561	.584	.67
September	1,280	541	786	.818	.91
The year	7,470	433	2,110	2.20	29.71

Monthly discharge of Oswegatchie River near Heuvelton, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919-20.					
October	2,250	365	1,320	1.37	1.58
November	2,320	1,080	1,520	1.58	1.76
December	2,390	755	1,410	1.47	1.70
January	938	555	674	.701	.81
February	900	500	653	.680	.73
March	7,890	550	3,970	4.13	4.76
April	6,650	1,770	3,560	3.71	4.14
May	3,870	686	1,880	1.96	2.26
June	654	452	541	.563	.63
July	1,780	499	1,020	1.06	1.22
August	678	394	505	.525	.61
September	1,030	459	615	.640	.71
The year	7,890	365	1,480	1.54	20.91

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, 1920.

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 ending September 30, 1919, 6.85 feet at 8 a. m. April 13 (discharge, 3,360 second-feet); minimum stage recorded, 1.4 feet at 7 a. m. August 8 and 15 (discharge, 68 second-feet).

Maximum stage recorded during year ending September 30, 1920, 6.9 feet at 6 p. m. March 27 (discharge, 3,410 second-feet); minimum stage recorded, 1.25 feet at 7 a. m. August 30 (discharge, 54 second-feet).

1916-1920: 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, 1.1 feet at 6 p. m. August 11, 1917, and 7 a. m. August 28 and 29, 1918 (discharge, 42 second-feet).

ICE.—Stage-discharge relation only slightly affected by ice during extremely cold periods.

REGULATION.—Operation of pulp mill at Harrisville causes some diurnal fluctuation.

ACCURACY.—Stage-discharge relation 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.

Discharge measurements of West Branch of Oswegatchie River near Harrisville, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
June 9	M. H. Carson	2.04	175	Mar. 12	B. F. Howe	[a] 3.20	522
				Apr. 9	do	3.80	889
1920.				9	do	3.83	900
Jan. 15	Howe and Davison	[a] 2.12	165	July 27	S. M. Currier	2.40	275
Feb. 14	B. F. Howe	[b] 1.76	120				

[a] Stage-discharge relation affected by ice.
[b] Control practically open; measurement made from ice.

Daily discharge, in second-feet, of West Branch of Oswegatchie River near Harrisville, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	422	1,350	650	370	388	440	750	850	335	260	158	98
2	405	1,210	560	480	275	700	700	850	275	208	135	106
3	305	1,090	520	560	275	700	600	850	275	220	146	106
4	305	910	560	560	245	650	650	850	232	124	106	124
5	305	750	520	600	305	650	750	970	220	124	106	124
6	700	700	520	560	245	650	910	1,210	220	98	91	91
7	2,220	560	480	480	220	700	1,210	1,210	170	91	91	98
8	2,040	480	460	440	220	600	1,800	1,090	220	74	91	106
9	1,560	480	460	405	208	600	2,130	910	182	91	91	146
10	1,280	480	520	335	195	800	1,880	750	158	106	98	275
11	970	422	480	305	182	850	1,800	700	170	124	91	275
12	650	480	440	370	170	910	2,690	700	170	195	79	320
13	480	405	440	275	182	800	3,090	650	170	170	79	480
14	520	388	600	320	220	850	2,400	650	146	124	85	405
15	520	370	1,490	305	370	750	1,960	560	146	124	79	320
16	405	335	2,310	305	370	650	1,640	480	106	170	85	275
17	405	335	1,880	290	335	970	1,420	480	158	220	106	208
18	388	910	1,490	275	320	1,640	1,280	600	182	195	124	208
19	305	1,960	1,090	305	305	2,400	1,090	700	135	170	245	245
20	275	2,890	850	290	245	2,040	970	650	115	135	146	232
21	460	2,490	750	245	275	1,640	910	650	106	115	158	305
22	700	1,960	600	245	245	1,350	850	600	146	245	170	305
23	650	1,560	750	275	232	1,210	750	560	170	440	245	405
24	600	1,150	850	560	245	1,030	650	520	195	320	182	520
25	560	910	910	750	245	850	650	440	232	195	245	370
26	650	700	850	600	232	800	600	480	158	170	158	335
27	850	520	800	520	260	750	600	560	650	245	146	275
28	910	480	700	480	220	700	600	520	750	305	146	220
29	850	560	600	440	.....	650	750	422	560	195	115	195
30	910	700	480	405	.....	650	850	370	405	182	170	195
31	1,150	.....	405	352	.....	750	.....	370	.....	170	124	.....

Daily discharge, in second-feet, of West Branch of Oswegatchie River near Harrisville, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	170	750	750	220	146	124	2,130	1,350	182	106	245	245
2	124	750	750	195	146	135	1,880	1,210	146	98	232	335
3	146	700	700	220	170	124	1,960	1,150	158	146	220	245
4	170	650	700	195	146	124	1,880	1,210	124	560	170	195
5	195	600	650	195	146	146	1,720	1,150	124	700	182	170
6	335	600	560	170	135	305	1,640	1,030	135	650	146	275
7	970	560	480	158	135	245	1,490	970	124	560	124	220
8	1,150	520	405	146	124	260	1,210	800	106	560	124	182
9	800	480	405	146	135	275	850	650	115	560	91	146
10	700	440	600	135	124	305	800	600	106	480	115	115
11	750	460	750	140	124	305	750	480	106	405	135	91
12	650	440	750	130	124	440	750	460	98	275	115	91
13	560	480	850	160	124	1,210	850	440	115	320	115	106
14	650	520	850	160	124	1,280	1,150	388	91	320	98	245
15	560	480	750	180	124	1,280	1,210	370	98	335	124	245
16	560	440	750	160	124	1,420	1,350	352	98	290	98	220
17	480	388	650	170	120	1,800	1,560	320	91	220	91	220
18	405	405	650	195	124	1,800	1,490	320	91	275	124	170
19	520	352	560	146	124	1,640	1,280	320	158	560	85	182
20	405	335	305	140	124	1,350	1,210	275	170	850	79	124
21	388	335	275	130	124	1,210	1,090	260	124	850	91	115
22	560	335	275	120	124	1,090	1,090	275	146	650	85	106
23	800	440	245	120	124	1,090	1,490	388	135	440	91	91
24	750	700	260	124	124	1,210	1,640	335	115	405	79	91
25	650	650	275	146	124	1,640	1,560	320	106	370	74	91
26	650	560	275	170	124	2,490	1,490	305	115	405	74	79
27	700	520	245	170	124	3,090	1,150	305	106	388	74	85
28	700	460	245	170	124	3,300	1,150	275	106	245	74	124
29	800	422	275	146	124	2,890	1,150	260	106	208	77	146
30	850	480	220	115	.....	2,690	1,350	232	106	245	60	146
31	750	.....	220	124	.....	2,490	.....	195	.....	305	91	.....

NOTE.—Stage-discharge relation not affected by ice during winter, 1918–19. Discharge, January 11–16, 20–23, February 17, and March 12, 1920, determined from gage heights corrected for ice effect by means of two discharge measurements and study of gage-height graph and weather records.

Monthly discharge of West Branch of Oswegatchie River near Harrisville, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 245 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	2,220	275	734	3.00	3.46
November	2,890	335	918	3.75	4.18
December	2,310	405	775	3.16	3.64
January	750	245	409	1.67	1.92
February	388	170	258	1.05	1.09
March	2,400	440	927	3.78	4.36
April	3,090	600	1,230	5.02	5.60
May	1,210	370	684	2.79	3.22
June	750	106	239	0.98	1.09
July	440	74	181	.739	.85
August	245	79	132	.539	.62
September	520	91	246	1.00	1.12
The year	3,090	74	563	2.30	31.15
1919–20.					
October	1,150	124	577	2.36	2.72
November	750	335	508	2.07	2.31
December	850	220	506	2.07	2.39
January	220	115	158	.645	.74
February	170	120	130	.531	.57
March	3,300	124	1,220	4.98	5.74
April	2,130	750	1,340	5.47	6.10
May	1,350	195	548	2.24	2.58
June	182	91	120	.490	.55
July	850	98	412	1.68	1.94
August	245	60	116	.473	.55
September	335	79	163	.665	.74
The year	3,300	60	485	1.98	26.93

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, 1920.

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 recorded during year ending September 30, 1919, 9.93 feet at 9 p. m. April 16 (discharge, 5,170 second-feet); minimum stage recorded, 1.62 feet from 6 a. m. to 3 p. m. September 7 (discharge, 43 second-feet).

Maximum stage for year ending September 30, 1920, not ascertained owing to breaks in automatic record; minimum stage recorded, 1.55 feet at 1 p. m. March 21 (discharge, 39 second-feet).

1908–1920: Maximum stage from water-stage recorder, 11.68 feet at 3 a. m. April 1, 1913 (discharge, 7,100 second-feet); 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 meaurements 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 dam during low and medium stages. Numerous lakes in upper part of drainage basin afford considerable storage, most of which is so controlled that the effect on the seasonal distribution of flow is large.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve well defined between 50 and 7,000 second-feet. Operation of water-stage recorder satisfactory except for periods indicated in footnote to daily-discharge table. Daily discharge ascertained by use of discharge integrator. Records good.

Discharge measurements of Raquette River at Piercefield, N. Y., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 13	B. F. Howe	8.72	3,430
Aug. 16	do	4.60	699

NOTE.—No discharge measurements were made at this station during the year ending Sept. 30, 1919.

Daily discharge, in second-feet, of Raquette River at Piercefield, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	1,280	2,410	1,550	1,690	1,010	620	2,300	3,440	1,910	845	464	78
2	1,260	2,780	1,920	1,690	409	306	2,380	3,300	2,080	623	463	296
3	1,240	2,680	1,800	1,690	575	734	2,480	3,160	1,940	855	240	434
4	1,190	2,980	1,720	1,660	890	903	2,500	3,290	1,890	294	320	390
5	1,160	2,880	1,590	1,210	900	580	2,520	3,400	1,810	184	479	255
6	1,440	2,880	1,510	1,560	918	683	2,310	3,340	1,760	194	462	91
7	2,180	2,780	1,590	1,560	895	800	2,700	3,560	1,590	518	446	50
8	2,500	2,500	1,150	1,490	800	791	2,840	3,410	1,260	643	451	305
9	2,780	2,500	1,520	1,510	327	411	3,060	3,300	1,510	609	427	509
10	2,900	2,240	1,490	1,490	392	737	3,400	3,240	1,320	615	129	530
11	2,900	2,410	1,420	1,380	589	990	3,610	2,890	1,210	604	425	515
12	2,770	2,410	1,390	650	589	868	3,990	2,940	1,200	495	442	369
13	2,510	2,240	1,360	1,100	545	925	4,300	2,820	1,190	219	405	512
14	2,590	2,150	1,360	1,310	598	963	4,600	2,750	1,130	444	240	282
15	2,430	2,070	896	1,280	750	975	4,900	2,890	563	604	225	384
16	2,270	1,990	1,390	1,230	416	567	5,010	2,760	854	576	185	562
17	2,170	1,570	1,460	1,200	648	923	5,030	2,790	937	599	195	586
18	2,080	1,900	1,490	1,280	755	1,160	5,090	2,710	960	595	436	560
19	1,940	2,070	1,490	1,240	780	1,230	5,010	2,710	938	587	425	568
20	1,820	2,070	1,460	545	680	1,260	5,020	2,680	870	305	287	555
21	1,860	2,150	1,420	720	560	1,430	4,910	2,670	600	396	289	231
22	1,840	2,240	960	690	560	1,580	4,820	2,650	278	597	225	412
23	1,760	2,320	1,490	880	303	1,420	4,670	2,650	452	573	125	579
24	1,760	1,990	1,440	1,160	600	1,820	4,560	2,610	652	575	73	523
25	1,660	2,240	1,360	1,180	820	1,950	4,290	2,570	622	575	342	575
26	1,660	2,240	1,800	1,140	640	2,020	4,180	2,680	624	463	395	539
27	1,590	2,070	1,870	520	598	2,070	4,030	2,590	665	222	424	608
28	1,720	1,720	1,840	927	627	2,210	3,900	2,530	556	384	333	318
29	1,720	2,030	1,460	940	.....	2,220	3,760	2,420	256	579	222	474
30	1,870	1,990	1,840	1,100	.....	1,980	3,610	2,320	600	520	284	592
31	2,070	.....	1,760	990	.....	2,240	.....	2,220	.....	460	150	.....
1919-20.												
1	604	1,220	1,530	896	321	339	1,850	.....	2,030	608	348	497
2	582	768	1,430	373	407	545	2,000	.....	1,660	601	507	513
3	578	1,110	1,620	815	487	513	2,150	.....	1,660	587	710	503
4	571	1,440	1,560	359	515	484	2,150	.....	1,610	260	662	485
5	283	1,460	1,560	652	500	395	2,400	.....	1,560	148	650	338
6	490	1,500	1,590	690	491	305	2,800	.....	453	488	666	106
7	544	1,560	1,690	690	364	243	2,800	.....	1,240	650	824	425
8	632	1,590	1,160	654	217	318	3,200	.....	1,230	658	520	423
9	646	697	1,660	706	450	483	3,300	.....	1,390	754	500	488
10	621	1,490	1,620	670	530	508	3,450	.....	1,300	970	641	485
11	686	1,490	1,620	261	419	503	3,450	.....	1,250	482	627	473
12	491	1,620	1,590	660	501	517	3,700	.....	1,140	801	629	220
13	745	1,620	1,510	658	515	515	3,700	.....	751	814	640	300
14	756	1,570	1,660	650	506	583	3,620	.....	1,260	841	629	490
15	718	1,620	1,420	646	299	191	3,540	.....	1,180	846	346	460
16	728	1,260	1,590	650	318	234	3,530	.....	998	937	456	500
17	710	1,840	1,460	650	524	398	3,490	.....	998	827	610	550
18	.....	1,750	1,260	318	514	437	3,290	.....	966	824	627	620
19	.....	1,760	1,310	533	506	418	3,620	.....	1,030	704	623	255
20	.....	1,720	1,460	636	509	491	3,510	.....	473	869	596	395
21	.....	1,710	572	626	389	98	3,610	2,680	692	826	584	552
22	.....	1,660	1,290	552	256	296	3,780	2,590	748	990	293	500
23	.....	1,310	1,430	524	384	498	4,000	2,210	721	1,060	400	497
24	.....	1,570	899	518	509	464	4,290	2,460	722	1,050	500	474
25	.....	1,660	350	248	521	890	.....	2,590	710	541	560	490
26	.....	1,560	1,130	437	527	900	.....	2,460	725	932	570	237
27	.....	1,620	1,300	521	518	900	.....	2,420	337	1,010	550	320
28	.....	1,590	607	500	387	340	.....	2,410	508	963	530	486
29	.....	1,590	964	512	228	1,050	.....	2,250	680	1,200	261	500
30	970	699	1,290	512	.....	1,350	.....	1,790	608	1,160	334	500
31	1,010	.....	1,020	533	.....	1,700	.....	1,970	.....	1,060	395	.....

NOTE.—Discharge, Oct. 18-29, 1919, estimated at 723 second-feet on basis of Oswegatchie River near Heuvelton; Apr. 25-30, at 4,900 second-feet, and May 1-20, 1920, 4,000 second-feet, from hydrographs and temperature records. Discharge for individual days during following periods, when gage-height record was incomplete, estimated from study of gage-height graph and comparison with records for other stations: Jan. 12, 13, 1919, Jan. 16, 17, 1920, Mar. 25 to Apr. 13, July 4, 5, Aug. 23-30, Sept. 5-7, 12-18, 26-27, and 30, 1920.

Monthly discharge of Raquette River at Piercefield, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 723 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	2,900	1,160	1,970	2.72	3.14
November	2,980	1,570	2,290	3.17	3.54
December	1,920	896	1,510	2.09	2.41
January	1,690	520	1,190	1.60	1.84
February	1,010	303	648	.896	.93
March	2,240	306	1,210	1.67	1.92
April	5,090	2,300	3,860	5.34	5.96
May	3,560	2,220	2,880	3.98	4.59
June	2,080	256	1,070	1.48	1.65
July	855	184	508	.703	.81
August	479	73	323	.447	.52
September	608	50	427	.591	.66
The year	5,090	50	1,490	2.06	27.97
1919–20.					
October	1,010	283	679	.939	1.08
November	1,840	697	1,470	2.03	2.26
December	1,660	350	1,290	1.78	2.05
January	896	248	585	.809	.93
February	530	217	435	.602	.65
March	1,700	98	541	.748	.86
April	.....	1,850	3,550	4.91	5.48
May	.....	1,790	3,410	4.72	5.44
June	2,030	337	1,020	1.41	1.57
July	1,200	148	773	1.07	1.23
August	824	261	542	.750	.86
September	620	106	436	.603	.67
The year	.....	98	1,230	1.70	23.08

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, 1920.

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. Gage read by Robert Berry and Henry Shattuck.

DISCHARGE MEASUREMENTS.—Made from a cable at the staff gage, installed in June 1916. Previously made from the highway bridge or by wading.

CHANNEL AND CONTROL.—Bed at cable composed of small boulders and coarse gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 9.5 feet at 5 p. m. March 18 (discharge, 5,850 second-feet); minimum stage recorded 5.88 feet several times during August (discharge, 206 second-feet).

Maximum stage recorded during year ending September 30, 1920, 10.58 feet at 7 a. m. March 18 (discharge, about 8,700 second-feet); minimum stage recorded, 5.64 feet at 6 a. m. June 1 (discharge, 112 second-feet).

1910–1920: 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. Gage read to quarter-tenths twice daily; since August 14, 1920, continuous record from recording gage. 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 9	E. D. Burchard	[a] 7.83	709	Feb. 12	B. F. Howe	[a] 7.05	370
Feb. 17	do	[a] 7.10	769	Mar. 10	do	[a] 7.48	540
Mar. 8	do	[a] 7.28	1,250	Apr. 11	do	7.18	1,640
June 11	M. H. Carson	6.32	532	May 15	Covert and Howe	6.64	853
1920.				Aug. 11	S. M. Currier	6.08	314
Jan. 12	Howe and Davison	[a] 6.70	360				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of St. Regis River at Brasher Center, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1				1,800	480	550	2,030	2,030	758	705	305	429
2				1,800	420	1,100	1,880	1,960	705	510	284	438
3				1,800	440	1,400	1,800	1,880	625	412	270	372
4				1,800	500	1,500	1,730	1,590	520	348	248	340
5				1,700	600	1,500	1,730	2,830	420	348	248	312
6				1,800	500	1,500	1,880	3,350	438		248	326
7				1,800	500	1,500	3,530	3,000	465		248	312
8				2,000	480	1,400	3,920	2,500	429		237	340
9				700	460	1,300	3,720	2,030	548		242	705
10				650	400	1,700	3,530	1,730	510		220	1,240
11				650	340	2,000	3,720	1,880	520		237	1,180
12				600	380	1,800	4,960	1,800	492		215	1,050
13				600	400	1,700	4,540	1,800	510		237	930
14				600	480	1,200	3,920	1,380	548		215	870
15				800	650	1,100	3,170	1,660	520		220	758
16				1,000	900	1,100	3,000	1,180	586		215	655
17				900	750	1,800	3,720	1,120	567		210	615
18				800	800	3,400	3,170	1,450	695		210	529
19				900	750	3,530	2,830	1,660	645		226	474
20				750	550	3,350	2,500	1,310	596		248	429
21				600	550	3,350	2,030	1,240	474		248	456
22				500	550	3,000	1,800	1,180	429		277	501
23				600	500	2,830	1,960	1,520	412		388	501
24				1,100	600	2,660	1,880	2,030	348		492	456
25				1,000	500	2,340	1,520	1,800	340		596	492
26				1,200	500	2,500	1,590	1,880	388		665	567
27				1,100	460	2,340	1,450	1,660	1,310		615	586
28				850	480	2,500	1,590	1,450	1,800		615	520
29				750		1,590	2,180	1,120	1,450		520	456
30				650		1,800	2,180	870	930		474	388
31				600		1,800		758			438	

Daily discharge, in second-feet, of St. Regis River at Brasher Center, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	356	3,000	1,800	340	380	280	3,530	2,660	121	695	576	284
2	348	2,500	1,310	360	380	280	3,170	2,340	429	758	586	438
3	404	2,030	930	340	400	280	3,170	2,660	420	930	520	474
4	548	1,660	1,240	400	360	280	3,170	2,660	319	1,310	465	404
5	695	1,590	2,500	440	360	280	3,600	2,180	412	1,880	372	348
6	1,180	1,800	2,030	440	400	440	3,170	1,880	483	2,180	364	312
7	1,800	1,590	1,240	440	420	800	2,660	1,590	758	1,800	348	305
8	1,730	1,380	1,240	440	400	700	2,180	1,110	870	1,380	340	319
9	1,380	1,180	1,180	360	360	750	1,880	1,110	870	1,120	340	305
10	1,180	1,120	1,660	340	380	600	1,730	1,520	333	870	340	319
11	1,880	1,050	1,240	380	380	600	2,500	1,590	333	695	312	312
12	1,520	1,120	1,180	360	380	1,000	2,340	1,520	277	645	372	319
13	1,120	1,180	1,380	400	340	3,000	2,500	1,180	237	596	465	427
14	930	1,180	1,050	380	380	2,180	2,340	930	277	548	429	1,310
15	695	1,120	810	380	380	2,340	2,030	930	319	548	429	1,520
16	605	1,050	750	360	520	2,180	2,660	990	298	501	483	1,230
17	615	870	600	360	500	7,530	2,660	930	220	548	438	954
18	645	870	600	380	460	5,400	2,180	810	348	645	429	726
19	645	990	550	400	460	3,720	1,730	758	348	870	404	665
20	605	930	400	420	420	2,030	1,660	758	372	1,880	340	768
21	665	1,180	380	400	400	2,340	1,450	990	420	2,030	305	747
22	930	930	340	420	420	1,800	2,660	1,180	520	1,520	277	635
23	1,180	990	320	400	360	2,080	3,350	990	447	990	264	538
24	1,120	1,180	280	380	320	3,000	3,170	930	456	810	270	474
25	990	1,050	300	380	320	3,350	3,170	930	364	758	259	420
26	870	1,880	280	420	300	3,720	3,170	548	305	685	254	356
27	870	2,500	280	440	280	4,540	2,500	501	264	615	248	340
28	870	1,730	280	380	280	4,330	2,180	520	264	758	242	396
29	1,050	1,380	280	380	280	4,120	2,660	237	326	615	226	465
30	1,050	1,450	280	400	.....	4,330	3,000	210	456	548	220	492
31	1,960	.....	340	400	.....	3,920	.....	124	.....	492	237	.....

NOTE.—Discharge, Jan. 1 to Mar. 18, 1919, and Dec. 16, 1919, to Mar. 13, 1920, determined from gage heights corrected for ice effect by means of discharge measurements and study of gage-height graph and weather records. Discharge, July 6–31, 1919, estimated at 383 second-feet, from study of precipitation record at Canton, N. Y., and discharge of Raquette River at Piercefield. Discharge, Aug. 8–9, 1920, estimated; no gage-height record.

Monthly discharge of St. Regis River at Brasher Center, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 621 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919.					
January	2,000	500	1,050	1.69	1.95
February	900	340	533	.858	.89
March	3,530	550	1,970	3.17	3.66
April	4,960	1,450	2,650	4.27	4.76
May	3,350	758	1,730	2.79	3.22
June	1,800	340	633	1.02	1.14
July	.....	.....	396	.638	.74
August	665	210	326	.525	.61
September	1,240	312	574	.924	1.03
1919–20.					
October	1,960	348	982	1.58	1.82
November	3,000	870	1,420	2.29	2.56
December	2,500	280	873	1.41	1.63
January	440	340	391	.630	.73
February	520	280	380	.612	.66
March	7,530	280	2,330	3.75	4.32
April	3,530	1,450	2,590	4.17	4.65
May	2,660	124	1,200	1.93	2.22
June	870	121	396	.638	.71
July	2,180	492	975	1.57	1.81
August	586	220	360	.580	.67
September	1,520	284	553	.891	.99
The year	7,530	121	1,040	1.67	22.77

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

LOCATION.—Inside Fort Montgomery, three-eighths mile south of international boundary, half a mile above head of Richlieu River (outlet of Lake Champlain), and 1 mile northeast of Rouses Point, Clinton County.

DRAINAGE AREA.—7,870 square miles, including 436 square miles of water surface (from annual report of New York State engineer and surveyor).

RECORDS AVAILABLE.—1875 to 1920.

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 the year ending September 30, 1919, 99.15 feet at 10 a. m. April 20; minimum elevation recorded, 93.20 feet at 10 a. m. September 8.

Maximum elevation recorded during year ending September 30, 1920, 99.77 feet at 10 a. m. April 29; minimum elevation recorded, 93.44 feet at 10 a. m. October 3.

1869–1920: Maximum elevation recorded, 103.28 feet April, 1869;[1] minimum elevation recorded, 91.9 feet November 13, 1908.

COOPERATION.—Gage heights observed under direction of the Corps of Engineers of the United States Army and reported weekly to the United States Geological Survey.

Daily gage height, in feet, of Richelieu River at Fort Montgomery, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	2.35	4.35	4.35	3.85	3.15	2.15	4.35	5.50	4.60	2.78	1.55	0.85
2	2.60	4.55	4.40	3.80	3.10	2.30	4.40	5.58	4.57	2.72	1.47	.82
3	2.40	4.60	4.35	3.85	3.05	2.30	4.45	5.37	4.44	2.67	1.43	.83
4	2.45	4.60	4.25	3.85	3.00	2.45	4.40	5.30	4.35	2.63	1.42	.82
5	2.60	4.55	4.20	3.85	2.95	2.40	4.40	5.30	4.30	2.55	1.40	.92
6	2.90	4.60	4.10	3.85	2.95	2.50	4.45	5.30	4.25	2.43	1.43	.90
7	3.30	5.00	4.45	3.90	2.90	2.55	4.60	5.70	4.10	2.38	1.42	.78
8	3.60	4.40	4.20	3.90	2.85	2.55	4.80	5.20	4.18	2.32	1.23	.70
9	3.85	5.40	4.00	3.90	2.80	2.65	4.95	5.23	4.22	2.42	1.24	.89
10	3.90	4.30	3.85	3.85	2.75	2.70	5.50	5.20	4.05	2.57	1.29	.80
11	3.90	4.25	4.15	3.80	2.70	2.70	5.30	5.15	3.90	2.25	1.23	.84
12	3.90	4.25	4.30	3.70	2.65	2.75	5.55	5.05	3.95	2.15	1.20	.75
13	4.05	4.55	3.80	3.65	2.60	2.80	6.05	5.05	3.85	2.10	1.18	.87
14	3.80	4.10	4.05	3.60	2.60	2.80	6.20	5.00	3.82	2.08	1.17	.98
15	3.70	4.15	3.75	3.50	2.55	2.80	6.30	4.88	3.75	2.25	1.10	1.05
16	3.75	3.95	3.95	3.50	2.50	2.90	6.40	4.86	3.67	2.05	1.10	1.19
17	3.65	3.95	3.80	3.45	2.45	2.90	6.45	4.85	3.60	2.12	1.15	1.03
18	3.55	3.90	3.95	3.40	2.40	3.00	6.40	4.73	3.53	2.07	1.12	1.20
19	3.60	4.25	3.95	3.35	2.40	3.05	6.40	4.75	3.57	1.95	1.18	1.38
20	4.25	4.60	4.05	3.30	2.35	3.15	6.65	4.72	3.50	1.91	1.05	1.15
21	3.65	4.85	3.85	3.20	2.35	3.25	6.20	4.65	3.38	1.95	1.08	1.22
22	3.55	4.85	4.15	3.25	2.30	3.30	6.30	4.60	3.25	2.00	1.00	1.27
23	3.60	4.90	3.80	3.20	2.30	3.45	6.25	4.87	3.32	1.87	.95	1.03
24	3.60	4.95	3.80	3.15	2.20	3.50	6.20	4.92	3.20	1.95	1.03	1.20
25	3.75	4.85	3.95	3.20	2.25	3.70	6.00	4.93	3.08	1.80	.92	1.40
26	3.60	4.65	4.00	3.25	2.15	3.80	6.05	4.92	3.12	1.86	.95	1.00
27	3.65	4.60	3.95	3.25	2.10	3.85	5.85	4.88	2.94	1.85	.93	1.10
28	3.80	4.70	3.85	3.20	2.10	3.90	5.80	4.88	2.87	1.72	.93	1.14
29	3.65	4.60	3.90	3.20	.....	3.95	5.55	4.84	2.83	1.63	.92	1.18
30	3.70	4.60	3.90	3.15	.....	4.20	5.50	4.67	2.82	1.57	.98	.95
31	4.10	.....	3.85	3.15	.....	4.30	.....	4.65	.....	1.62	.88	.....

[1] Hoyt, J. C., U. S. Geol. Survey Water-Supply Paper 97, p. 340, 1904.

Daily gage height, in feet, of Richelieu River, at Fort Montgomery, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	1.00	2.10	2.88	2.22	1.42	1.28	5.74	7.23	4.36	2.27	2.00	1.25
2	1.05	2.25	2.90	2.10	1.42	1.28	5.88	7.15	4.28	2.25	1.95	1.23
3	.94	2.37	2.90	2.05	1.41	1.28	5.90	7.12	4.15	2.42	1.90	1.22
4	1.07	2.60	3.07	1.98	1.40	1.30	5.93	7.04	4.07	2.23	1.88	1.24
5	1.10	2.42	3.10	1.95	1.40	1.40	6.02	7.01	3.95	2.10	1.88	1.21
6	1.28	2.47	2.95	1.93	1.40	1.52	6.25	6.95	3.85	2.18	1.83	1.23
7	1.18	2.68	3.00	1.90	1.40	1.45	6.40	6.83	3.70	2.35	1.81	1.20
8	1.35	2.75	3.20	1.88	1.38	1.40	6.43	6.77	3.65	2.15	1.78	1.18
9	1.85	2.80	3.05	1.85	1.38	1.40	6.42	6.60	3.60	2.08	1.76	1.22
10	1.70	2.87	2.70	1.82	1.40	1.40	6.33	6.55	3.48	2.15	1.75	1.19
11	1.60	3.15	2.75	1.80	1.38	1.42	6.23	6.47	3.45	2.10	1.67	1.16
12	1.58	2.90	3.20	1.75	1.38	1.65	6.27	6.30	3.32	2.10	1.63	1.22
13	1.75	2.87	2.92	1.72	1.38	1.57	6.15	6.13	3.27	2.10	1.62	1.07
14	1.90	2.95	2.95	1.68	1.38	1.70	6.42	6.02	3.25	2.15	1.62	1.15
15	1.70	3.00	2.80	1.65	1.38	1.95	6.68	5.95	3.25	2.07	1.64	1.22
16	1.64	3.17	2.78	1.63	1.38	2.03	6.70	5.85	3.07	2.00	1.65	1.35
17	1.65	3.18	2.75	1.62	1.40	2.20	6.74	5.75	3.00	2.00	1.59	1.25
18	1.70	3.15	2.73	1.60	1.37	2.30	6.70	5.63	2.97	2.05	1.54	1.23
19	1.66	3.05	2.67	1.60	1.37	2.52	6.75	5.54	2.92	2.12	1.55	1.20
20	1.64	3.00	2.60	1.57	1.37	2.65	6.72	5.40	2.90	2.10	1.62	1.23
21	2.20	3.20	2.58	1.55	1.35	2.72	6.69	5.30	3.00	2.23	1.75	1.25
22	1.68	3.07	2.57	1.53	1.33	2.93	6.73	5.22	2.85	2.18	1.40	1.27
23	1.85	3.03	2.53	1.52	1.30	3.07	7.10	5.20	2.70	2.15	1.47	1.27
24	1.87	2.98	2.45	1.52	1.28	3.25	6.74	5.15	2.72	2.13	1.43	1.25
25	2.10	2.90	2.43	1.50	1.28	3.50	7.17	5.05	2.68	2.07	1.43	1.23
26	1.90	2.85	2.36	1.50	1.27	3.90	7.12	4.95	2.60	2.03	1.42	1.22
27	1.70	2.90	2.36	1.50	1.28	4.40	7.20	4.88	2.55	2.00	1.40	1.23
28	2.15	2.93	2.30	1.48	1.28	4.90	7.13	4.70	2.47	2.03	1.37	1.22
29	1.70	3.15	2.25	1.45	1.28	5.35	7.27	4.60	2.45	2.13	1.39	1.25
30	1.87	2.98	2.21	1.43	.....	5.52	7.23	4.58	2.40	2.05	1.38	1.23
31	2.05	.....	2.18	1.42	.....	5.65	.....	4.67	.....	2.03	1.38	.....

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, 1920.

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 a vertical staff spiked to timber work dike between tailrace and river and about 50 feet below power house. 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. Low-water measurements made by wading under cable or in tailrace. Gages and watt meters read by power-house operators.

DISCHARGE RATING.—Records include flow over concrete spillway 171.25 feet in crest length, a rating for which has been prepared by 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 measurements; and the discharge through two 5-foot waste gates when open. Occasional observations are made on the inclined staff gage at the cable as a check on the ratings of the spillway and turbines.

[1] Horton, R. E., Weir experiments, coefficients, and formulas: U. S. Geol. Survey Water-Supply Paper 200, pp. 98–100, 1907.

EXTREMES OF DISCHARGE.—Maximum daily discharge during year ending September 30, 1919, 3,400 second-feet April 12 and 13; minimum daily discharge 205 second-feet July 20.

Maximum daily discharge during year ending September 30, 1920, 3,400 second-feet March 27; minimum daily discharge, 270 second-feet January 6 and June 29.

1908–1920: Maximum daily discharge recorded, 6,410 second-feet, April 20, 1914; minimum daily discharge recorded, 90 second-feet, September 28, 1914.

SPECIAL STUDY.—A portable water-stage recorder was operated at the cable for a short period in July, 1914. Mean daily discharge computed from its record agreed very closely with mean daily discharge derived from power-plant ratings.

ICE.—The crest of the spillway is kept free from ice so that the stage-discharge relation is not affected.

REGULATION.—The lakes and ponds on the main stream and tributaries above the station comprise a water surface area of about 25.5 square miles. The actual storage afforded by these reservoirs has been largely increased by the State dam at Lower Saranac Lake, the operation of which affects the distribution of flow throughout the year.

ACCURACY.—Discharge over the spillway ascertained by applying to rating table mean gage heights 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 years ending September 30, 1919 and 1920.

Daily discharge, in second-feet, of Saranac River at Plattsburg, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1,060	2,300	1,220	920	660	1,160	1,550	1,350	1,180	500	310	235
2	920	2,100	920	1,040	580	860	1,300	1,350	1,200	480	500	300
3	840	2,000	1,220	1,120	540	800	1,400	1,350	1,000	380	370	350
4	760	1,950	1,220	1,120	560	800	1,300	1,500	1,020	280	400	380
5	720	1,850	1,160	920	600	1,050	1,300	2,250	1,000	360	250	290
6	3,000	1,600	920	760	600	960	1,550	2,500	860	290	290	320
7	3,100	1,150	820	720	620	920	2,500	2,150	940	450	260	360
8	3,000	1,350	840	920	620	960	3,000	2,200	920	480	340	320
9	2,600	1,400	1,040	960	520	1,020	2,600	1,950	820	400	480	540
10	2,350	1,450	1,000	760	580	1,040	2,350	1,700	700	380	330	600
11	2,050	1,350	980	800	540	1,100	2,350	1,550	680	250	350	560
12	1,750	1,160	1,000	780	540	1,000	3,400	1,700	700	350	260	620
13	1,550	1,020	1,040	980	540	1,060	3,400	1,500	620	390	310	640
14	1,450	1,040	1,120	660	440	880	2,900	1,300	600	390	300	470
15	1,250	960	1,700	940	560	860	2,500	1,220	780	540	300	430
16	1,180	1,020	1,700	740	540	960	2,300	1,240	780	720	350	260
17	1,000	1,020	1,350	940	560	940	2,700	1,240	1,020	640	320	490
18	1,160	1,160	1,300	840	540	1,650	2,450	1,900	940	480	380	360
19	1,300	2,400	1,100	680	460	2,350	2,250	1,650	840	440	320	400
20	1,100	2,050	1,080	720	500	2,100	2,200	1,400	780	205	490	320
21	1,300	1,950	1,100	720	520	2,400	1,950	1,450	740	400	330	300
22	1,200	1,900	980	680	600	2,500	1,750	1,550	540	340	320	410
23	1,160	1,850	1,300	840	560	2,300	1,600	2,600	720	500	310	420
24	1,160	1,700	1,550	800	700	2,100	1,500	2,200	700	540	380	310
25	1,300	1,600	1,160	900	540	2,000	1,450	2,050	660	290	900	360
26	1,350	1,450	1,550	800	620	1,850	1,400	1,600	520	340	470	380
27	1,550	1,220	720	880	600	1,900	1,500	1,600	580	270	410	410
28	1,250	1,350	1,120	780	580	2,100	1,300	1,400	560	400	250	290
29	1,200	1,400	1,100	780	.....	1,140	1,400	1,300	440	350	490	420
30	1,650	1,400	1,060	700	.....	1,900	1,450	1,240	580	480	240	440
31	2,450	.....	860	700	.....	1,700	.....	1,160	.....	300	240	.....

Daily discharge, in second-feet, of Saranac River at Plattsburg, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	400	1,450	1,040	410	340	490	2,500	2,250	680	580	480	640
2	350	1,140	780	410	500	410	2,450	2,100	660	450	680	640
3	680	1,020	740	390	350	520	2,600	2,050	700	430	660	490
4	800	980	740	450	400	490	2,600	1,950	600	680	640	440
5	640	1,220	780	430	490	520	2,250	1,800	660	480	520	350
6	660	1,220	660	270	400	620	3,100	1,750	540	640	460	480
7	1,120	1,140	740	480	520	600	2,200	1,700	720	480	440	400
8	980	980	780	540	470	600	1,850	1,650	720	660	480	700
9	940	900	800	370	560	560	1,700	1,600	820	700	520	490
10	1,100	820	1,020	440	430	540	1,450	1,700	700	640	450	660
11	1,800	860	740	270	390	470	1,450	1,750	660	360	450	380
12	1,450	1,000	820	440	400	520	1,350	1,650	600	600	560	330
13	920	1,140	940	340	440	920	1,750	1,400	410	660	600	720
14	800	1,120	1,080	350	410	960	2,450	1,450	680	620	460	820
15	720	960	700	330	430	840	1,800	1,350	500	580	640	720
16	660	800	600	390	500	1,300	1,950	1,120	660	560	700	560
17	680	900	560	350	400	1,750	2,100	1,100	620	500	440	640
18	600	840	440	290	310	1,700	1,950	1,140	620	460	470	540
19	400	860	470	500	370	1,450	1,800	1,200	600	1,040	440	500
20	660	740	490	300	460	1,350	1,850	1,160	600	1,350	410	620
21	600	660	380	330	410	1,250	1,750	1,200	720	1,120	450	440
22	600	940	540	340	380	1,120	2,900	1,250	720	1,000	370	430
23	700	1,000	320	400	390	1,450	2,900	1,300	680	820	470	560
24	700	1,120	540	580	380	2,500	3,000	1,400	560	860	390	540
25	720	1,040	450	340	330	2,900	2,700	1,500	440	760	420	490
26	640	940	430	560	340	3,000	2,450	1,400	380	740	420	350
27	800	900	500	500	460	3,400	2,400	1,240	290	660	400	520
28	680	740	480	520	480	3,300	2,300	1,200	450	660	410	390
29	680	700	540	380	520	3,300	2,900	1,040	270	580	350	580
30	680	1,250	420	460	.....	3,100	2,500	740	680	500	500	500
31	700	.....	520	380	.....	2,800	.....	940	.....	620	580	.....

Monthly discharge of Saranac River near Plattsburg, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 607 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	3,100	720	1,540	2.54	2.93
November	2,400	960	1,540	2.54	2.83
December	1,700	720	1,140	1.88	2.17
January	1,120	660	835	1.38	1.59
February	700	440	565	.931	.97
March	2,500	800	1,430	2.36	2.72
April	3,400	1,300	2,020	3.33	3.72
May	2,600	1,160	1,650	2.72	3.14
June	1,200	440	781	1.29	1.44
July	720	205	407	.671	.77
August	900	240	363	.598	.69
September	640	235	400	.659	.73
The year	3,400	205	1,060	1.74	23.70
1919–20.					
October	1,800	350	770	1.27	1.46
November	1,450	660	979	1.61	1.80
December	1,080	320	646	1.06	1.22
January	580	270	403	.664	.77
February	560	310	423	.697	.75
March	3,400	410	1,440	2.37	2.73
April	3,100	1,350	2,230	3.67	4.10
May	2,250	740	1,450	2.39	2.76
June	820	270	598	.985	1.10
July	1,350	360	668	1.10	1.27
August	700	350	492	.811	.94
September	820	330	531	.875	.98
The year	3,400	270	887	1.46	19.88

WEST BRANCH OF AUSABLE RIVER NEAR NEWMAN, N. Y.

LOCATION.—On farm of 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, 1920.

GAGE.—Staff in two sections, on the right bank near the residence of Mr. Dudley. Lower section is inclined, graduated from 1.0 to 6.5 feet; the upper section is vertical, graduated from 6.55 to 10.1 feet; read by James Dudley, June 7, 1916, to December 31, 1917, by Jesse Martin, July 15 to December 31, 1919, and by Mrs. Ethel Fuller, April 14 to September 30, 1920.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet above gage or by wading.

CHANNEL AND CONTROL.—Solid rock.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period July 15, 1919, to Sepember 30, 1920, 5.68 feet at 7 p. m. April 22 (discharge, 1,830 second-feet); minimum stage recorded, 1.60 feet at 7.30 p. m. September 13 (discharge, practically zero).

1916–17 and 1919–20: Maximum stage recorded, 6.71 feet at 6 p. m. October 30, 1917 (discharge, 3,180 second-feet); minimum stage recorded, that of September 13, 1920.

ACCURACY.—Stage-discharge relation practically permanent. 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
July 14	C. C. Covert	[a] 2.72	69.4	Apr. 14	B. F. Howe	4.69	867
14	do	2.41	32.7	14	do	4.61	825
Aug. 24	do	[b] 3.02	101	May 18	do	[d] 3.90	369
26	do	[b] 2.76	84.8	18	do	[d] 3.82	344
1920.							
Jan. 9	Davison and Howe	[c] 2.74	38.0	Aug. 17	do	2.65	51.3
Feb. 11	B. F. Howe	[c] 2.96	57.1	Sept. 26	Covert and Currier	2.56	52.0
Mar. 8	do	[c] 3.46	84.6				

[a] Made 1 mile below gage.
[b] Made 1 mile above gage.
[c] Stage-discharge relation affected by ice.
[d] Stage-discharge relation probably slightly affected by logs on control.

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Daily discharge, in second-feet, of West Branch of Ausable River near Newman, N. Y., for the periods June 7, 1916, to Dec. 31, 1917, and July 15, 1919 to Sept. 30, 1920.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1916.								
1	.....	.....	130	76	48	153	82	353
2	.....	.....	130	73	73	100	109	208
3	.....	.....	153	73	58	94	126	275
4	.....	.....	353	58	58	76	100	240
5	.....	.....	534	66	52	90	94	194
6	.....	.....	395	48	48	48	94	462
7	.....	224	208	52	48	76	76	294
8	.....	179	166	70	48	70	73	275
9	.....	179	142	130	58	70	142	258
10	.....	179	153	120	48	70	224	417
11	.....	166	275	73	46	66	153	294
12	.....	275	275	76	48	46	105	240
13	.....	240	208	56	36	73	90	142
14	.....	240	395	66	46	179	82	240
15	.....	208	208	58	153	94	105	240
16	.....	208	142	61	208	73	90	179
17	.....	395	353	38	90	100	100	94
18	.....	395	353	41	90	94	76	100
19	.....	294	208	46	73	94	90	90
20	.....	275	153	41	56	353	76	82
21	.....	240	120	44	73	534	48	66
22	.....	208	109	38	61	258	46	66
23	.....	179	313	41	153	166	66	105
24	.....	153	395	52	179	113	1,100	120
25	.....	142	294	58	109	66	353	82
26	.....	153	208	58	87	109	240	113
27	.....	130	224	38	100	100	166	120
28	.....	313	166	44	48	82	130	126
29	.....	179	126	41	82	66	126	126
30	.....	208	105	36	333	61	395	100
31	.....	.....	105	41	.....	58	.....	100
1917.								
1	462	641	240	33	111	153	560	62
2	510	732	240	42	194	166	374	67
3	417	1,060	179	33	111	142	275	60
4	439	560	208	42	87	208	258	67
5	313	439	130	42	75	313	224	64
6	294	485	122	34	80	313	122	67
7	294	374	142	37	101	208	153	56
8	240	560	83	117	80	142	179	44
9	224	700	98	111	70	153	130	60
10	313	395	83	166	70	122	130	53
11	275	830	70	75	67	117	117	53
12	439	1,850	117	70	64	92	105	87
13	417	732	122	80	105	485	75	44
14	395	560	111	44	64	208	53	51
15	510	462	98	56	40	224	92	87
16	353	417	83	64	44	353	64	70
17	294	395	87	75	47	194	92	83
18	462	395	75	83	44	153	70	75
19	333	101	92	70	56	153	92	98
20	732	417	83	67	510	510	130	98
21	700	534	75	67	208	313	92	101
22	417	560	80	64	130	258	87	101
23	641	510	67	56	98	166	101	70
24	586	439	44	64	87	153	98	53
25	462	395	80	64	80	258	92	42
26	439	417	75	60	56	240	92	60
27	395	395	56	56	56	294	60	64
28	534	353	53	47	98	763	60	67
29	586	313	53	75	142	510	83	92
30	763	938	47	105	117	1,740	64	47
31	830	.....	51	153	.....	1,230	.....	47

Daily discharge, in second-feet, of West Branch of Ausable River near Newman, N. Y., for the periods June 7, 1916, to Dec. 31, 1917, and July 15, 1919, to Sept. 30, 1920—Continued.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1919.				1919.				1919.			
1	.....	61	109	11	.....	54	194	21	72	83	101
2	.....	72	120	12	.....	61	153	22	83	61	166
3	.....	68	100	13	.....	64	142	23	68	61	534
4	.....	61	92	14	.....	52	130	24	78	100	763
5	.....	61	92	15	52	54	109	25	72	75	586
6	.....	61	100	16	100	54	94	26	75	73	333
7	.....	58	105	17	120	54	109	27	105	92	333
8	.....	41	130	18	72	52	130	28	166	92	113
9	.....	41	153	19	61	64	126	29	153	101	96
10	.....	37	179	20	50	153	105	30	120	61	83
								31	78	88	.....

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.									
1	75	72	62	.....	485	180	100	11	130
2	75	62	72	.....	313	160	75	111	73
3	75	78	78	.....	313	150	100	13	66
4	67	62	88	.....	333	100	150	7.6	46
5	462	83	94	.....	275	110	380	7.6	44
6	1,420	78	105	.....	275	110	260	208	46
7	700	61	113	.....	510	180	280	50	56
8	294	67	113	.....	462	180	650	50	46
9	92	313	130	.....	439	130	260	111	44
10	67	100	208	.....	439	90	260	107	58
11	54	92	294	.....	374	85	140	85	66
12	58	72	153	.....	313	85	220	94	41
13	61	58	166	.....	294	75	190	85	28
14	72	78	240	732	294	85	160	179	100
15	72	72	142	417	485	70	160	153	73
16	62	88	120	374	294	75	120	76	66
17	62	94	94	374	320	90	100	90	73
18	62	78	88	313	500	75	85	73	70
19	62	105	62	294	420	100	400	82	52
20	58	94	50	353	440	30	700	46	179
21	72	105	51	417	750	160	460	52	58
22	78	94	50	1,740	500	100	240	58	109
23	78	100	41	1,420	480	70	140	105	120
24	62	153	51	1,230	380	50	160	66	82
25	72	275	51	586	440	75	85	52	76
26	78	179	58	439	380	55	18	44	66
27	72	88	51	439	280	40	15	56	58
28	78	72	47	796	300	46	8.3	38	90
29	72	58	47	641	240	75	7.2	52	109
30	62	54	51	462	200	85	8.3	56	105
31	62	.....	44	.....	240	.....	9.8	90	.....

NOTE.—Discharge, Jan. 1 to Apr. 13, 1920, estimated as follows on basis of four discharge measurements and record of flow of Ausable River at Ausable Forks, N. Y.: Jan. 1–31, 48 second-feet; Feb. 1–29, 55 second-feet; Mar. 1–31, 280 second-feet; Apr. 1–13, 380 second-feet. Discharge, May 17 to July 24, 1920, ascertained by indirect method on account of logs on control.

Monthly discharge of West Branch of Ausable River near Newman, N. Y., for the periods June 7, 1916, to Dec. 31, 1917, and July 15, 1919, to Sept. 30, 1920.

[Drainage area, 116 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1916.					
June 7–30	395	130	223	1.92	1.71
July	534	105	229	1.97	2.27
August	130	36	58.5	.504	.58
September	333	36	87.0	.750	.84
October	534	46	117	1.01	1.16
November	1,100	46	159	1.37	1.53
December	462	66	187	1.61	1.86
1917.					
May	830	224	454	3.91	4.51
June	1,850	101	565	4.87	5.43
July	240	44	101	.871	1.00
August	166	33	69.4	.598	.69
September	510	40	103	.888	.99
October	1,740	92	333	2.87	3.31
November	560	53	137	1.18	1.32
December	101	42	67.4	.581	.67
1919.					
July 15–31	166	50	89.7	.773	.49
August	153	37	68.1	.587	.68
September	763	83	186	1.60	1.78
1919–20.					
October	1,420	54	153	1.32	1.52
November	313	54	99.5	.858	.96
December	294	41	97.2	.838	.97
January	.....	.....	48.0	.414	.48
February	.....	.....	55.0	.474	.51
March	.....	.....	280	2.41	2.78
April	1,740	294	532	4.59	5.12
May	750	200	380	3.28	3.78
June	180	30	97.2	.838	.94
July	700	7.2	192	1.66	1.91
August	208	7.6	74.5	.642	.74
September	179	28	74.3	.641	.72
The year	1,740	7.2	174	1.50	20.43

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, 1920.

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.

CHANNEL AND CONTROL.—Stone and gravel; occasionally shifting. Channel divided by an island opposite the gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 9.0 feet at 8 a. m. October 6 (discharge, 15,600 second-feet); minimum state recorded, 3.40 feet at 7 a. m. August 2 (discharge, 110 second-feet).

Maximum stage recorded during year ending September 30, 1920, 6.85 feet at 5 p. m. April 13 (discharge, 7,260 second-feet); minimum stage recorded, 3.43 feet at 7 a. m. August 28 (discharge, 126 second-feet).

1910–1920: 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).

SPECIAL STUDY.—A portable water-stage recorder was installed at this station and a continuous gage-height record obtained July 11 to September 30, 1914, which showed a continual small fluctuation in stage. It was shown that monthly mean discharge for that period based on a semidaily gage height is in error less than 5 per cent. Some of the determinations of daily discharge showed greater errors, but these were largely compensating.

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

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

Discharge measurements of Ausable River at Ausable Forks, N. Y., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 10	M. H. Carson	[a] 4.10	327	Feb. 10	B. F. Howe	[a] 3.52	164
July 14	C. C. Covert	3.59	203	Aug. 18	S. M. Currier	3.66	276
Nov. 10	do	3.85	418				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Ausable River at Ausable Forks, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	903	2,270	599	851	340	1,070	984	864	380	272	153	220
2	588	1,620	546	1,230	320	645	800	1,180	360	272	121	240
3	800	1,440	800	890	320	465	955	1,440	340	227	132	264
4	1,100	1,130	1,100	679	300	505	984	1,620	320	202	132	287
5	825	929	567	505	300	546	776	4,480	319	196	132	264
6	14,300	813	546	460	280	702	1,260	2,720	319	164	148	242
7	5,600	727	526	400	294	825	2,950	2,050	929	227	157	157
8	2,380	599	515	380	287	567	3,070	1,620	1,070	183	153	242
9	1,440	1,620	776	340	294	465	2,160	1,260	634	170	142	984
10	929	1,100	1,530	320	280	588	1,940	1,030	567	227	142	813
11	727	1,260	578	320	272	578	3,950	1,070	465	220	177	567
12	727	1,030	567	300	264	546	7,740	1,260	354	190	177	546
13	984	955	465	340	257	567	2,840	1,260	319	170	177	800
14	800	588	916	700	264	526	2,160	1,200	336	164	148	465
15	903	567	1,830	550	272	800	1,530	1,130	1,200	257	148	407
16	714	526	1,260	440	257	546	1,350	1,030	1,440	345	170	379
17	567	526	1,150	400	272	702	1,440	1,260	751	319	142	336
18	929	1,030	864	380	294	3,690	1,830	2,950	1,090	272	170	287
19	800	3,440	567	360	311	2,050	3,690	1,730	371	221	214	264
20	929	2,490	955	345	336	1,350	1,440	1,440	611	202	242	264
21	1,160	1,620	825	336	407	1,830	1,350	1,070	505	170	202	302
22	1,040	1,180	1,030	345	371	1,620	1,210	3,950	407	157	202	272
23	851	984	1,830	371	302	1,130	1,150	4,480	484	214	196	825
24	764	851	1,620	955	294	929	1,350	2,600	417	319	400	567
25	588	800	1,440	567	311	903	1,260	1,730	153	227	407	417
26	739	851	955	494	354	1,010	998	1,620	196	157	302	336
27	998	788	702	407	354	1,130	851	1,260	319	170	257	287
28	851	764	764	371	371	9,790	877	984	851	345	227	264
29	851	739	1,260	388	.....	3,440	998	727	679	287	257	242
30	2,270	800	1,350	371	.....	1,530	929	505	465	242	234	214
31	3,690	.....	1,350	360	.....	1,230	.....	417	.....	202	221	.....

Daily discharge, in second-feet, of Ausable River at Ausable Forks, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	189	929	800	242	208	177	1,200	1,350	567	264	264	257
2	227	877	1,180	221	214	177	1,730	1,230	505	272	242	257
3	354	567	588	202	196	164	2,490	1,060	515	272	234	227
4	407	536	702	234	196	170	1,940	970	417	354	214	214
5	505	1,440	1,030	234	177	227	1,620	942	426	407	208	208
6	1,620	825	567	227	177	407	1,200	929	426	536	189	214
7	1,620	578	465	177	177	388	1,070	955	484	890	196	221
8	955	505	407	164	183	379	929	1,350	1,030	788	170	183
9	851	436	515	177	189	354	851	1,530	465	1,030	157	214
10	1,090	436	691	177	170	336	1,030	1,230	417	645	189	208
11	851	426	942	164	189	336	929	929	287	484	234	234
12	567	417	1,030	177	202	398	702	929	234	328	221	287
13	465	1,830	588	189	208	2,270	4,480	890	208	465	196	484
14	474	1,130	702	189	202	1,940	2,840	877	177	446	202	1,130
15	336	1,010	955	200	234	751	1,620	851	202	407	234	955
16	336	864	1,350	200	257	851	1,440	776	227	354	230	813
17	371	567	1,350	200	234	1,260	1,350	800	214	311	220	679
18	336	505	1,230	200	221	1,030	1,160	851	227	319	210	890
19	354	407	1,120	200	214	702	984	1,160	242	903	208	1,130
20	371	354	929	200	196	1,180	1,130	1,350	257	1,440	157	998
21	455	354	679	200	177	536	1,240	1,940	242	751	142	319
22	851	354	526	200	177	505	5,030	1,830	257	955	153	287
23	622	379	446	200	189	1,100	3,070	1,730	264	505	202	227
24	599	417	371	200	189	1,940	2,050	1,440	234	398	189	221
25	505	407	319	190	189	2,600	1,620	1,160	214	350	157	202
26	484	398	242	202	189	3,440	1,350	1,070	208	294	142	196
27	505	398	354	221	189	5,030	1,440	970	189	257	142	202
28	526	388	379	221	189	2,720	2,490	903	177	234	132	202
29	955	426	388	221	189	3,070	2,490	851	202	202	157	189
30	536	505	287	214	.....	2,050	1,440	1,100	234	221	177	622
31	557	.....	214	227	.....	1,620	.....	1,100	.....	242	164	.....

NOTE.—Discharge, Jan. 6–19 and Jan. 31 to Feb. 5, 1919, and Jan. 15–24, 1920, estimated because of ice. Discharge, Oct. 9–12, Dec. 26, June 1–4, 15, July 11–13, Aug. 24, Sept. 1 and 2, 1919, estimated from records of flow of Saranac River near Plattsburg; July 25 and Aug. 16–18, 1920, estimated.

Monthly discharge of Ausable River at Ausable Forks, N. Y., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 444 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	14,300	567	1,640	3.69	4.25
November	3,440	526	1,130	2.55	2.84
December	1,830	465	961	2.16	2.49
January	1,230	300	489	1.10	1.27
February	407	257	306	.689	.72
March	9,790	465	1,360	3.06	3.53
April	7,740	776	1,830	4.12	4.60
May	4,480	417	1,680	3.78	4.36
June	1,440	153	555	1.25	1.40
July	345	157	225	.507	.58
August	407	121	196	.441	.51
September	984	157	392	.883	.99
The year	14,300	121	901	2.03	27.54
1919–20.					
October	1,620	189	609	1.37	1.58
November	1,830	354	622	1.40	1.56
December	1,350	214	689	1.55	1.79
January	242	164	202	.455	.52
February	257	170	197	.444	.48
March	5,030	164	1,230	2.77	3.19
April	5,030	702	1,760	3.96	4.42
May	1,940	776	1,130	2.55	2.94
June	1,030	177	325	.732	.82
July	1,440	202	494	1.11	1.28
August	264	132	191	.430	.50
September	1,130	183	416	.937	1.05
The year	5,030	132	657	1.48	20.13

LAKE GEORGE AT ROGERS ROCK, N. Y.

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

DRAINAGE AREA—Not measured.

RECORDS AVAILABLE.—July 10, 1913, to September 30, 1920.

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

EXTREMES OF STAGE.—Maximum stage recorded during year ending September 30, 1919, 4.68 feet May 24; minimum stage recorded, 2.2 feet October 27 and 29.

Maximum stage recorded during year ending September 30, 1920, 4.48 feet on April 30 and May 2; minimum stage recorded, 1.45 feet on March 5.

1913-1920: Maximum stage recorded, 4.98 feet on May 2, 1914; minimum stage recorded, 1.2 feet on November 21 and December 22, 1916.

REGULATION.—The elevation of lake surface is regulated by the operation of gates and wheels at the dam at the outlet of the lake at Ticonderoga.

COOPERATION.—Gage-height record furnished by International Paper Co.

Daily gage height, in feet, of Lake George at Rogers Rock, N. Y., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	2.42	2.5	2.9	3.0	3.0	2.82	3.8	4.42	4.45	3.85	3.55	2.95
2	2.4	2.45	2.85	3.1	3.02	2.88	3.78	4.5	4.4	3.82	3.45	2.9
3	2.38	2.48	2.82	3.22	3.0	2.88	3.82	4.42	4.48	3.78	3.5	2.88
4	2.4	2.45	2.8	3.18	2.98	2.85	3.8	4.48	4.35	3.82	3.5	2.88
5	2.4	2.42	2.82	3.12	2.95	2.82	3.88	4.45	4.32	3.8	3.45	2.9
6	2.35	2.48	2.8	3.1	2.9	2.85	3.92	4.42	4.35	3.7	3.5	2.85
7	2.3	2.5	2.8	3.18	2.9	2.88	3.98	4.45	4.3	3.75	3.48	2.8
8	2.42	2.4	2.82	3.15	2.88	2.85	4.0	4.4	4.32	3.72	3.45	2.7
9	2.42	2.48	2.8	3.12	2.85	2.92	4.02	4.35	4.35	3.78	3.4	2.85
10	2.4	2.5	2.78	3.15	2.85	3.12	4.1	4.35	4.3	3.85	3.38	2.9
11	2.38	2.45	2.75	3.15	2.82	3.15	4.2	4.32	4.25	3.9	3.35	2.9
12	2.4	2.48	2.72	3.0	2.85	3.12	4.4	4.35	4.2	3.8	3.3	2.92
13	2.38	2.42	2.7	3.05	2.82	3.0	4.45	4.4	4.18	3.78	3.3	2.85
14	2.35	2.38	2.7	3.02	2.8	3.05	4.5	4.4	4.15	3.72	3.25	2.88
15	2.3	2.4	2.78	3.05	2.82	3.12	4.48	4.38	4.15	3.8	3.2	2.8
16	2.28	2.38	2.75	3.08	2.85	3.2	4.5	4.4	4.18	3.75	3.2	2.8
17	2.25	2.4	2.7	3.05	2.82	3.15	4.58	4.45	4.1	3.78	3.18	2.7
18	2.22	2.42	2.72	3.02	2.8	3.25	4.55	4.48	4.12	3.75	3.15	2.78
19	2.25	2.7	2.78	2.98	2.8	3.2	4.55	4.5	4.1	3.72	3.1	2.8
20	2.32	2.75	2.8	3.05	2.78	3.28	4.6	4.45	4.08	3.7	3.15	2.7
21	2.3	2.8	2.8	3.0	2.75	3.35	4.5	4.4	4.1	3.8	3.12	2.65
22	2.25	2.85	2.82	3.02	2.78	3.3	4.58	4.55	3.85	3.85	3.1	2.7
23	2.28	2.88	2.85	3.05	2.8	3.35	4.58	4.65	3.95	3.8	3.0	2.6
24	2.22	2.9	2.78	3.1	2.82	3.38	4.62	4.68	3.85	3.82	3.08	2.65
25	2.25	2.82	2.98	3.08	2.85	3.4	4.58	4.65	3.88	3.75	3.05	2.6
26	2.28	2.8	2.95	3.05	2.8	3.42	4.6	4.65	3.85	3.75	3.3	2.6
27	2.2	2.82	3.0	3.08	2.8	3.45	4.58	4.62	3.8	3.72	3.05	2.55
28	2.22	2.8	2.8	3.05	2.78	3.7	4.55	4.55	3.78	3.7	3.0	2.52
29	2.2	2.85	2.85	3.05	.....	3.75	4.52	4.6	3.82	3.68	2.95	2.55
30	2.22	2.9	2.9	3.08	.....	3.8	4.45	4.5	3.85	3.65	2.95	2.45
31	2.42	.....	3.02	3.05	.....	3.85	.....	4.48	.....	3.6	2.92	.....

Daily gage height, in feet, of Lake George at Rogers Rock, N. Y., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	2.4	2.1	2.15	1.9	1.58	1.55	2.75	4.4	3.7	3.2	2.85	2.25
2	2.42	2.05	2.1	1.88	1.6	1.52	2.85	4.48	3.62	3.22	2.8	2.3
3	2.4	2.02	2.08	1.85	1.55	1.5	3.0	4.4	3.58	3.2	2.8	2.25
4	2.4	2.05	2.1	1.8	1.58	1.48	2.95	4.38	3.52	3.22	2.78	2.2
5	2.42	2.18	2.05	1.78	1.55	1.45	3.3	4.3	3.48	3.2	2.8	2.18
6	2.5	2.15	2.02	1.8	1.52	1.5	3.35	4.3	3.5	3.25	2.78	2.15
7	2.4	2.12	2.08	1.8	1.55	1.6	3.4	4.25	3.55	3.25	2.75	2.15
8	2.32	2.12	2.05	1.78	1.55	1.6	3.4	4.22	3.5	3.22	2.72	2.18
9	2.38	2.15	2.08	1.72	1.6	1.55	3.42	4.2	3.52	3.2	2.7	2.15
10	2.3	2.18	2.15	1.7	1.58	1.6	3.35	4.2	3.5	3.2	2.68	2.1
11	2.3	2.18	2.1	1.75	1.6	1.62	3.4	4.18	3.52	3.18	2.7	2.08
12	2.2	2.15	2.08	1.78	1.6	1.65	3.42	4.05	3.42	3.15	2.65	2.0
13	2.28	2.2	2.05	1.7	1.55	1.65	3.5	4.0	3.42	3.18	2.62	1.98
14	2.25	2.3	2.05	1.72	1.58	1.72	3.9	3.95	3.45	3.2	2.6	1.98
15	2.2	2.28	2.02	1.7	1.6	1.7	3.95	3.92	3.42	3.2	2.6	2.0
16	2.2	2.25	2.1	1.65	1.7	1.75	4.0	3.95	3.4	3.18	2.58	2.02
17	2.18	2.2	2.05	1.65	1.7	1.92	4.0	3.9	3.38	3.15	2.55	1.95
18	2.22	2.15	2.08	1.7	1.68	1.92	4.02	3.85	3.35	3.1	2.6	1.92
19	2.2	2.15	1.98	1.62	1.7	1.98	4.05	3.8	3.3	3.2	2.6	1.9
20	2.15	2.1	1.95	1.65	1.68	1.95	4.05	3.78	3.4	3.18	2.6	1.88
21	2.2	2.15	1.98	1.65	1.62	2.0	4.02	3.75	3.38	3.15	2.58	1.85
22	2.22	2.1	2.0	1.68	1.68	2.02	4.18	3.78	3.4	3.05	2.52	1.8
23	2.18	2.08	1.98	1.62	1.65	2.02	4.3	3.8	3.4	3.1	2.48	1.82
24	2.18	2.1	1.95	1.58	1.7	2.05	4.35	3.8	3.38	3.05	2.45	1.78
25	2.15	2.05	1.9	1.6	1.68	2.08	4.32	3.72	3.35	2.98	2.42	1.78
26	2.1	2.02	1.95	1.6	1.62	2.15	4.40	3.7	3.3	2.95	2.4	1.72
27	2.08	2.0	1.92	1.58	1.6	2.25	4.32	3.75	3.28	2.98	2.4	1.75
28	2.3	1.98	1.9	1.6	1.5	2.45	4.35	3.7	3.3	2.92	2.35	1.8
29	2.15	2.05	1.88	1.58	1.58	2.5	4.45	3.62	3.25	2.98	2.32	1.85
30	2.08	2.2	1.85	1.55	.....	2.6	4.48	3.62	3.2	2.95	2.3	1.8
31	2.08	.....	1.88	1.55	.....	2.65	.....	3.7	.....	2.9	2.28	.....

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.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 4, 1919, to September 30, 1920.

GAGE.—Vertical cast-iron staff gage, reading from 6.0 to 10.0 feet fastened to 2 by 8-inch oak plank. Gage read twice daily to quarter-tenths by Jay Taylor, ranger.

EXTREMES OF STAGE.—Maximum stage recorded during period September 4, 1919, to September 30, 1920, 9.25 feet on April 23, 24, and 29; minimum stage recorded, 6.45 feet March 1–6.

REGULATION.—The elevation of lake surface is regulated by the operation of gates and wheels at the dam at the outlet of the lake at Ticonderoga.

COOPERATION.—Gage-height record furnished by New York State Conservation Commission.

Daily gage height, in feet, of Lake George at Glen Island, near Bolton Landing, N. Y., for the period Sept. 4, 1919, to Sept. 30, 1920.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	7.3	7.0	6.9	6.75	6.55	6.45	7.7	9.15	8.4	8.05	7.7	7.15
2	.....	7.3	7.0	6.95	6.7	6.55	6.45	7.8	9.15	8.4	8.1	7.7	7.1
3	.....	7.3	7.0	7.0	6.7	6.55	6.45	7.9	9.15	8.35	8.1	7.65	7.1
4	7.8	7.25	7.0	6.95	6.7	6.55	6.45	7.95	9.1	8.35	8.05	7.6	7.1
5	7.75	7.25	7.1	6.95	6.7	6.55	6.45	8.1	9.1	8.35	8.05	7.6	7.05
6	7.7	7.3	7.15	6.95	6.7	6.55	6.45	8.3	9.05	8.35	8.0	7.55	7.0
7	7.7	7.3	7.15	6.95	6.65	6.55	6.55	8.35	9.0	8.35	8.0	7.5	7.0
8	7.7	7.25	7.1	6.95	6.65	6.55	6.6	8.45	8.95	8.3	8.0	7.5	7.0
9	7.8	7.2	7.1	7.0	6.65	6.55	6.6	8.55	8.9	8.3	8.0	7.5	7.0
10	7.8	7.2	7.05	7.0	6.65	6.55	6.6	8.6	8.9	8.25	7.95	7.5	7.0
11	7.75	7.2	7.05	7.0	6.65	6.55	6.55	8.65	8.85	8.25	7.95	7.5	7.0
12	7.75	7.2	7.05	7.0	6.7	6.5	6.55	8.7	8.85	8.25	7.95	7.5	7.0
13	7.7	7.15	7.1	7.0	6.65	6.5	6.6	8.85	8.8	8.25	7.95	7.5	7.0
14	7.7	7.1	7.1	.....	6.65	6.5	6.65	9.1	8.75	8.25	7.95	7.5	6.9
15	7.7	7.1	7.1	.....	6.65	6.55	6.7	9.1	8.75	8.25	7.9	7.55	6.95
16	7.65	7.1	7.1	.....	6.65	6.55	6.7	9.2	8.7	8.25	7.9	7.55	6.95
17	7.6	7.1	7.1	.....	6.6	6.55	6.7	9.2	8.65	8.2	7.9	7.5	6.95
18	7.6	7.1	7.1	.....	6.6	6.55	6.7	9.2	8.6	8.2	7.95	7.5	6.8
19	7.55	7.1	7.1	.....	6.65	6.6	6.7	9.1	8.6	8.2	7.95	7.45	6.85
20	7.55	7.1	7.05	.....	6.6	6.55	6.75	9.0	8.5	8.2	7.9	7.45	6.85
21	7.55	7.05	7.0	.....	6.65	6.55	6.8	9.05	8.5	8.2	7.9	7.4	6.85
22	7.5	7.1	7.0	.....	6.65	6.55	6.8	9.2	8.55	8.2	7.9	7.4	6.8
23	7.5	7.1	6.9	.....	6.6	6.55	6.8	9.2	8.55	8.2	7.9	7.35	6.8
24	7.55	7.05	6.95	.....	6.6	6.5	6.8	9.25	8.55	8.15	7.9	7.35	6.8
25	7.5	7.0	6.95	.....	6.6	6.5	6.9	9.2	8.55	8.1	7.9	7.35	6.8
26	7.45	7.0	6.9	.....	6.6	6.5	7.0	9.15	8.55	8.1	7.85	7.3	6.75
27	7.4	7.0	6.95	.....	6.6	6.5	7.2	9.15	8.5	8.1	7.8	7.3	6.6
28	7.4	7.05	6.9	.....	6.6	6.5	7.35	9.2	8.5	8.1	7.75	7.3	6.7
29	7.35	7.05	6.9	6.8	6.6	6.5	7.45	9.25	8.5	8.05	7.75	7.25	6.85
30	7.35	7.0	6.9	6.8	6.6	.....	7.6	9.15	8.45	8.05	7.75	7.2	7.0
31	.....	7.0	.....	6.8	6.6	.....	7 65	.....	8.4	.....	7.75	7.2	.....

NOTE.—No record Dec. 14 to 28, 1919; gage not read.

LAKE CHAMPLAIN AT BURLINGTON, VT.

LOCATION.—On south side of roadway leading to dock of Champlain Transportation Co. at foot of King Street, Burlington, Vt.

RECORDS AVAILABLE.—May 1, 1907, to September 30, 1920.

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 for year ending September 30, 1919, 6.70 feet, April 19; minimum stage, 1.30 feet September 30.

Maximum stage for year ending September 30, 1920, 7.72 feet May 1. Minimum stage, 1.32 feet October 1.

1907–1920; Maximum stage recorded, 8.20 feet on April 7, 1913; minimum stage recorded, −0.25 foot on December 4, 1908.

ICE.—Lake Champlain does not usually close over in its wider portions until the later part of January. Occasionally the period of closure does not occur until February, and sometimes only lasts for a few days. At the northern end of the lake above the outlet the period of ice cover is usually from the middle of December to the middle of April.

ACCURACY.—Gage read to hundredths once a day at irregular intervals. When the lake is rough, there is considerable wave action at the gage and readings at those times may not be exact.

COOPERATION.—Gage-height record furnished through the courtesy of Mr. D. A. Loomis, general manager of the Champlain Transportation Co.

Daily gage-height, in feet, of Lake Champlain at Burlington, Vt., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	2.75	4.75	.....	.....	3.47	2.56	4.82	.....	.....	3.10	.....	1.18
2	.....	4.95	.....	4.20	.....	.....	4.80	5.80	4.85	3.05	1.70	1.18
3	2.74	.....	4.75	4.30	3.43	2.68	4.77	5.76	4.79	2.96	.....	.....
4	.....	4.95	4.70	.....	.....	2.76	4.78	.....	4.74	2.92	1.68	1.16
5	3.00	5.00	.....	.....	3.30	2.82	4.80	5.68	4.60	2.88	1.64	.....
6	.....	4.97	4.62	.....	.....	2.88	.....	5.82	.....	.....	.....	.....
7	3.65	.....	.....	.....	3.22	2.96	4.90	.....	.....	2.78	1.58	.....
8	4.06	4.80	.....	4.12	.....	2.98	5.22	5.70	.....	2.72	.....	1.06
9	4.15	.....	4.35	.....	.....	.....	5.47	5.74	.....	.....	1.56	.....
10	4.24	.....	4.30	.....	3.10	3.02	.....	5.67	4.33	.....	.....	.....
11	4.22	4.72	.....	.....	.....	3.12	5.50	.....	4.22	2.59	1.46	.....
12	.....	4.60	.....	.....	3.00	3.14	5.93	5.57	4.16	2.46	1.44	.....
13	.....	.....	4.23	.....	2.97	.....	.....	5.45	4.06	.....	.....	1.40
14	.....	4.42	.....	3.88	.....	.....	6.50	5.38	3.97	2.38	1.38	.....
15	.....	.....	.....	.....	.....	3.24	6.58	5.25	.....	2.33	1.36	1.52
16	4.10	4.22	4.33	.....	.....	.....	6.60	.....	3.96	.....	1.36	.....
17	4.02	.....	4.43	3.75	2.86	3.14	6.65	.....	3.90	2.32	.....	.....
18	.....	4.30	4.38	3.72	2.82	3.20	6.67	.....	3.88	2.28	1.34	.....
19	.....	4.67	.....	.....	.....	3.37	6.70	5.07	.....	2.26	.....	.....
20	.....	5.03	.....	.....	2.74	3.46	.....	5.07	3.80	.....	1.24	1.40
21	.....	5.23	.....	3.60	2.70	3.70	6.60	5.02	.....	2.18	1.24	.....
22	3.93	5.28	.....	.....	.....	3.87	6.58	4.95	.....	.....	.....	1.40
23	3.95	.....	4.13	.....	.....	.....	.....	.....	.....	2.10	1.24	1.40
24	.....	.....	.....	3.55	2.60	4.07	6.36	5.30	3.50	.....	.....	.....
25	.....	.....	.....	.....	2.56	4.10	.....	.....	.....	.....	1.22	.....
26	3.90	5.15	.....	.....	2.56	4.10	6.22	5.33	3.35	.....	1.24	1.40
27	.....	.....	.....	.....	.....	4.10	6.12	5.31	3.27	.....	.....	.....
28	.....	.....	4.37	.....	2.48	4.28	6.06	5.26	.....	.....	.....	.....
29	3.90	4.90	.....	.....	.....	4.60	6.02	5.19	.....	.....	1.18	.....
30	4.10	.....	4.33	3.50	.....	.....	5.96	.....	3.16	1.88	.....	1.30
31	4.40	.....	4.30	.....	.....	4.78	.....	5.06	.....	1.80	.....	.....
1919–20.												
1	1.32	2.46	3.22	.....	.....	.....	6.30	7.72	4.75	2.78	.....	.....
2	.....	.....	3.30	.....	.....	1.64	.....	.....	4.70	2.75	.....	.....
3	1.38	2.77	3.26	.....	.....	.....	6.45	7.60	4.60	.....	2.24	1.56
4	1.46	2.82	.....	.....	1.80	.....	.....	7.60	4.50	.....	.....	.....
5	.....	2.90	.....	2.35	.....	1.62	6.55	7.50	4.40	.....	2.16	1.45
6	1.56	3.10	3.15	.....	.....	.....	6.80	7.40	.....	2.68	.....	.....
7	1.72	3.15	.....	.....	.....	.....	6.94	7.28	4.27	2.60	2.06	1.42
8	1.83	3.20	3.12	.....	.....	.....	6.98	7.12	4.15	.....	.....	.....
9	1.86	.....	3.08	.....	1.78	1.72	6.90	.....	4.08	2.62	2.02	1.46
10	.....	3.25	.....	.....	.....	1.74	.....	6.98	4.05	2.68	.....	.....
11	1.92	.....	3.20	.....	.....	1.78	.....	6.88	3.90	.....	.....	1.44
12	.....	.....	.....	2.10	.....	1.74	.....	6.78	3.85	2.64	1.97	.....
13	2.02	.....	.....	.....	.....	1.90	6.70	6.66	.....	2.60	.....	.....
14	.....	.....	.....	.....	.....	.....	6.90	6.57	3.68	.....	.....	1.56
15	2.04	3.45	.....	.....	.....	2.30	7.14	6.45	3.63	2.52	.....	1.65
16	2.07	.....	3.16	.....	1.74	2.40	7.20	.....	3.63	2.52	1.94	.....
17	2.06	.....	.....	.....	.....	2.50	.....	6.20	3.53	.....	1.94	1.60
18	2.08	3.38	.....	.....	.....	2.84	.....	6.15	3.45	.....	.....	1.58
19	.....	.....	.....	1.98	.....	3.06	7.25	5.97	3.40	2.52	1.90	.....
20	2.12	.....	2.96	.....	.....	3.22	7.20	5.86	3.34	.....	.....	1.60
21	.....	.....	.....	.....	.....	.....	.....	5.77	3.30	2.49	.....	.....
22	.....	.....	.....	.....	.....	3.40	7.22	5.68	.....	2.49	1.72	.....
23	2.19	.....	2.86	1.95	.....	3.50	7.30	.....	3.14	2.50	1.76	1.54
24	2.20	3.30	.....	.....	.....	3.65	7.42	5.53	3.10	.....	.....	.....
25	.....	3.28	.....	.....	.....	4.00	.....	5.47	3.04	.....	1.70	.....
26	.....	3.28	.....	1.94	.....	4.42	7.60	5.42	2.98	.....	.....	.....
27	2.13	.....	2.65	.....	.....	4.82	7.55	5.32	.....	2.48	.....	1.52
28	.....	3.28	.....	.....	.....	.....	7.55	5.22	.....	2.36	.....	.....
29	2.16	.....	2.65	.....	.....	5.85	.....	5.12	2.82	2.32	1.65	1.50
30	.....	.....	.....	.....	.....	5.98	7.70	.....	2.80	2.25	1.65	1.48
31	.....	.....	2.60	.....	.....	6.20	.....	.....	.....	2.26	.....	.....

OTTER CREEK AT MIDDLEBURY, VT.

LOCATION.—At railroad bridge half a mile south of railroad station at Middlebury, Addison County, 3½ miles below mouth of Middlebury River, and 3½ miles above mouth of New Haven River.

DRAINAGE AREA.—615 square miles.

RECORDS AVAILABLE.—April 1, 1903, to May 1, 1907, and October 5, 1910, to January 31, 1920, when station was discontinued.

GAGE.—Chain; read by A. Lovett and N. A. Brooks.

DISCHARGE MEASUREMENTS.—Made from boat just below railroad bridge, at the stone-arch highway bridge just above the dam, or by wading.

CHANNEL AND CONTROL.—Channel deep; current sluggish for several miles above station. Control for low stages is gravel and boulder rips about 800 feet below gage, and is somewhat shifting; control at high stages is near the dam 800 feet farther downstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 15.6 feet at 7.25 a. m. April 12 (discharge, 3,050 second-feet); minimum stage recorded, 11.82 feet at 8.25 a. m. July 6 (discharge, 224 second-feet).

1903–1907 and 1910–1920: Maximum stage recorded, 21.07 feet March 30, 1913 (approximate discharge from extension of rating curve, about 8,000 second-feet); minimum open-water stage recorded, 11.45 feet September 15, 1913 (discharge, 138 second-feet). A somewhat lower discharge has possibly occurred at various times when the stage-discharge relation was affected by ice.

ICE.—Ice usually forms to a considerable thickness at the gage and occasionally at the control, affecting the stage-discharge relation, during most winters.

REGULATION.—Probably little if any effect from power developments above the station. Considerable storage has been developed on tributaries near the headwaters.

ACCURACY.—Stage-discharge relation has changed slightly at various times. Rating curves fairly well defined for periods used. Chain gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table. Records fair.

Discharge measurements of Otter Creek at Middlebury, Vt., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Jan. 3	R. H. Suttie	14.11	1,660	June 27	R. H. Suttie	12.22	390
4	do	14.17	1,720	29	do	12.84	737
Feb. 27	M. R. Stackpole	12.38	531	29	do	12.80	700
28	do	12.44	553	Sept. 15	M. R. Stackpole	14.55	2,010
28	do	12.42	541				
June 26	R. H. Suttie	12.15	355	1920.			
27	do	12.22	377	Jan. 20	H. S. Price	[a] 12.50	283

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Otter Creek at Middlebury, Vt., for the period Oct. 1, 1918, to Jan. 31, 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1,440	2,420	870	1,280	930	2,420	2,150	970	585	475	352	375
2	970	2,150	780	1,440	840	2,240	2,150	900	530	425	375	400
3	765	1,610	690	1,700	720	2,240	2,150	1,110	475	375	352	425
4	830	1,360	750	1,700	720	2,330	1,880	1,110	425	352	290	475
5	735	1,130	780	1,790	720	2,420	1,790	1,040	375	290	270	475
6	1,270	1,060	660	1,790	690	2,060	1,970	1,190	375	224	330	530
7	1,970	930	780	1,610	660	1,970	2,330	1,110	425	350	400	475
8	1,700	870	635	1,200	660	1,440	2,420	1,040	425	375	375	352
9	1,350	840	660	1,130	560	1,360	2,330	1,040	425	375	425	675
10	1,040	780	750	1,280	510	1,790	2,420	900	475	330	425	1,110
11	900	690	635	1,280	535	1,970	2,330	765	500	352	330	970
12	765	690	635	1,700	585	1,790	3,050	765	530	425	290	352
13	705	6 0	635	1,130	535	1,520	2,870	830	400	425	330	2,510
14	585	660	660	810	510	1,190	2,780	830	375	330	352	2,330
15	705	635	1,610	810	485	900	2,870	735	350	375	352	2,150
16	615	635	1,700	870	485	830	2,780	645	270	375	375	1,970
17	615	635	1,610	810	440	830	2,690	675	425	330	330	1,610
18	500	585	930	810	485	1,040	2,690	1,270	530	330	290	1,110
19	615	2,510	1,610	810	510	1,700	2,510	1,525	615	330	330	830
20	585	2,510	870	810	485	1,700	2,420	1,440	585	310	425	645
21	530	2,420	870	720	485	1,790	2,240	1,355	475	270	425	585
22	645	2,150	810	720	485	1,880	2,150	970	425	290	475	550
23	735	1,880	1,200	690	440	1,790	1,880	2 060	270	425	475	550
24	675	1 440	1,610	1,280	415	1,610	1,520	2,150	400	530	425	645
25	615	1,200	1,530	1,790	485	1,360	1,270	2,150	400	475	425	735
26	555	930	1,970	1,610	535	1,190	1,190	2,150	375	450	400	735
27	615	780	1,880	1,530	585	1,190	1,040	1,970	350	450	450	705
28	705	750	1,700	1,280	585	1,970	970	1,700	765	352	530	615
29	705	720	1,610	1,130	.....	2,150	970	1,270	735	375	502	500
30	675	990	1,130	1,060	.....	2,330	1,040	970	585	425	475	500
31	2,690	.....	1,280	930	.....	2,150	.....	765	.....	375	475	.....

Day.	Oct.	Nov.	Dec.	Jan.	Day.	Oct.	Nov.	Dec.	Jan.
1919–20.									
1	475	1,440	2,060	370	16	530	2,150	900	290
2	450	1,610	2,150	330	17	830	1,880	840	250
3	502	1,610	2,150	330	18	1,440	1,610	820	330
4	530	1,610	1,790	250	19	1,270	1,350	760	250
5	530	1,440	1,440	220	20	970	1,110	700	290
6	475	1,790	1,520	220	21	900	970	640	200
7	830	1,970	1,040	250	22	900	900	580	290
8	900	1,790	1,040	250	23	970	1,190	580	250
9	735	1,610	1,040	290	24	900	1,270	560	290
10	645	1,440	970	290	25	765	1,190	540	290
11	645	1,270	2,150	290	26	645	1,040	420	220
12	705	1,350	1,790	220	27	705	1,040	420	290
13	645	2,240	1,270	250	28	1,040	1,040	400	290
14	585	2,330	1,520	250	29	1,270	1,110	400	250
15	557	2,240	1,610	290	30	1,190	1,610	380	250
					31	1,110	.....	380	250

NOTE.—Stage-discharge relation affected by ice Dec. 17, 1919, to Jan. 31, 1920; discharge based on gage heights corrected for effect of ice by means of one discharge measurement, observer's notes, and weather records.

Monthly discharge of Otter Creek at Middlebury, Vt., for the period Oct. 1, 1918, to Jan. 31, 1920.

[Drainage area, 615 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	2,690	500	897	1.46	1.68
November	2,510	585	1,220	1.98	2.21
December	1,970	635	1,090	1.77	2.04
January	1,790	690	1,210	1.97	2.27
February	930	415	574	.933	.97
March	2,420	830	1,710	.278	3.20
April	3,050	970	2,100	3.41	3.81
May	2,150	645	1,210	1.97	2.27
June	765	270	462	.751	.84
July	530	224	370	.602	.69
August	530	290	389	.633	.73
September	2,510	352	863	1.40	1.56
The year	3,050	224	1,010	1.64	22.27
1919-20.					
October	1,440	450	795	1.29	1.49
November	2,330	900	1,510	2.46	2.74
December	2,150	380	1,060	1.72	1.98
January	370	220	273	.444	.51

WINOOSKI RIVER AT MONTPELIER, VT.

LOCATION.—One 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, 1920.

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 a 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 from water-stage recorder during year ending September 30, 1919, 14.6 feet at 2.30 p. m. March 28 (discharge from extension of rating curve, 15,000 second-feet); minimum stage from water-stage recorder, 2.87 feet at 2 a. m. September 7 (discharge, 30 second-feet).

Maximum stage from water-stage recorder during year ending September 30, 1920, 14.1 feet at 6.15 p. m. March 26 (discharge from extension of rating curve, 13,900 second-feet); minimum stage from water-stage recorder, 2.76 feet at 2 p. m. August 8 (discharge, 19 second-feet).

1909-1920: 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 2.76 feet, August 8, 1920 (discharge, 19 second-feet).

ICE.—Stage-discharge relation affected by ice during the winter. 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 determined by discharge integrator and by applying to rating table mean daily gage heights, with corrections for effect of ice during winter. Records good.

Discharge measurements of Winooski River at Montpelier, Vt., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Jan. 23	H. W. Fear	[a] 4.36	420	Nov. 21	H. S. Price	4.26	452
Mar. 1	M. R. Stackpole	[a] 4.44	397				
June 25	R. H. Suttie	3.57	179	1920.			
				Jan. 15	do	[a] 4.55	276

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	520	2,180	720	630	300	660	1,460	900	450	190	110	118
2	420	1,540	650	900	280	1,700	1,260	1,140	420	180	116	188
3	870	1,220	640	830	390	1,340	1,140	1,080	390	172	93	142
4	720	1,140	640	740	320	1,000	1,140	980	350	131	108	124
5	1,260	1,220	620	630	280	1,550	1,500	1,260	320	154	110	150
6	6,600	1,060	530	540	280	1,720	2,400	1,140	290	120	132	92
7	3,600	970	490	510	270	1,060	3,350	880	340	174	188	62
8	1,600	890	560	510	220	860	3,000	910	330	194	170	132
9	1,160	560	550	500	220	770	2,150	720	365	160	122	580
10	950	970	550	480	280	1,340	1,840	640	540	142	67	340
11	860	940	500	470	260	1,040	1,980	620	370	150	120	240
12	720	780	460	470	230	780	5,900	670	305	134	114	930
13	660	690	440	470	210	710	2,600	600	230	80	94	1,730
14	760	680	620	470	210	700	2,100	520	225	130	90	560
15	600	670	1,680	440	220	640	1,720	450	260	150	94	345
16	550	640	1,280	420	210	560	1,500	400	315	158	100	275
17	510	610	790	420	220	465	1,820	650	540	172	78	250
18	1,240	1,240	660	400	240	800	1,760	1,700	315	150	126	210
19	950	3,900	640	370	240	1,200	1,480	1,020	250	118	118	210
20	730	1,680	610	370	220	1,540	1,380	740	295	61	124	190
21	1,360	1,240	490	340	220	2,550	1,300	620	290	106	102	156
22	970	1,080	510	340	210	2,350	1,140	2,250	220	128	88	190
23	730	900	1,680	340	180	1,440	1,040	4,000	230	150	96	230
24	640	830	1,340	860	220	1,440	1,000	1,900	200	142	66	235
25	580	740	1,380	930	220	1,420	1,180	1,380	180	130	130	225
26	960	600	1,240	750	230	1,440	1,040	1,180	180	120	124	260
27	1,000	600	860	590	260	1,760	920	1,000	300	178	140	230
28	800	630	690	500	240	8,000	870	830	425	96	146	136
29	730	970	550	380	.....	3,400	1,040	690	240	112	130	154
30	1,960	940	465	320	.....	2,300	1,060	610	230	126	114	112
31	6,000	.....	430	320	.....	1,780	.....	530	.....	114	54	.....

Daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	108	1,460	1,040	300	230	210	2,060	1,970	272	494	198	237
2	126	909	664	320	240	210	2,670	1,700	244	276	204	264
3	1,680	626	470	310	220	210	3,120	1,540	268	312	168	195
4	937	500	506	310	230	190	2,430	1,460	228	560	155	145
5	818	671	548	290	210	200	2,850	1,250	204	482	131	108
6	1,440	755	494	290	230	300	3,290	1,130	272	304	120	115
7	1,380	727	435	280	230	330	1,790	1,080	365	225	120	210
8	650	734	488	270	210	380	1,440	1,030	300	405	49	536
9	405	664	590	300	200	360	1,200	1,240	234	300	131	350
10	644	602	1,180	310	230	220	1,160	1,050	210	222	120	268
11	1,110	650	902	280	230	320	1,200	902	175	178	470	410
12	825	1,000	727	260	220	370	1,150	790	170	204	530	320
13	566	2,580	699	250	220	1,650	4,500	706	126	189	350	1,100
14	410	1,460	1,340	240	190	1,250	5,020	671	180	244	560	900
15	360	979	965	220	200	1,000	2,330	755	148	455	692	650
16	460	706	692	220	240	800	3,910	632	225	276	930	435
17	660	685	572	230	240	1,200	2,990	596	213	186	560	455
18	420	678	520	220	240	1,300	2,420	542	204	145	300	445
19	400	671	480	220	240	840	2,130	494	272	320	237	965
20	385	584	380	220	230	720	2,220	476	225	518	201	560
21	330	518	400	220	240	560	2,410	506	231	280	165	390
22	776	566	400	220	200	460	4,810	1,100	276	276	160	325
23	572	874	380	220	210	540	4,070	839	210	280	276	284
24	415	769	370	230	220	1,350	4,630	638	195	240	210	260
25	385	590	360	220	210	2,600	2,660	584	165	186	195	200
26	365	554	390	220	200	7,890	1,920	482	143	198	143	180
27	500	554	360	220	200	7,640	2,700	405	84	180	136	220
28	506	488	340	230	200	5,090	3,540	355	153	168	117	280
29	500	470	380	230	195	3,430	3,460	292	145	160	90	370
30	385	1,410	360	230	.....	3,030	2,650	284	506	400	160	600
31	867	.....	360	220	.....	2,370	.....	268	.....	320	141	.....

Stage-discharge relation affected by ice Jan. 6 to Mar. 2, 1919, and Dec. 18, 1919, to Mar. 25, 1920; discharge based on gage heights corrected for effect of ice by means of three discharge measurements, observer's notes, and weather records.

Recorder clock stopped at various times during the winter, 1919-20, also Oct. 14-17, 1919, Sept. 13-15, and 25-28, 1920; discharge estimated for those periods.

Monthly discharge of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 420 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918-19.					
October	6,000	420	1,320	3.14	3.62
November	3,900	600	1,070	2.55	2.84
December	1,680	430	751	1.79	2.06
January	930	320	524	1.25	1.44
February	390	180	246	.586	.61
March	8,000	465	1,560	3.71	4.28
April	3,350	870	1,740	4.14	4.62
May	2,250	400	1,030	2.45	2.82
June	450	180	313	.745	.83
July	194	61	139	.331	.38
August	188	54	112	.267	.31
September	1,730	62	293	.698	.78
The year	8,000	54	761	1.81	24.59

Monthly discharge of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1919 and 1920—Continued.

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1919-20.					
October	1,680	108	625	1.49	1.72
November	2,580	470	815	1.94	2.16
December	1,340	340	574	1.37	1.58
January	320	220	252	.600	.69
February	240	190	219	.521	.56
March	7,890	190	1,520	3.62	4.17
April	5,020	1,150	2,760	6.57	7.33
May	1,970	268	831	1.98	2.28
June	506	84	221	.526	.59
July	560	145	290	.690	.80
August	930	49	259	.617	.71
September	1,100	108	392	.933	1.04
The year	7,890	49	729	1.74	23.63

DOG RIVER AT NORTHFIELD, VT.

LOCATION.—At highway bridge near Norwich University campus in Northfield, Washington County. Union Brook joins Dog River a short distance below station.

DRAINAGE AREA.—47 square miles.

RECORDS AVAILABLE.—May 14, 1909, to October 31, 1920, when station was discontinued. Records from May 14, 1909, to August 22, 1910, obtained at lower highway bridge; those from August 23, 1910, to October 31, 1920, at present location.

GAGE.—Inclined staff on left bank; read by Florence C. Doyle.

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

CHANNEL AND CONTROL.—Channel composed of gravel and alluvial deposits; subject to slight shifts. Banks overflow at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 7.52 feet at 9 a. m. March 28 (discharge from extension of rating curve, 3,380 second-feet); minimum stage recorded, 1.14 feet on August 12 (discharge, 7 second-feet).

Maximum stage recorded during year ending September 30, 1920, 6.0 feet at 12.30 p. m. March 13 (discharge, 1,630 second-feet); minimum stage recorded: 1.4 feet at 8. a. m. and 6 p. m. August 9 (discharge, 4 second-feet).

1910–1920: Maximum stage recorded at present site, 8.5 feet March 25, 1913 (discharge, 3,400 second-feet); minimum stage recorded, 0.60 foot September 10 and 11, 1913 (discharge, 3.0 second-feet). At the lower gage, 1909–10, flow was practically zero at various times when water was held back by dam.

ICE.—River usually freezes over, and the stage-discharge relation is slightly affected by ice during some winters; probably not affected by ice during winters of 1918–19 or 1919–20.

ACCURACY.—Stage-discharge relation changed slightly during the year and two rating curves were used. Rating curves well defined below 600 second-feet. Gage read to quarter-tenths twice daily except during winter, when it was read once daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Records good for discharge below 600 second-feet; results somewhat uncertain for high stages as banks are overflowed at a discharge of about 2,000 second-feet.

Discharge measurements of Dog River at Northfield, Vt., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft*
Jan. 23	H. W. Fear	1.60	53	Jan. 16	H. S. Price	1.47	25.8
Mar. 1	M. R. Stackpole	2.46	150	Aug. 20	J. L. Lamson	1.57	12.3
June 25	R. H. Suttie	1.41	20.8	20	do	1.67	25.5
Nov. 20[a]	B. L. Bigwood	2.07	75				

[a] Doubtful accuracy.

Daily discharge, in second-feet, of Dog River at Northfield, Vt., for the period Oct. 1, 1918, to Oct. 21, 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	70	257	107	125	56	157	256	104	90	21	14	14
2	62	192	116	155	51	130	215	172	88	19	9	15
3	108	169	107	130	56	109	184	122	76	18	9	15
4	79	181	96	110	51	130	194	129	65	16	7	14
5	130	155	86	107	49	228	404	148	221	15	7	11
6	527	132	90	104	42	217	417	125	61	21	18	10
7	266	121	86	100	38	196	513	124	64	24	15	10
8	164	121	86	93	45	161	430	108	56	19	15	9
9	135	106	80	96	51	143	350	97	84	15	14	39
10	108	107	74	100	58	161	297	90	77	15	11	23
11	104	104	74	96	49	136	377	106	56	16	8	21
12	92	94	68	93	45	119	404	103	48	14	7	53
13	90	86	63	100	40	109	363	85	48	14	8	196
14	85	80	80	96	38	153	310	76	49	14	9	40
15	75	79	249	90	32	139	260	71	48	17	13	33
16	69	73	141	90	36	67	242	65	42	16	14	27
17	63	69	93	93	40	20	310	109	37	15	9	23
18	138	119	104	80	36	91	284	230	35	14	9	19
19	90	700	74	68	36	106	234	137	29	13	13	16
20	86	268	80	66	32	242	207	109	34	11	14	18
21	148	205	78	58	30	417	215	114	34	14	12	19
22	119	172	80	47	24	310	178	541	26	20	10	21
23	90	153	270	49	28	217	161	444	24	19	9	23
24	79	138	245	58	28	249	157	377	26	15	12	21
25	78	124	194	86	24	242	148	272	21	14	15	33
26	90	125	158	80	24	238	141	225	20	13	18	29
27	85	122	125	74	26	390	120	200	65	12	15	26
28	75	104	107	66	32	2,360	114	161	40	13	13	23
29	75	181	110	56	.....	805	125	132	34	12	12	19
30	130	125	114	49	.....	527	122	106	26	12	11	18
31	471	.....	119	54	.....	323	.....	91	.....	10	14	.....

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Daily discharge, in second-feet, of Dog River at Northfield, Vt., for the period Oct. 1, 1918, to Oct. 31, 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1919–20.													
1	17	84	157	38	20	19	284	260	41	35	25	35	602
2	18	75	125	40	19	20	336	260	40	25	23	14	444
3	186	67	109	40	24	20	272	238	41	79	14	8	126
4	109	65	84	40	22	19	256	228	30	64	16	8	95
5	77	88	65	35	20	24	363	176	43	56	14	9	88
6	80	71	67	34	20	44	336	176	64	43	10	14	82
7	66	92	84	32	24	40	249	152	56	25	7	35	73
8	52	85	83	32	24	32	256	140	47	51	6	14	64
9	52	77	106	34	26	35	242	160	41	41	4	12	56
10	39	78	178	34	24	40	207	140	30	30	11	16	51
11	49	84	114	35	22	42	192	128	28	20	90	36	41
12	42	153	85	30	20	88	180	116	27	17	34	53	45
13	39	363	180	30	22	1,630	1,310	114	23	41	27	116	41
14	35	172	228	30	22	740	404	132	17	34	16	64	47
15	35	141	129	27	26	880	390	107	30	53	38	34	38
16	42	119	91	27	27	260	1,540	98	82	27	28	30	35
17	83	116	97	30	24	990	830	92	70	18	23	27	38
18	56	106	71	27	20	527	350	80	59	14	17	20	38
19	55	100	65	30	22	390	336	73	77	60	14	47	41
20	55	77	65	27	24	310	363	76	48	53	12	28	36
21	56	75	63	24	24	228	431	107	61	34	8	23	41
22	91	85	59	22	26	196	640	150	56	30	11	20	30
23	91	132	65	20	26	238	541	116	41	23	18	27	25
24	56	94	59	20	27	260	485	98	35	23	12	18	25
25	48	91	59	22	24	272	417	95	43	20	8	13	27
26	54	88	49	20	20	640	260	82	28	14	9	16	28
27	63	91	40	26	19	1,050	284	73	23	10	14	13	30
28	88	75	40	24	20	880	284	65	23	10	14	14	100
29	83	77	44	24	17	585	284	59	41	8	14	14	70
30	56	260	44	22	.....	499	272	53	28	25	13	79	48
31	78	.....	40	22	.....	349	.....	47	.....	34	14	.....	41

Monthly discharge of Dog River at Northfield, Vt., for the period Oct. 1, 1918, to Oct. 31, 1920.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	527	62	128	2.72	3.14
November	700	69	155	3.30	3.68
December	270	63	115	2.45	2.82
January	155	47	86.1	1.83	2.11
February	58	24	39.2	.834	.87
March	2,360	20	287	6.11	7.04
April	513	114	258	5.49	6.12
May	541	65	160	3.40	3.92
June	221	20	54.1	1.15	1.28
July	24	10	15.5	.330	.38
August	18	7	11.7	.249	.29
September	196	9	27.9	.594	.66
The year	2,360	7	112	2.38	32.31
1919–20.					
October	186	17	62.9	1.34	1.54
November	363	65	109	2.32	2.59
December	228	40	87.9	1.87	2.16
January	40	20	29.0	.617	.71
February	27	17	22.6	.481	.52
March	1,630	19	366	7.79	8.98
April	1,540	180	420	8.94	9.97
May	260	47	126	2.68	3.09
June	82	17	42.4	.902	1.01
July	79	8	32.8	.698	.80
August	90	4	18.2	.387	.45
September	116	8	28.6	.609	.68
The year	1,630	4	112	2.38	32.50
October, 1920	602	25	82.1	1.75	2.02

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, 1920.

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.—Channel smooth gravel; well defined gravel control 500 feet downstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder during year ending September 30, 1919, 10.77 feet at 7 a. m. April 12 (discharge from extension of rating curve, 7,530 second-feet); minimum stage from water-stage recorder, 1.39 feet at 5 a. m. August 6 (discharge from extension of rating curve, 5 second-feet; water held back by dam).

Maximum stage from water-stage recorder during year ending September 30, 1920, 8.90 feet at midnight March 26 (discharge, 5,140 second-feet); minimum stage from water-stage recorder, 1.48 feet at 2 a. m. August 9 (discharge from extension of rating curve, 9 second-feet).

1913–1920: Maximum stage recorded, 10.77 feet April 12, 1919 (discharge from extension of rating curve, 7,530 second-feet); minimum stage recorded, 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 slightly affected by ice. Discharge determined from gage heights with corrections for backwater based on current-meter measurements, observer's notes, and climatic records.

ACCURACY.—Stage-discharge relation practically permanent, except when affected by ice. Rating curve well defined. Operation of water-stage recorder satisfactory throughout year except for clock stopping frequently during December, January, February, and March. Daily discharge ascertained by discharge integrator. Records good.

Discharge measurements of Lamoille River at Cadys Falls, Vt., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Jan. 5	R. H. Suttie	[a] 2.93	359	Feb. 24	M. R. Stackpole	2.47	219
5	do	[a] 2.91	344	1920.			
20	H. W. Fear	[a] 2.64	277	Feb. 20	H. S. Price	[a] 2.75	210

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Lamoille River at Cadys Falls, Vt., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	435	1,840	365	440	300	240	880	650	235	146	96	148
2	370	1,060	325	670	350	600	720	790	235	154	91	136
3	360	790	385	640	184	550	690	760	230	138	40	124
4	370	700	435	520	155	500	640	670	154	100	52	126
5	560	700	410	440	150	700	740	1,060	150	128	65	118
6	4,000	650	330	400	150	700	1,340	920	220	118	69	110
7	3,250	550	325	400	140	500	2,700	660	330	152	80	75
8	1,060	550	315	370	300	480	2,450	700	290	138	69	136
9	485	600	375	340	250	430	1,900	560	270	126	90	160
10	640	700	320	280	240	680	1,420	450	345	122	52	170
11	630	910	270	260	190	600	1,940	415	270	130	110	152
12	305	190	300	230	190	480	5,600	435	215	114	100	460
13	355	170	325	260	220	520	2,250	390	185	63	98	790
14	490	435	485	230	190	550	1,700	345	168	124	110	350
15	430	430	1,500	240	190	480	1,340	315	198	120	98	220
16	400	400	1,050	250	210	355	1,200	290	580	134	84	184
17	365	400	660	255	230	340	1,600	355	880	124	40	162
18	620	740	480	290	190	410	1,480	1,060	445	124	104	154
19	680	1,500	390	300	190	580	1,220	740	275	124	104	146
20	560	1,080	350	295	200	830	1,000	500	360	85	104	130
21	1,100	790	320	280	210	1,760	1,140	400	300	126	106	112
22	600	690	395	280	220	1,840	730	910	290	130	112	170
23	450	610	1,600	290	240	1,040	770	1,880	180	104	100	285
24	450	700	1,180	530	250	920	720	1,480	166	150	51	190
25	470	550	840	720	275	950	880	1,000	154	130	106	188
26	500	370	770	500	230	1,040	700	1,080	150	172	120	235
27	600	350	570	460	240	1,460	650	770	235	54	82	190
28	460	365	500	400	275	3,550	690	440	300	110	94	142
29	440	650	440	400	.....	2,050	770	435	215	106	110	156
30	1,420	950	420	400	.....	1,460	840	465	176	104	120	160
31	4,900	.....	335	350	.....	1,100	.....	380	.....	108	112	.....
1919–20.												
1	150	1,980	790	196	72	245	1,240	1,400	184	152	124	180
2	154	1,000	520	196	132	240	1,660	1,170	174	150	120	230
3	430	700	390	185	172	250	2,150	1,060	170	142	108	210
4	340	560	320	112	165	240	1,800	990	174	60	90	175
5	250	580	370	205	155	210	1,900	820	166	154	100	95
6	1,140	630	300	245	172	270	2,500	740	60	154	88	120
7	1,140	600	295	216	112	310	1,300	730	104	138	93	162
8	500	580	340	216	52	290	980	730	142	280	33	230
9	335	540	340	162	172	270	770	840	172	205	86	215
10	610	490	720	140	172	235	700	830	176	158	100	190
11	2,300	540	570	112	165	310	750	630	154	96	182	172
12	1,100	800	500	172	155	340	770	560	135	140	180	112
13	610	2,400	530	205	140	1,000	3,000	540	60	132	153	330
14	465	1,360	930	205	112	1,050	3,500	480	132	132	580	570
15	370	850	620	200	52	930	1,760	370	150	132	760	450
16	370	590	475	200	126	770	2,850	300	150	130	340	380
17	540	570	345	195	135	1,200	2,150	300	156	140	235	440
18	450	550	270	126	140	1,140	1,880	300	130	66	230	450
19	320	540	255	195	140	1,120	1,580	295	156	142	210	700
20	300	480	210	220	135	830	1,860	270	73	330	220	440
21	310	400	170	205	112	530	1,860	255	154	278	188	350
22	900	455	235	172	85	485	2,800	740	160	205	92	235
23	620	930	220	172	140	620	2,650	630	174	168	275	275
24	400	760	200	195	185	1,260	3,500	520	170	150	225	220
25	360	570	132	85	225	1,880	2,150	450	162	140	154	195
26	335	510	182	165	230	3,900	1,350	375	150	148	160	120
27	460	510	182	140	235	550	1,200	320	70	135	186	200
28	490	340	100	126	205	3,000	2,150	210	134	124	190	196
29	500	360	224	126	112	2,250	2,350	194	152	110	85	235
30	390	910	205	140	.....	1,960	1,980	184	150	140	150	560
31	1,520	.....	211	126	.....	1,520	.....	190	.....	162	150	.....

NOTE.—No record for week ending Dec. 20, 1918; discharge estimated by hydrograph comparison with Winooksi River at Montpelier. Stage-discharge relation affected by ice Jan. 5–15 and Feb. 10–22, 1919; daily discharge for these periods based on gage heights corrected for effect of ice.

Stage-discharge relation affected by ice Jan. 15 to Feb. 23 and Mar. 6–11, 1920; discharge estimated from gage heights, one discharge measurement, and records at power plant at Cadys Falls. Operation of water-stage recorder unsatisfactory at various times during December, January, February, and March, 1920.

Monthly discharge of Lamoille River at Cadys Falls, Vt., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 280 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	4,900	305	895	3.20	3.69
November	1,840	170	681	2.43	2.71
December	1,600	270	541	1.93	2.22
January	670	240	380	1.36	1.57
February	350	140	221	.789	.82
March	3,550	240	893	3.19	3.68
April	5,600	640	1,360	4.86	5.42
May	1,880	290	687	2.45	2.82
June	880	150	270	.964	1.08
July	154	54	121	.432	.50
August	120	40	89.3	.319	.37
September	460	75	196	.700	.78
The year	5,600	40	5,290	1.89	25.66
1919–20.					
October	2,300	150	586	2.09	2.41
November	2,400	340	736	2.63	2.93
December	930	100	360	1.28	1.48
January	245	85	173	.618	.71
February	235	52	145	.518	.56
March	3,900	210	942	3.36	3.87
April	3,500	700	1,900	6.79	7.58
May	1,400	184	562	2.00	2.30
June	184	60	143	.511	.57
July	330	60	155	.554	.64
August	760	33	191	.682	.79
September	700	95	284	1.01	1.13
The year	3,900	33	514	1.84	24.97

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 September 30, 1920.

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 during year ending September 30, 1919, 4.63 feet during early morning of April 12, determined by leveling from high-water marks (discharge from extension of rating curve, about 710 second-feet); minimum stage recorded, 0.29 foot August 21, 23, 24, and 26 (discharge, 4.7 second-feet).

Maximum stage recorded during year ending September 30, 1920, 3.05 feet at 9 a. m. April 24 (discharge, 310 second-feet); minimum stage recorded, 0.20 foot morning and afternoon of August 8 and 9 (discharge, 2.7 second-feet).

1915–1920: Maximum stage determined from high-water marks, 4.63 feet on April 12, 1919 (discharge from extension of rating curve, about 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.—Stage-discharge relation 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 years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
June 21[a]	R. H. Suttie	0.82	23.7	Aug. 16[a]	J. L. Lamson	0.76	20.7
21[b]	do	.81	23.6	16[b]	do	.74	18.6
				18[a]	do	.48	[c]12.3

[a] Made by wading at section near farm bridge about half a mile above gage.
[b] Made by wading at section half a mile below gage.
[c] Doubtful accuracy.

Daily discharge, in second-feet, of Green River at Garfield, Vt., during the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	40	170	39	23	14	14	61	56	24	14	6.6	9.3
2	32	90	33	30	14	13	50	64	21	13	6.3	8.7
3	29	66	28	30	14	12	39	61	19	12	6.0	8.4
4	28	51	26	28	14	12	36	55	18	12	6.0	8.0
5	37	47	25	27	13	15	38	69	16	11	5.7	7.7
6	110	43	22	24	13	14	50	69	16	12	9.3	7.7
7	253	38	22	22	12	14	102	52	46	12	7.1	7.7
8	101	37	21	21	12	13	164	45	52	11	6.6	7.7
9	54	35	20	20	12	16	145	38	36	11	6.0	10
10	44	38	18	18	12	20	130	32	35	11	5.7	8.7
11	37	53	16	16	11	18	135	30	27	10	5.7	8.7
12	32	40	17	17	11	19	610	28	24	10	5.5	17
13	29	34	17	16	11	23	2.6	26	20	10	5.2	25
14	28	31	21	15	10	25	169	24	19	9.3	5.2	23
15	27	28	40	15	12	22	127	21	21	10	6.0	21
16	25	26	54	16	12	20	104	19	35	13	5.5	19
17	23	25	37	16	11	18	107	29	99	9.3	4.9	18
18	34	43	29	16	10	20	126	71	61	9	4.9	17
19	33	89	27	16	11	21	103	55	34	8.7	6.6	16
20	34	139	25	15	11	26	93	38	38	8.4	5.5	15
21	72	70	23	15	12	44	93	31	24	8.7	4.9	14
22	70	51	25	14	11	67	77	47	19	9.3	5.2	17
23	46	44	65	14	11	74	67	148	17	8.4	4.7	17
24	36	42	127	20	11	63	60	88	16	8	6.3	17
25	32	34	80	14	11	62	60	104	15	7.7	5.2	17
26	37	27	54	19	10	62	52	130	14	7.4	4.9	18
27	49	24	37	19	10	81	46	76	23	7.7	5.2	18
28	43	23	36	18	11	141	50	50	16	7.1	9.3	16
29	35	31	32	16	.....	152	59	39	14	9	9.3	15
30	112	43	27	16	.....	107	71	34	14	8	9.0	14
31	352	.....	24	15	.....	86	.....	28	.....	6.9	9.7	.....

Daily discharge, in second-feet, of Green River at Garfield, Vt., during the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	14	241	43	12	7.7	8.7	103	153	11	6.3	9.0	5.7
2	14	106	40	12	8.0	8.4	100	118	10	6.3	7.4	7.7
3	25	65	36	12	7.7	8.4	128	111	9.3	10	5.5	6.9
4	14	48	30	11	7.7	8.7	130	100	8.7	18	4.6	5.5
5	19	45	25	12	7.4	8.7	128	91	8.4	20	3.8	4.7
6	36	40	22	11	7.4	9.7	142	81	9.3	16	3.4	4.7
7	39	38	23	11	7.4	9.3	118	75	14	13	2.9	6.3
8	47	36	21	11	7.4	9.0	85	71	13	24	2.7	7.4
9	34	34	26	11	7.1	8.7	63	71	12	24	2.7	5.7
10	51	32	26	11	7.1	9.0	54	60	11	15	2.9	5.7
11	204	38	32	10	7.1	9.3	54	54	8.7	14	8.0	6.3
12	122	42	31	11	7.4	10	54	50	7.4	11	12	12
13	75	139	31	10	7.4	12	116	47	6.3	10	18	23
14	50	143	37	10	7.4	12	273	37	5.7	9.3	29	25
15	39	171	43	10	8.0	12	141	30	6.0	8.0	25	21
16	35	49	32	9.7	8.0	12	174	26	5.7	6.3	19	19
17	37	41	22	10	8.0	13	172	23	5.2	4.9	14	21
18	32	39	17	9.7	7.7	14	162	20	5.2	4.2	11	26
19	29	39	17	9.7	8.0	13	148	18	5.7	15	8.0	28
20	26	34	16	9.7	8.0	13	191	16	5.7	21	6.3	26
21	24	30	16	9.3	8.0	14	174	15	6.6	24	5.2	21
22	31	30	14	9.3	8.0	16	172	50	6.9	19	11	15
23	47	40	15	10	8.7	24	199	55	6.9	13	11	12
24	49	45	14	9.3	8.7	29	302	50	6.3	11	12	11
25	37	41	13	9.0	8.7	39	164	42	4.9	11	11	8.7
26	34	36	14	9.0	8.7	57	123	33	4.7	10	8.0	7.4
27	34	32	16	9.0	8.0	138	102	27	4.2	10	6.3	6.9
28	38	30	17	8.7	8.4	191	126	23	4.0	9.0	5.2	11
29	40	27	14	8.7	8.7	136	150	19	4.9	9.0	4.2	11
30	35	39	13	8.4	.....	123	162	16	4.9	12	3.8	13
31	109	.....	12	8.0	.....	116	.....	12	.....	10	3.6	.....

Monthly discharge, in second-feet, of Green River at Garfield, Vt., for the years ending Sept. 30, 1919 and 1920.

Month.	Maximum.	Minimum.	Mean.	Month.	Maximum.	Minimum.	Mean.
1918–19.				1919–20.			
October	352	23	61.7	October	204	14	45.8
November	170	23	50.4	November	241	27	55.7
December	127	16	34.4	December	43	12	23.5
January	30	14	18.7	January	12	8.0	10.1
February	14	10	11.7	February	8.7	7.1	7.86
March	152	12	41.7	March	191	8.4	35.2
April	610	36	109	April	302	54	140
May	148	19	53.5	May	153	12	51.4
June	99	14	27.8	June	14	4.0	7.42
July	14	6.9	9.84	July	24	4.2	12.7
August	9.7	4.7	6.25	August	29	2.7	8.92
September	25	7.7	14.2	September	28	4.7	12.8
The year	610	4.7	36.7	The year	302	2.7	34.2

MISSISQUOI RIVER NEAR RICHFORD, VT.

LOCATION.—About 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, 1920.

GAGE.—Gurley water-stage recorder on left bank, about one-fourth mile above highway bridge, inspected by P. Sloan until March 20, 1920, and by Harry Jenne after June 24; 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 from water-stage recorder during year ending September 30, 1919, 12.06 feet at 4 a. m. April 12 (discharge, 9,380 second-feet); minimum stage, from water-stage recorder, 1.93 feet at noon, August 20, (discharge by extension of rating curve, 13 second-feet).

Maximum stage during year ending September 30, 1920, about 15 feet on March 26 (stage-discharge relation affected by ice and gage house wrecked by ice jam); minimum stage from water-stage recorder, 2.05 feet at 10 p. m. August 21 (discharge, 26 second-feet).

1911–1920: Maximum stage recorded, 17.64 feet April 1, 1918 (stage-discharge relation affected by ice). Maximum discharge occurred on March 26, 1913 (about 10,200 second-feet); minimum stage recorded, 4.15 feet (by chain gage), July 14, 1911 (discharge, about 8 second-feet).

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 21, 1920, and rebuilt June 23; operation of water-stage recorder satisfactory during remainder of the year 1920. Operation of recorder not entirely satisfactory prior to March 20, 1920, on account of carelessness of observer. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder sheets, with corrections for effect of ice during winter. Records good for open-water periods and poor for the winter.

Discharge measurements of Missisquoi River near Richford, Vt., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 30	R. H. Suttie	5.91	2,130	June 24	R. H. Suttie	2.90	227
1919.				1920.			
Jan. 16	H. W. Fear	[a]5.67	469	Jan. 19	H. S. Price	[a]4.34	219
17	do	[a]5.57	414	Feb. 21	do	[a]4.51	124
Feb. 26	M. R. Stackpole	[a]4.27	302	June 24	M. R. Stackpole	2.95	239

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	1,480	6,720	1,480	1,920	400	480	1,360	1,440	375	200	95	343
2	1,170	3,830	1,170	2,100	400	860	925	1,640	343	179	100	317
3	2,200	1,880	1,680	2,100	400	920	1,130	1,560	303	160	88	237
4	1,560	1,440	1,640	2,000	400	860	1,100	1,400	265	145	105	197
5	1,440	1,360	1,240	1,800	375	1,360	1,030	1,800	237	140	102	197
6	7,870	1,200	1,170	1,600	335	1,320	2,010	1,720	233	115	95	155
7	7,610	960	1,100	1,440	320	770	5,280	1,640	247	135	125	170
8	4,820	960	1,030	1,280	280	830	4,600	1,480	446	140	115	437
9	2,240	925	1,030	1,140	280	830	3,500	1,170	355	140	107	1,100
10	1,400	1,130	960	1,000	265	1,240	2,440	860	324	120	112	1,030
11	1,060	1,400	925	900	265	1,680	3,720	770	282	122	135	1,170
12	890	995	890	800	265	1,400	8,000	710	247	120	110	1,920
13	830	800	890	700	250	1,400	7,220	650	215	120	105	4,160
14	860	740	2,150	620	250	1,030	4,820	595	317	110	100	3,500
15	830	710	4,160	550	280	830	3,060	541	662	120	93	1,280
16	710	698	2,950	460	265	710	2,340	500	770	200	125	740
17	565	740	1,760	400	280	710	3,060	650	2,240	221	122	740
18	1,200	1,360	1,240	350	350	2,540	3,390	1,560	830	176	132	668
19	1,560	2,8.0	960	320	300	3,610	2,840	1,440	460	127	115	496
20	1,130	3,060	830	280	280	5,520	2,200	960	335	115	28	600
21	2,340	2,340	770	250	280	3,610	2,150	770	282	120	188	710
22	1,920	1,880	860	185	230	3,720	1,970	1,060	247	95	300	635
23	1,240	1,560	3,170	265	250	3,280	1,720	2,340	224	95	261	710
24	960	1,240	3,280	1,360	300	2,390	1,440	1,400	224	95	237	610
25	830	1,170	2,060	1,440	250	1,970	1,400	1,100	206	86	363	740
26	1,720	1,030	1,480	1,100	280	1,970	1,240	1,240	176	83	383	1,060
27	1,840	890	1,100	860	280	2,290	1,240	1,030	247	77	265	800
28	1,360	830	960	650	265	3,940	1,240	740	415	130	324	460
29	1,170	1,480	890	550	.....	3,720	1,400	595	300	122	367	505
30	5,280	2,200	830	500	.....	2,490	1,720	505	240	120	300	415
31	7,480	.....	1,680	460	.....	1,800	.....	424	.....	115	265	.....
1919-20.												
1	335	7,740	1,970	260		92	.....	.....	.....	890	800	145
2	282	5,520	1,140	270		90	.....	.....	.....	460	500	268
3	1,760	2,840	770	260		88	.....	.....	.....	656	335	268
4	1,880	1,000	960	210		90	.....	.....	.....	1,520	303	188
5	1,170	1,640	1,200	230		145	.....	.....	.....	1,640	261	145
6	3,060	1,640	1,950	190		230	.....	.....	.....	1,030	233	115
7	2,240	1,520	1,900	230		300	.....	.....	.....	960	203	145
8	2,390	1,400	1,700	230		290	.....	.....	.....	1,800	179	282
9	1,560	1,320	1,550	250		300	.....	.....	.....	1,520	188	343
10	1,920	1,200	2,800	240		290	.....	.....	.....	890	157	275
11	2,240	1,640	1,700	220	180	260	.....	.....	.....	605	162	203
12	2,150	2,440	1,500	230		330	.....	.....	.....	446	209	203
13	1,280	4,710	1,800	230		2,600	.....	.....	.....	505	227	321
14	920	4,160	2,300	210		2,700	.....	.....	.....	455	227	585
15	740	2,440	1,700	210		1,950	.....	.....	.....	363	215	411
16	645	1,520	1,350	220		1,650	.....	.....	.....	293	240	314
17	860	1,170	940	200		2,800	.....	.....	.....	237	194	960
18	890	1,170	720	185		2,450	.....	.....	.....	221	179	1,060
19	704	1,170	640	175		2,000	.....	.....	.....	2,150	132	925
20	625	1,180	420	170		1,900	.....	.....	.....	3,170	132	740
21	630	1,250	400		98	.....	.....	.....	.....	1,560	95	509
22	2,100	1,650	440		98	.....	.....	.....	.....	960	132	399
23	1,840	2,020	460		86	.....	.....	.....	.....	692	230	355
24	1,170	1,720	440		125	.....	.....	.....	230	536	200	300
25	890	1,280	400		76	.....	.....	.....	182	469	197	279
26	1,060	1,030	380	190	100	.....	.....	.....	145	399	132	247
27	1,140	920	360		96	.....	.....	.....	115	347	145	240
28	1,170	830	350		100	.....	.....	.....	145	300	107	268
29	1,030	800	340		82	.....	.....	.....	200	268	93	343
30	1,200	1,800	330		.....	.....	.....	.....	1,360	383	132	460
31	5,040	.....	300		.....	.....	.....	.....	.....	740	125	.....

NOTE.—Recorder not in operation and discharge estimated Jan. 1, 5-15; Mar. 9-15; Apr. 22, 23; May 2-9, 23; June 11, 17; July 15; Sept. 28-30, 1919. Operation of recorder unsatisfactory Nov. 20-22, 1919, and Jan. 21 to Feb. 20, 1920. Stage-discharge relation affected by ice Dec. 6-14 and Dec. 30, 1918, to Mar. 19, 1919, and Dec. 4, 1919, to Mar. 26, 1920; daily discharge based on gage heights corrected for effect of ice by means of discharge measurements, observer's notes, and weather records. Gage house wrecked by ice Mar. 26, 1920; gage put in operation, June 24. No record Mar. 21 to June 23.

Monthly discharge of Missisquoi River near Richford, Vt., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 445 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	7,870	565	2,180	4.90	5.65
November	6,720	698	1,610	3.62	4.04
December	4,160	770	1,500	3.37	3.88
January	2,100	185	948	2.13	2.46
February	400	230	298	.670	.70
March	5,520	480	1,940	4.36	5.03
April	8,000	925	2,650	5.96	6.65
May	2,340	424	1,110	2.49	2.87
June	2,240	176	402	.903	1.01
July	221	77	130	.292	.34
August	383	28	173	.389	.45
September	4,160	155	870	1.96	2.19
The year	8,000	28	1,150	2.58	35.27
1919–20.					
October	5,040	282	1,450	3.26	3.76
November	7,740	800	2,020	4.54	5.06
December	2,800	300	1,070	2.40	2.77
January	.....	.....	210	.472	.54
February	.....	.....	154	.346	.37
March 1–20	2,800	88	1,030	2.31	1.72
June 24–30	1,360	115	340	.764	.20
July	3,170	221	854	1.92	2.21
August	800	93	215	.483	.56
September	1,060	115	377	.847	.94

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 to September 30, 1920.

GAGES.—Gurley 7-day 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 E. C. Rogers during 1919 and by F. R. Sherwell during 1920.

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 from water-stage recorder, during year ending September 30, 1919, 3.77 feet at 7.45 a. m. November 2 (discharge, 1,360 second-feet); minimum stage from water-stage recorder, 1.70 feet at 4 a. m. September 1 (discharge from extension of rating curve, about 20 second-feet).

Minimum stage from water-stage recorder during period May 24 to September 30, 1920, 1.53 feet at 2 p. m. June 13 (discharge from extension of rating curve, about 10 second-feet).

1909–1920: 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 1.53 feet at 2 p. m. June 13, 1920 (discharge from extension of rating curve, about 10 second-feet).

ICE.—Ice usually covers large boulders below gage during greater part of winter causing some backwater at the gage. Probably no effect from ice during winter of 1918–19.

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, except when affected by ice; individual current-meter measurements occasionally plot erratically, probably because of rough measuring section. Rating curve fairly well defined. Operation of water-stage recorder unsatisfactory during a part of the year 1919, as indicated in footnote to daily discharge table. Daily discharge ascertained by applying mean daily gage height to rating table, using observer's reading chain gage when recorder was not in operation. Records fair prior to September 30, 1919, and good since May 24, 1920.

Discharge measurements of Clyde River at West Derby, Vt., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage Height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Dec. 1	R. H. Suttie	2.68	335	June 23	R. H. Suttie	2.52	240
1919.				1920.			
Jan. 17	H. W. Fear	2.43	227	June 25	M. R. Stackpole	2.28	144
Feb. 25	M. R. Stackpole	2.30	153				

Daily discharge, in second-feet, of Clyde River at West Derby, Vt., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	532	1,280	328	264	.....	138	540	740	232	227	79	31
2	515	1,330	328	259	.....	93	523	740	259	227	113	44
3	490	1,300	340	264	.....	134	482	740	141	225	123	62
4	437	1,030	328	304	.....	145	482	710	196	225	128	60
5	374	850	292	300	.....	160	523	565	232	225	128	60
6	523	610	292	280	.....	182	523	760	232	225	107	71
7	684	540	260	260	.....	227	540	565	254	225	167	66
8	800	557	260	238	.....	218	655	482	238	227	298	60
9	910	557	240	227	.....	243	.....	498	254	164	218	62
10	498	702	220	220	.....	243	.....	445	269	81	128	48
11	628	684	210	220	.....	222	.....	482	238	85	113	64
12	655	548	190	220	.....	222	.....	467	191	99	182	220
13	565	490	170	215	.....	243	.....	374	164	81	81	200
14	548	467	170	210	.....	232	.....	482	149	113	53	280
15	374	440	149	210	.....	204	.....	280	182	128	50	390
16	310	415	152	210	.....	182	.....	310	145	120	44	350
17	540	415	213	204	.....	204	.....	320	138	113	44	340
18	674	430	367	204	.....	213	.....	330	128	91	53	290
19	565	437	353	204	.....	218	.....	340	91	85	44	240
20	225	380	340	204	.....	254	.....	353	81	83	37	220
21	227	318	298	204	.....	387	.....	374	81	83	37	180
22	340	259	298	145	.....	565	.....	400	105	85	50	190
23	400	298	275	145	.....	540	.....	498	204	93	51	230
24	445	310	286	152	.....	523	.....	482	238	102	51	200
25	353	394	380	150	138	523	.....	445	227	107	51	190
26	340	365	360	150	145	482	.....	422	204	67	60	60
27	353	340	360	150	145	482	637	422	191	67	60	220
28	540	340	394	145	145	523	523	415	145	67	160	60
29	374	350	400	145	.....	583	565	407	71	57	248	60
30	583	350	350	145	.....	583	702	310	167	62	200	200
31	1,100	.....	300	145	.....	583	.....	259	.....	69	145	.....

Daily discharge, in second-feet, of Clyde River at West Derby, Vt., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1920.						1920.					
1	.....	248	152	91	187	16	.....	145	222	200	64
2	.....	227	175	74	93	17	.....	160	222	191	126
3	.....	254	175	116	51	18	.....	156	99	200	254
4	.....	269	238	175	62	19	.....	131	119	204	232
5	.....	248	280	204	53	20	.....	134	145	200	232
6	.....	232	264	204	99	21	.....	138	152	191	238
7	.....	248	238	175	182	22	.....	145	164	191	227
8	.....	232	227	138	182	23	.....	145	191	96	213
9	.....	243	204	83	182	24	340	141	238	58	209
10	.....	238	227	67	182	25	334	128	204	56	209
11	.....	116	243	53	182	26	328	47	196	53	196
12	.....	62	248	51	187	27	316	57	196	58	113
13	.....	43	222	46	116	28	286	113	191	126	152
14	.....	35	218	102	71	29	286	145	204	178	187
15	.....	102	213	204	60	30	275	141	209	182	187
						31	259	.....	196	187	.....

NOTE.—Water-stage recorder not in operation and discharge estimated Oct. 8, 20, 23; Nov. 1–2, 15, 26, 29, 30; Dec. 7–14, and 29–31, 1918; Jan. 5–7, 10–16, 25–31; May 17, 18, 22; July 3–7, 16; Aug. 15, 22, 30; and Sept. 7–30, 1919 (chain gage read once daily).

Monthly discharge of Clyde River at West Derby, Vt., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 150 square miles.]

Month.	Discharge in second-feet.				Run-off in inches.
	Maximum.	Minimum.	Mean.	Per square mile.	
1918–19.					
October	1,100	225	513	3.42	3.94
November	1,330	259	560	3.73	4.16
December	400	149	287	1.91	2.20
January	304	145	206	1.37	1.58
February	.....	.....	110	.733	.76
March	583	93	315	2.10	2.42
April	.....	.....	751	5.01	5.59
May	760	259	465	3.10	3.57
June	269	71	182	1.21	1.35
July	227	57	126	.840	.97
August	298	37	107	.713	.82
September	390	31	158	1.05	1.17
The year	1,330	31	316	2.11	28.53
1920.					
May 24–31	340	259	303	2.02	.60
June	269	35	157	1.05	1.17
July	280	99	202	1.34	1.54
August	204	46	134	.893	1.03
September	254	51	158	1.05	1.17

NOTE.—Discharge Feb. 1–24, 1919, estimated 105 second-feet, and Apr. 9–26, 1919, 880 second-feet.

MISCELLANEOUS MEASUREMENTS.

Miscellaneous measurements in St. Lawrence River drainage basin during the years ending Sept. 30, 1919 and 1920.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1920. Jan. 7	Genesee River	Lake Ontario	South Park, Rochester, N. Y.		385
1918. Nov. 19	Canaseraga Creek	Genesee River	Hermitage Farm Bridge, N. Y.	6.55	245
19	do	do	do	6.61	258
19	do	do	do	6.65	267
1920. Mar. 17	East mill race	do	Court Street, Rochester, N. Y.	[a]508.35	448
19	do	do	do	[a]507.60	424
20	do	do	do	[a]505.88	357
22	do	do	do	[a]505.18	339
Apr. 23	do	do	do	[a]504.11	274
24	do	do	do	[a]504.25	245
26	do	do	do	[a]504.25	253
28	do	do	do	[a]504.41	250
May 4	do	do	do	[a]505.44	515
Mar. 19	West mill race	do	do	[a]507.70	118
Apr. 23	do	do	do	[a]504.11	314
24	do	do	do	[a]504.25	299
26	do	do	do	[a]504.25	340
28	do	do	do	[a]504.38	339
May 4	do	do	do	[a]505.47	329
1919. June 9	Erie Canal	Lake Ontario	South Greece, N. Y		532
9	do	do	do		454
20	do	do	do		431
Sept. 9	do	do	Macedon, N. Y		150
1920. May 15	do	do	South Greece, N. Y		10
21	do	do	do	9.00	136
June 24	do	do	do		135
Sept. 1	do	do	do	9.05	77
1919. Sept. 8	Barge Canal	do	Lockport, N. Y.		1,130
8	do	do	do		1,280
30	do	do	do		1,360
30	do	do	do		1,270
8	do	do	Holley, N. Y	11.53	746
8	do	do	do	[a]11.52	722
29	do	do	do	11.66	705
30	do	do	do	11.69	699
30	do	do	do	11.69	708
8	do	do	Medina, N. Y	11.26	1,000
9	do	do	do	11.26	1,020
30	do	do	do		1,100
30	do	do	do		1,140
9	do	do	West Guard Lock, N.Y	2.38	433
1920. May 15	West Branch of St. Regis River.	St. Regis River	Winthrop, N. Y		708

[a] Barge Canal datnm.

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