69TH CONGRESS, 1st Session } HOUSE OF REPRESENTATIVES { DOCUMENT No. 79

DEPARTMENT OF THE INTERIOR
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

Water-Supply Paper 585

SURFACE WATER SUPPLY OF THE UNITED STATES

1924

PART V. HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS

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Prepared in cooperation with the States of
NORTH DAKOTA, MINNESOTA, WISCONSIN, IOWA
ILLINOIS, and MISSOURI

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON
1928

ADDITIONAL COPIES

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SURFACE WATER SUPPLY OF HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS, 1924

AUTHORIZATION AND SCOPE OF WORK

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

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

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

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

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

Annual appropriations for the fiscal years ending June 30, 1895–1925

1895	$12,500.00
1896	[1] 24,500.00
1897 to 1899, inclusive	50,000.00
1900	[2] 70,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10
1920	175,000.00
1921 to 1923, inclusive	180,000.00
1924 to 1925, inclusive	170,000.00

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 10.

Measurements of stream flow have been made at about 4,990 points in the United States and also at many points in Alaska and

[1] Includes $4,500 appropriated in act of Apr. 25, 1896.
[2] Includes $20,000 appropriated in deficiency act of Mar. 30, 1900.

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

DEFINITION OF TERMS

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, and acre-feet. They may be defined as follows:

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

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

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

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

The following terms not in common use are here defined:

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

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

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

EXPLANATION OF DATA

The data presented in this report cover the year ending September 30, 1924. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consists 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

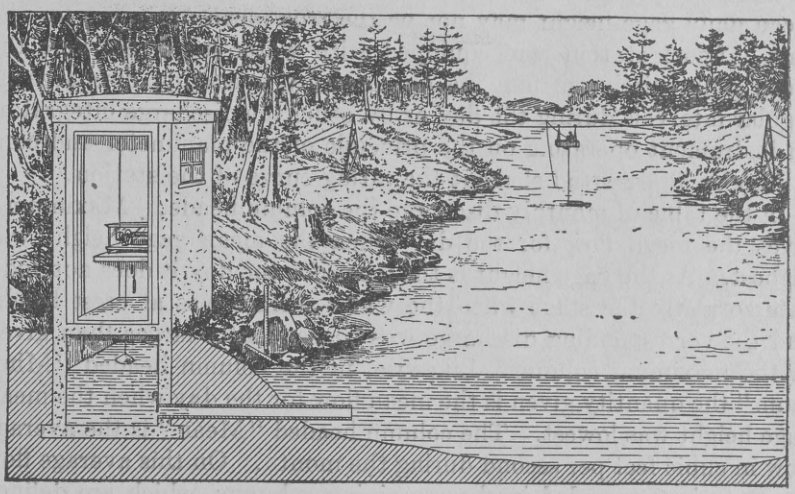

FIGURE 1.—Typical gaging station

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. The general methods are outlined in standard textbooks on the measurement of river discharge. A typical gaging station, equipped with water-stage recorder and measuring cable and car, is shown in Figure 1.

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

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

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

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

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuations the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging discharge at regular intervals during the day or by using the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

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

ACCURACY OF FIELD DATA AND COMPUTED RESULTS

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

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

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

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

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

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

PUBLICATIONS

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, ground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the monographs, bulletins, professional papers, and annual reports.

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

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins in three parts:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

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

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

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

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

Boston, Mass., 2500 Customhouse.
Albany, N. Y., 21 Washington Avenue.
Trenton, N. J., Statehouse.
Charlottesville, Va., care of University of Virginia.
Asheville, N. C., 316 Jackson Building.
Chattanooga, Tenn., 830 Power Building.
Columbus, Ohio, Engineering Experiment Station, Ohio State University.
Chicago, Ill., 1510 Consumers Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Rolla, Mo., Rolla Building, School of Mines and Metallurgy.
Helena, Mont., 45–46 Federal Building.
Denver, Colo., 403 Post Office Building.
Salt Lake City, Utah, 313 Federal Building.
Idaho Fall, Idaho, 228 Federal Building.
Boise, Idaho, Federal Building.
Tacoma, Wash., 404 Federal Building.
Portland, Oreg., 606 Post Office Building.
San Francisco, Calif., 303 Customhouse.
Los Angeles, Calif., 600 Federal Building.
Tucson, Ariz., 106 College of Law Building, University of Arizona.
Austin, Tex., State Capitol.
Honolulu, Hawaii, Territorial Office Building.

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

Stream-flow records have been obtained at about 5,800 points in the United States, and the data obtained have been published in the reports tabulated below.

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

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

Report	Character of data	Year
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to September, 1890.
12th A, pt. 2	do	1884 to June 30 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Description, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measuremets, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907 and 1908.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.
W 431 to 444	do	1916.
W 451 to 464	do	1917.
W 471 to 484	do	1918.
W 501 to 514	do	1919 and 1920.
W 521 to 534	do	1921.
W 541 to 554	do	1922.
W 561 to 574	do	1923.
W 581 to 594	do	1924.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

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

Numbers of water-supply papers containing results of stream measurements, 1899–1924

[For basins included, see p. 6]

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												A	B	C
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125 [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202 [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	215	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918	471	472	473	474	475	476	477	478	479	480	481	482	483	484
1919–20	501	502	503	504	505	506	507	508	509	510	511	512	513	514
1921	521	522	523	524	525	526	527	528	529	530	531	532	533	534
1922	541	542	543	544	545	546	547	548	549	550	551	552	553	554
1923	561	562	563	564	565	566	567	568	569	570	571	572	573	574
1924	581	582	583	584	585	586	587	588	589	590	591	592	593	594

[a] Rating tables and index to Water-supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison Rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern Rivers and south Pacific slope basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill Rivers to James River.
[i] Scioto River.
[j] Loup and Platte Rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries of St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas Rivers.
[r] Great Basin in California except Truckee and Carson River basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz Rivers only.

COOPERATION

In Montana the work was carried on in cooperation with the United States Bureau of Reclamation. With the exception of the station on St. Mary River near Babb, all stations in Montana were maintained jointly with the Reclamation Service, Department of the Interior, Canada.

In North Dakota the work was carried on in cooperation with the State engineer.

In Minnesota the work was carried on in the Red River drainage basin in cooperation with the Minnesota State Drainage Commission, E. V. Willard, commissioner, and with the United States Weather Bureau (Mississippi River at St. Paul and Minnesota River near Mankato) and United States Engineer Corps (Mississippi River at Elk River and Minnesota River near Montevideo).

In Wisconsin the work was done in cooperation with the Railroad Commission of Wisconsin, C. M. Larson, chief engineer, and with Northern States Power Co. (Red Cedar River near Colfax, Red Cedar River at Menomonie, St Croix River near Grantsburg, St. Croix River near Rush City).

In Iowa the work was carried on in cooperation with the State Geological Survey, George F. Kay, director; Iowa Highway Commission, F. R. White, chief engineer; and Mississippi River Power Co., of Keokuk, Iowa, Albion Davis, hydraulic engineer.

The United States Weather Bureau paid the salaries of gage observers for stations on Cedar River at Cedar Rapids and part of the salaries of observers for stations on Des Moines River near Boone and Tracy, and Raccoon River at Van Meter. The Interstate Power Co., of Chicago, paid the salary of the observer for the station on upper Iowa River near Decorah.

In Illinois work was carried on in cooperation with the Illinois Department of Public Works and Buildings, division of waterways, W. L. Sackett, superintendent. The Central Illinois Public Service Co. paid the salary of the observer on South Fork of Sangamon River at power plant near Taylorville.

In Missouri the work was carried on in cooperation with the Missouri Bureau of Geology and Mines, through H. A. Buehler, State geologist.

DIVISION OF WORK

The data for stations in the Hudson Bay basin in Montana and North Dakota were collected and prepared for publication under the direction of W. A. Lamb, district engineer, assisted by E. F. Chandler and A. H. Tuttle.

The data for stations in the Hudson Bay basin in Minnesota were collected and prepared for publication under the direction of S. B. Soulé, district engineer, and by E. F. Chandler, assisted by Ray V. Tilley and Richard B. Black.

The data for stations in the Mississippi River basin in Wisconsin and Minnesota were collected and prepared for publication under the direction of S. B. Soulé, district engineer, assisted by F. C. Christopherson and Edgar E. Foster.

The data for stations in the upper Mississippi River basin in Iowa were collected and prepared for publication under the direction of J. B. Spiegel, district engineer, assisted by Albion Davis, C. Herlofson, and P. L. Mercer.

The data for stations in the upper Mississippi River basin in Illinois were collected and prepared for publication under the direction of H. E. Grosbach, district engineer, assisted by A. M. Wahl.

The data for stations in the upper Mississippi River basin in Missouri were collected and prepared for publication under the direction of H. C. Beckman, district engineer, assisted by V. L. Austin, W. S. Frame, and H. H. Brittingham.

The manuscript was reviewed and assembled by J. W. Mangan.

GAGING-STATION RECORDS

HUDSON BAY DRAINAGE BASIN

ST. MARY RIVER NEAR BABB, MONT.

LOCATION.—In SE. ¼ sec. 27, T. 36 N., R. 14 W., above headworks of United States Bureau of Reclamation St. Mary Canal and 1 mile east of Babb, Glacier County, on Blackfeet Indian Reservation.

DRAINAGE AREA.—278 square miles (including area of Swiftcurrent Creek above point of diversion into St. Mary Lake); measured on topographic maps.

RECORDS AVAILABLE.—April 9, 1902, to September 30, 1924.

GAGE.—Stevens water-stage recorder on right bank 20 feet above diversion dam and referenced to staff gage which reads head over crest; read by Wm. J. Dorrington and J. L. Bassett.

DISCHARGE MEASUREMENTS.—Made from a cable 500 feet above dam. Flow of canal subtracted to obtain flow over dam during irrigation season.

CHANNEL AND CONTROL.—Banks high and not subject to overflow. Concrete diversion works for St. Mary Canal form control.

EXTREMES OF DISCHARGE.—Maximum discharge, 2,790 second-feet May 19 (includes discharge of the canal); minimum stage, 0.30 foot January 1–22 (discharge, 86 second-feet).

1902–1924: Maximum stage recorded, estimated at 9.4 feet June 5, 1908 (discharge, 7,980 second-feet); minimum discharge, 30 second-feet April 3–7, 1904.

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

DIVERSIONS.—Intake for United States Bureau of Reclamation canal located at left end of diversion dam. Tables of daily and monthly discharge include the discharge of St. Mary Canal.

REGULATION.—Natural storage in St. Mary Lake. Swiftcurrent Creek is diverted into St. Mary Lake, and the flow is regulated by gate operations at Sherburne Lake Reservoir.

ACCURACY.—Stage-discharge relation probably permanent; affected by ice February 18 to March 31. Rating curve well defined above 300 second-feet. Daily gage height obtained from graph of water-stage recorder October 1 to 29; May 1 to September 30. Staff gage readings to hundredths once daily used October 30 to April 30. Daily discharge ascertained by applying daily gage height to rating table and adding flow in canal for days during which canal was in operation. Records good.

The diversion dam below the gaging station was constructed by the United States Bureau of Reclamation for the purpose of diverting water from St. Mary River into St. Mary Canal, which carries the water across the divide into North Fork of Milk River. The water then flows in the channel of Milk River through Canada and is finally used for irrigation in the Milk River Valley in Montana. The present capacity of the diversion canal is about 600 second-feet. A storage reservoir is provided on Swiftcurrent Creek by a dam at the outlet of Sherburne Lake. By means of a diversion channel connecting Swiftcurrent Creek and Lower St. Mary Lake, the run-off from Swiftcurrent Creek is made available for diversion through St. Mary Canal.

Discharge measurements of St. Mary River near Babb, Mont., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
May 12	0.94	475	July 19	1.25	976	Sept. 15	0.75	358
June 13	1.64	1,620	Aug. 19	.72	348			

NOTE.—The above figures show flow over diversion dam.

Daily discharge, in second-feet, of St. Mary River near Babb, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Apr.	May	June	July	Aug.	Sept.
1	369	328	190	86	156	134	306	1,370	1,930	1,090	692
2	344	313	190	86	168	134	306	1,350	1,950	1,040	669
3	313	313	179	86	179	134	353	1,400	2,060	1,080	654
4	291	313	179	86	179	134	446	1,550	2,210	1,130	646
5	276	313	179	86	190	134	631	1,640	2,300	1,100	642
6	276	298	168	86	190	145	816	1,640	2,390	1,040	642
7	291	298	179	86	190	156	898	1,980	2,350	1,000	685
8	361	284	190	86	179	156	954	2,040	2,260	1,100	553
9	385	284	179	86	179	228	945	2,080	2,170	1,090	542
10	464	269	179	86	190	228	1,060	2,060	2,010	1,050	516

Daily discharge, in second-feet, of St. Mary River near Babb, Mont., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Apr.	May	June	July	Aug.	Sept.
11	473	241	168	86	190	179	1,170	1,950	1,950	1,030	466
12	482	228	156	86	203	179	1,360	1,900	1,930	1,000	479
13	491	228	145	86	203	203	1,520	1,940	1,860	992	410
14	491	228	145	86	216	216	1,760	2,110	1,830	983	385
15	491	228	145	86	216	216	1,950	2,280	1,760	1,020	369
16	473	228	134	86	216	228	2,200	2,470	1,700	1,020	369
17	464	228	134	86	216	228	2,460	2,580	1,620	986	361
18	455	216	134	86	-------	228	2,720	2,650	1,640	1,000	361
19	446	203	134	86	-------	228	2,790	2,620	1,600	957	353
20	437	190	134	86	-------	228	2,470	2,530	1,550	986	361
21	419	190	134	86	-------	228	2,160	2,390	1,530	1,010	344
22	428	190	134	86	-------	241	1,980	2,300	1,550	1,020	328
23	410	190	134	105	-------	241	1,940	2,170	1,550	1,040	328
24	402	190	134	105	-------	241	1,830	2,040	1,520	962	321
25	402	190	134	105	-------	254	1,830	1,930	1,480	828	306
26	394	190	134	105	-------	254	1,830	1,850	1,460	757	306
27	385	190	124	115	-------	284	1,820	1,810	1,440	751	298
28	377	190	115	124	-------	284	1,760	1,830	1,410	774	291
29	402	190	105	134	-------	298	1,680	1,870	1,320	747	284
30	328	190	96	145	-------	298	1,550	1,810	1,220	744	298
31	328	-------	96	145	-------	-------	1,420	-------	1,130	709	-------

Monthly discharge of St. Mary River near Babb, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	491	276	398	24,500
November	328	190	238	14,200
December	190	96	148	9,100
January	145	86	96.0	5,900
February 1-17	216	156	192	6,480
April	298	134	211	12,600
May	2,790	306	1,510	92,800
June	2,650	1,350	2,000	119,000
July	2,390	1,130	1,760	108,000
August	1,130	709	969	59,600
September	692	284	442	26,300

ST. MARY RIVER NEAR KIMBALL, ALBERTA

LOCATION.—In SW. ¼ sec. 25, T. 1 N., R. 25 W. fourth meridian, 1 mile south and 1 mile west of Kimball, Alberta, and 5 miles north of international boundary.

DRAINAGE AREA.—472 square miles (measured on topographic map).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1924. September 1, 1902, to December 31, 1912, records were obtained at point half a mile north of boundary line. Records were also obtained by the irrigation branch, Department of Interior, Canada, at a point half a mile below present station, from 1905 to 1912. Discharge at the three points practically the same.

GAGE.—Stevens continuous water-stage recorder on right bank used during open-water season. During winter chain gage on highway bridge 3 miles below station. Gages to different data. Read by W. Nicolls.

DISCHARGE MEASUREMENTS.—Made from cable 1,200 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed of stream at gage and at control is composed of boulders and sandstone ledges. Control formed by an outcropping ledge

of sandstone covered with boulders near left bank; subject to occasional shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.25 feet at 11.30 a. m. June 17 (discharge, 3,030 second-feet); minimum discharge, 82 second-feet January 5 (stage-discharge relation affected by ice).

1902–1924: Maximum discharge, 18,000 second-feet June 5, 1908 (estimated by comparison with record for station near Babb); minimum discharge, 46 second-feet December 1, 1919 (stage-discharge relation affected by ice).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—St. Mary Canal diverts water from St. Mary River near Babb, Mont., to North Fork of Milk River. Alberta Railway & Irrigation Co.'s canal diverts from St. Mary River 2 miles below station.

REGULATION.—Flow of Swiftcurrent Creek regulated by Sherburne Lake Reservoir.

ACCURACY.—Stage-discharge relation not permanent; affected by ice November 20 to April 6. Rating curves well defined. Operation of water-stage recorder satisfactory October 1 to November 19 and April 17 to September 30. Chain gage read to hundredths once or twice daily November 20 to April 16. Shifting-control method used July 7 to September 20. Daily discharge determined by applying to rating table mean daily gage height and, if necessary, proper correction for ice and shifting control. Records for open channel good; winter records fair.

COOPERATION.—Maintained in cooperation with Department of Interior, Canada.

Discharge measurements of St. Mary River near Kimball, Alberta, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 1	2.71	370	Jan. 22	[a b] 5.15	124	June 15	5.12	2,900
Oct. 25	2.93	487	Feb. 11	[a b] 5.40	216	June 23	4.89	2,500
Do	[a] 3.42	104	Feb. 15	[a b] 5.52	235	July 16	4.14	1,440
Nov. 19	[a] 3.88	226	Mar. 8	[a b] 4.91	146	Aug. 2	[a] 3.20	64
Do	2.35	226	Mar. 28	[a b] 4.44	129	Aug. 13	3.15	555
Dec. 6	[a b] 3.79	165	Apr. 17	2.58	307	Aug. 19	3.10	515
Dec. 21	[a b] 3.82	122	Apr. 26	2.60	351	Aug. 20	[a] 3.20	63
Do	[a b] 3.80	109	May 7	3.74	1,130	Sept. 16	[a] 2.99	33.1
Jan. 3	[a b] 5.14	91	May 15	4.61	2,110	Sept. 25	[a] 2.96	27.8
Do	[a b] 5.14	92	May 29	4.22	1,620	Do	2.60	326
Jan. 22	[a b] 5.15	122	June 11	4.83	2,330			

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

Daily discharge, in second-feet, of St. Mary River near Kimball, Alberta, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	379	490	163	88	189	166	251	421	1,280	1,970	604	456
2	355	473	163	88	198	160	300	427	1,280	1,970	555	427
3	334	467	163	92	201	160	353	508	1,370	2,110	567	392
4	312	410	163	83	204	160	400	657	1,570	2,270	637	370
5	298	375	163	82	207	140	400	818	1,630	2,340	624	362
6	285	355	166	88	207	150	560	958	1,680	2,390	592	352
7	277	334	163	88	207	140	722	1,070	2,660	2,290	555	379
8	521	316	160	88	201	147	649	1,140	2,920	2,190	664	397
9	758	309	158	88	204	142	617	1,160	2,890	2,060	699	359
10	780	295	155	88	211	142	437	1,100	2,660	1,940	657	401

Daily discharge, in second-feet, of St. Mary River near Kimball, Alberta, for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
11	758	292	152	88	214	140	437	1,230	2,440	1,880	604	397
12	765	295	152	88	221	140	410	1,410	2,440	1,760	579	392
13	765	288	152	88	224	134	410	1,660	2,510	1,630	555	461
14	772	284	152	90	231	134	357	1,890	2,600	1,570	561	444
15	742	277	152	90	235	130	383	2,070	2,790	1,480	618	427
16	720	260	155	90	228	130	331	2,340	2,930	1,440	618	416
17	713	267	155	98	214	127	323	2,620	2,980	1,370	598	401
18	692	264	150	90	207	130	316	2,740	2,950	1,300	561	406
19	657	225	147	109	204	134	320	2,810	2,950	1,260	502	406
20	644	192	137	118	201	130	326	2,450	2,760	1,190	502	392
21	618	174	122	120	201	134	323	2,100	2,630	1,100	484	379
22	573	174	118	122	201	130	344	1,940	2,580	1,130	467	375
23	549	174	111	124	201	130	352	1,890	2,450	1,140	490	362
24	513	174	102	130	198	132	341	1,770	2,230	1,140	513	352
25	496	177	92	132	195	140	337	1,770	2,070	1,090	461	334
26	490	177	88	137	189	134	330	1,810	1,970	1,040	392	337
27	519	174	88	140	174	127	326	1,740	1,930	967	370	334
28	531	174	88	147	163	130	352	1,630	1,930	915	410	323
29	531	171	88	155	155	130	384	1,590	1,960	810	456	312
30	519	163	88	166	-------	120	410	1,440	1,960	750	467	309
31	508	-------	88	180	-------	120	-------	1,340	-------	678	484	-------

Monthly discharge of St. Mary River near Kimball, Alberta, for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	780	277	560	34,400
November	490	163	273	16,200
December	166	88	135	8,300
January	180	82	109	6,700
February	235	155	203	11,700
March	166	120	138	8,480
April	722	251	393	23,400
May	2,810	421	1,560	95,900
June	2,980	1,280	2,300	137,000
July	2,390	678	1,520	93,500
August	699	370	543	33,400
September	461	309	382	22,700
The year	2,980	82	678	492,000

ST. MARY CANAL AT INTAKE, NEAR BABB, MONT.

LOCATION.—In NW. ¼ sec. 27, T. 36 N., R. 14 W., 600 feet below intake of canal on Blackfeet Indian Reservation, 1 mile east of Babb, Glacier County.

RECORDS AVAILABLE.—June 1, 1918, to September 30, 1924.

GAGE.—Gurley printing water-stage recorder on right bank, installed April 17, 1919; inspected by ditch rider of canal.

DISCHARGE MEASUREMENTS.—Made from cable near gage.

ACCURACY.—Stage-discharge relation permanent during period. Rating curve well defined above 40 second-feet. Gage read to hundredths once or twice daily. Operation of water-stage recorder unsatisfactory and used only as observer's check. Daily discharge ascertained by applying mean daily gage height to rating table, except September 11 when discharge was interpolated. Records fair.

COOPERATION.—Station maintained in cooperation with Department of Interior, Canada.

St. Mary Canal diverts water from west bank of St. Mary River, near Babb, Mont., and discharges into North Fork of Milk River. The water then flows in the natural channel of Milk River through Canada and is finally used for irrigation in Milk River Valley east of Havre, Mont. Water may be returned to St. Mary River at St. Mary crossing.

Discharge measurements of St. Mary Canal at intake, near Babb, Mont., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
May 5	1.73	54	May 27	5.80	497	Aug. 9	6.00	537
May 7	1.90	59	June 18	4.90	339	Aug. 21	7.50	738
May 11	4.03	253	July 17	6.15	505	Sept. 10	3.35	171
May 13	4.54	313	July 31	6.59	595			

Daily discharge, in second-feet, of St. Mary Canal at intake, near Babb, Mont , for the year ending September 30, 1924

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1	-------	464	344	604	348	16	357	357	500	570	-------
2	-------	461	344	608	348	17	367	357	530	567	-------
3	-------	458	344	612	348	18	430	357	564	585	-------
4	-------	461	348	600	348	19	472	355	588	604	-------
5	61	461	349	579	344	20	471	354	609	658	-------
6	61	475	349	567	344	21	475	351	642	708	-------
7	62	489	349	567	341	22	471	351	677	722	-------
8	62	284	346	574	240	22	471	349	638	714	-------
9	70	285	348	570	236	24	481	348	591	609	-------
10	214	280	344	570	172	25	478	344	574	507	-------
11	244	280	341	570	145	26	481	344	572	481	-------
12	300	273	380	567	118	27	489	344	567	475	-------
13	305	273	451	564	-------	28	478	341	567	461	-------
14	305	351	478	564	-------	29	478	344	564	411	-------
15	357	354	485	570	-------	30	467	344	561	383	-------
						31	461	-------	560	348	-------

Monthly discharge of St. Mary Canal at intake, near Babb, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 5-31	489	61	347	18,600
June	489	273	363	21,600
July	677	341	481	29,600
August	722	348	564	34,700
September 1-12	348	118	278	6,620

ST. MARY CANAL AT ST. MARY CROSSING, NEAR BABB, MONT.

LOCATION.—In NE. ¼ sec. 30, T. 37 N., R. 13 W. Montana meridian, 500 feet east of outlet of St. Mary River siphon, 10 miles below intake and 9 miles north of Babb, Glacier County.

RECORDS AVAILABLE.—July 6, 1918, to September 30, 1924 (irrigation seasons only).

GAGE.—Stevens continuous water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from cable near gage.

CHANNEL AND CONTROL.—Control is located at entrance of steel flumes. May shift due to silting of canal.

ACCURACY.—Stage-discharge relation probably permanent during period. Rating curve well defined above 20 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Data collected and compiled jointly with Department of Interior, Canada.

Discharge measurements of St. Mary Canal at St. Mary Crossing, near Babb, Mont., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
May 7	1.32	38.9	June 17	3.65	300	Aug. 21	4.94	542
May 11	2.97	186	July 4	3.58	289	Aug. 22	5.02	564
May 13	3.33	250	July 16	4.30	406	Sept. 9	2.79	173
May 26	4.27	413	July 31	4.53	468	Sept. 10	2.42	130
June 14	3.64	303	Aug. 12	4.54	451	Sept. 13	.92	23.2

Daily discharge, in second-feet, of St. Mary Canal at St. Mary crossing, near Babb, Mont., for the year ending September 30, 1924

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1	-------	390	284	495	265	16	289	306	420	461	2.0
2	10.5	391	284	499	263	17	309	299	435	459	-------
3	38	391	286	501	260	18	354	299	449	465	-------
4	40.5	390	289	499	258	19	386	302	479	495	-------
5	41	391	289	477	257	20	395	300	507	525	-------
6	42	407	290	467	256	21	401	299	525	537	-------
7	41	382	290	467	221	22	399	302	537	557	-------
8	41.5	270	287	471	178	23	399	297	533	559	-------
9	66	260	287	469	171	24	407	294	495	513	-------
10	162	245	284	465	131	25	407	290	477	420	-------
11	204	239	282	465	99	26	410	289	469	393	-------
12	242	238	295	463	94	27	418	287	467	386	-------
13	250	239	365	461	31.6	28	407	287	469	365	-------
14	257	299	397	461	10.0	29	401	287	467	328	-------
15	292	304	408	463	8.8	30	395	286	467	295	-------
						31	391	-------	467	268	-------

Monthly discharge of St. Mary Canal at St. Mary crossing, near Babb, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 2-31	418	10.5	263	15,600
June	407	238	309	18,400
July	537	282	396	24,300
August	559	268	456	28,000
September 1-16	265	2.0	157	4,980

ST. MARY CANAL AT HUDSON BAY DIVIDE, NEAR BROWNING MONT.

LOCATION.—In sec. 5, T. 37 N., R. 11 W., 3 miles above canal outlet, 30 miles north of Browning, Glacier County, on Blackfeet Indian Reservation.

RECORDS AVAILABLE.—July 3, 1917, to September 30, 1924 (irrigation seasons only).

GAGE.—Stevens continuous water-stage recorder on right bank 50 feet above first drop in canal.

DISCHARGE MEASUREMENTS.—Made from cable 500 feet above gage.

CHANNEL AND CONTROL.—Canal uniform in section. Control is V-shaped notch in concrete drop just below gage.

ACCURACY.—Stage-discharge relation permanent during period. Rating curve well defined above 30 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying mean daily gage height to rating table, except May 5, 10, and September 13, when discharge was determined by hourly method. Records good.

COOPERATION.—Data collected and compiled jointly with Department of Interior Canada.

Discharge measurements of St. Mary Canal at Hudson Bay divide near Browning, Mont., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
May 6	2.42	45.2	June 15	5.13	300	Aug. 22	6.34	531
May 12	4.46	221	July 19	5.96	478	Aug. 25	6.06	482
May 14	4.73	264	Aug. 13	6.00	456	Sept. 11	3.67	136
June 12	4.70	249						

Daily discharge, in second-feet, of St. Mary Canal at Hudson Bay divide, near Browning, Mont., for the year ending September 30, 1924

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1	-------	395	296	475	304	16	298	309	410	469	8.8
2	-------	393	294	488	301	17	301	315	423	473	5.0
3	-------	391	293	490	296	18	325	307	440	467	3.4
4	-------	400	296	499	296	19	363	312	458	475	2.2
5	54	395	298	494	296	20	391	315	482	501	1.2
6	47.6	398	304	480	294	21	400	310	498	522	.9
7	42	427	293	469	288	22	404	315	518	536	-------
8	42	377	296	478	237	23	402	312	522	541	-------
9	44	301	298	477	208	24	405	306	520	541	-------
10	84	272	292	473	184	25	409	302	490	492	-------
11	171	255	290	471	138	26	409	302	475	427	-------
12	216	252	288	471	114	27	416	294	469	407	-------
13	249	249	317	467	100	28	409	298	473	400	-------
14	259	266	372	469	40.8	29	409	298	467	377	-------
15	280	304	405	467	16.6	30	402	296	467	342	-------
						31	398	-------	467	315	-------

NOTE.—No recorder records June 3, 4, 16, and July 23; discharge determined from observer's daily readings.

Monthly discharge of St. Mary Canal at Hudson Bay divide, near Browning, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 5-31	416	42	283	15,200
June	427	249	322	19,200
July	522	288	394	24,200
August	541	315	466	28,700
Sept. 1-21	304	.0	149	6,210

SWIFTCURRENT CREEK AT MANY GLACIER, MONT.

LOCATION.—In sec. 12, T. 35 N., R. 16 W., at outlet of McDermott Lake at Many Glacier, Glacier County, in Glacier National Park, 14 miles southwest of Babb.

DRAINAGE AREA.—31.4 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 6, 1912, to September 30, 1924 (irrigation seasons only).

GAGE.—Stevens continuous water-stage recorder on right bank installed June 15 1918; inspected by C. N. McGillis and others.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet below gage or by wading.

CHANNEL AND CONTROL.—Limestone outcrop at outlet of lake forms control; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.00 feet at 2 p. m. May 16 (discharge, 771 second-feet); minimum stage during period 1.40 feet March 29 to April 5 (discharge, 13 second-feet).

1912–1924: Maximum stage recorded, 4.75 feet June 17, 1916 (discharge, 1,550 second-feet); minimum stage, 1.22 feet November 6–7, 1921 (discharge, 10 second-feet).

ICE.—Not operated during winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly during winter. Rating curves well defined between 35 and 700 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily discharge table. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Data collected and compiled jointly with Department of Interior, Canada.

Discharge measurements of Swiftcurrent Creek at Many Glacier, Mont., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
May 6	2.51	245	July 4	3.19	470	Aug. 22	2.17	144
May 13	3.42	579	July 14	2.42	224	Aug. 27	2.11	136
May 27	2.91	380	July 17	2.32	193	Sept. 13	1.78	50
June 13	3.51	585	Aug. 12	2.13	137	Do	1.78	53
June 17	3.53	612						

NOTE.—Recorder not operating Mar. 23 to May 5, May 11, 12, 15–19, 27, 31, June 1, 2, 7–12, 18–25, July 3, 9–16, 21–26, Aug. 7–21, 27, 31, Sept. 1–3, and 12–14. Discharge determined from staff gage readings to hundredths once daily.

Daily discharge, in second-feet, of Swiftcurrent Creek at Many Glacier, Mont., for the year ending September 30, 1924

Day	Oct.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	36.6		13.6	85	344	375	135	71
2	36.6		14.2	146	427	424	130	71
3	36.6		17.2	229	399	434	127	71
4	36.6		14.2	368	402	480	135	76
5	35.5		13.0	321	399	472	120	80
6	34.4		13.6	265	375	466	102	92
7	38.8		19	223	519	462	100	95
8	98		27	226	512	262	135	85
9	191		32	301	361	248	135	80
10	159		32	347	354	248	135	80

Daily discharge, in second-feet, of Swiftcurrent Creek at Many Glacier, Mont., for the year ending September 30, 1924—Continued

Day	Oct.	Mar.	Apr.	May	June	July	Aug.	Sept.
11	123	--------	37	455	424	281	135	69
12	98	--------	50	541	541	248	132	55
13	82	--------	66	555	587	216	130	51
14	72	--------	71	555	631	216	130	51
15	69	--------	55	591	652	216	151	53
16	100	--------	55	771	645	201	146	55
17	120	--------	46	753	591	189	154	55
18	70	--------	46	609	533	163	146	51
19	60	--------	46	523	494	163	140	50
20	53	--------	55	430	515	149	151	46.0
21	53	--------	46	396	494	140	163	37.0
22	56	--------	44	434	344	163	146	31.0
23	60	16.0	66	444	318	140	135	27.0
24	50	13.6	66	430	288	130	127	25.4
25	50	14.8	66	519	298	135	124	23.8
26	50	14.8	78	483	321	163	124	31.0
27	50	14.8	85	382	354	180	127	27.0
28	42.5	13.6	90	311	388	177	132	27.0
29	42.5	13.0	73	262	347	177	122	26.2
30	42.5	13.6	62	248	361	157	100	26.2
31	42.5	13.6	--------	278	--------	146	85	--------

Monthly discharge of Swiftcurrent Creek at Many Glacier, Mont., for the year ending September 30, 1924

[Drainage area, 31.4 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	191	34.4	67.4	2.15	2.48	4,140
March 23–31	16.0	13.0	14.2	.45	.15	254
April	90	13.0	46.6	1.48	1.65	2,770
May	771	85	403	12.8	14.76	24,800
June	652	288	441	14.0	15.62	26,000
July	480	135	246	7.83	9.03	15,100
August	163	85	131	4.17	4.81	8,060
September	95	23.8	54.0	1.72	1.92	3,210

SWIFTCURRENT CREEK AT SHERBURNE, MONT.

LOCATION.—In sec. 35, T. 36 N., R. 15 W., 800 feet below spillway of Sherburne Lake dam at Sherburne, Glacier County.

DRAINAGE AREA.—64 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 1, 1912, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on left bank, installed May 18, 1921.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 450 feet above gage.

CHANNEL AND CONTROL.—An outcropping limestone ledge, somewhat broken and irregular, forms control; subject to slight shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.28 feet July 19 (discharge, 857 second-feet); minimum stage, 0.77 foot at 11 a. m. May 27 (discharge, 10.7 second-feet).

1912–1924: Maximum stage recorded, 7.85 feet June 17, 1916 (discharge, 2,280 second-feet); minimum discharge, no flow when gates were closed for several periods in 1918, 1919, 1920, 1921, and 1923.

DIVERSIONS.—None.

REGULATION.—Flow regulated by gate operations.

ACCURACY.—Stage-discharge relation changed slightly during winter. Rating curves well defined. Gage heights determined from graph of water-stage recorder October 1–31, May 1 to June 30, July 5–15, and July 18 to September 30. Observer's readings on staff gage to hundredths for intervening days. Daily discharge determined by hourly method October 8, 14–17, 19–21, May 19, 21, June 17, 19, 24, 28, August 23–24, 26, and September 10. Daily discharge determined by applying mean daily gage height to rating table for remainder of records. Records fair.

COOPERATION.—Data collected and compiled jointly with the Department of Interior, Canada.

Discharge measurements of Swiftcurrent Creek at Sherburne, Mont., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
May 6	3.75	354	July 16	4.83	685	Aug. 22	4.45	578
May 13	4.25	518	July 31	3.80	393	Sept. 13	1.98	85
July 4	4.98	749	Aug. 12	4.14	480			

Daily discharge, in second-feet, of Swiftcurrent Creek at Sherburne, Mont., for the year ending September 30, 1924

Day	Oct.	May	June	July	Aug.	Sept.	Day	Oct.	May	June	July	Aug.	Sept.
1	49.4	168	11.6	419	432	304	16	110	593	15.4	738	482	87
2	48.6	213	11.9	419	454	298	17	105	668	53	704	474	87
3	45.2	307	12.2	624	538	292	18	103	738	139	785	508	88
4	45.2	400	12.2	746	482	292	19	106	388	152	857	559	88
5	45.8	397	12.6	742	443	280	20	92	58	178	814	587	88
6	43.4	375	12.9	738	457	266	21	84	49.5	181	810	590	88
7	42.8	356	21.6	742	485	221	22	83	38.0	182	835	574	86
8	81	344	20.4	738	494	181	23	96	30.8	182	846	403	86
9	174	333	18.4	738	488	179	24	108	19.6	194	846	245	87
10	228	331	17.4	735	432	135	25	109	12.9	216	846	197	86
11	214	344	16.7	749	477	88	26	104	11.6	216	846	266	85
12	190	414	16.4	774	480	87	27	100	11.0	216	806	322	86
13	163	523	15.8	774	482	87	28	97	11.9	293	633	320	85
14	144	571	15.1	770	491	86	29	79	12.9	443	568	320	85
15	103	590	15.8	767	491	87	30	82	12.2	443	435	315	84
							31	84	11.6	------	414	311	------

Monthly discharge of Swiftcurrent Creek at Sherburne, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	228	42.8	102	6,270
May	738	11.0	269	16,500
June	443	11.6	111	6,600
July	857	414	718	44,200
August	590	197	440	27,100
September	304	84	139	8,270

CANYON CREEK NEAR MANY GLACIER, MONT.

LOCATION.—At edge of heavy timber area half a mile above mouth, in Glacier National Park, and 2 miles southeast of Many Glacier, Glacier County.

DRAINAGE AREA.—7 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 12, 1918, to September 30, 1924

GAGE.—Stevens continuous water-stage recorder on left bank.

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

CHANNEL AND CONTROL.—Bed of large boulders and cobblestones. Banks high and are not overflowed. Control is riffle 20 feet below gage; subject to shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.97 feet at 2 a. m. June 15 (discharge, 145 second-feet); minimum stage, 0.66 foot at 10 a. m. October 16 (discharge, 7.7 second-feet).

1918–1924: Maximum stage, 3.34 feet May 16, 1922 (discharge, estimated 500 second-feet); minimum stage, 0.56 foot October 4, 1919 (discharge. 3.3 second-feet).

ICE.—Station not operated during winter.

DIVERSIONS.—None.

REGULATION.—Some natural storage in small lake at head of creek.

ACCURACY.—Stage-discharge relation changed slightly during winter or during spring break-up. Rating curves fairly well defined. Operation of water-stage recorder satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, except for period of estimated discharge, for which they are fair.

COOPERATION.—Maintained in cooperation with Department of Interior, Canada,

Discharge measurements of Canyon Creek near Many Glacier, Mont., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
May 27	1.40	57	July 4	1.57	79	Aug. 12	1.05	23.7
June 13	1.82	121	July 14	1.19	34.3	Sept. 10	.85	12.4
June 18	1.69	94	Aug. 1	1.04	23.0	Sept. 14	.70	8.0

Daily discharge, in second-feet, of Canyon Creek near Many Glacier, Mont., for the year ending September 30, 1924

Day	Oct.	May	June	July	Aug.	Sept.	Day	Oct.	May	June	July	Aug.	Sept.
1	8.8	------	57	68.0	23.1	15.0	16	14.6	80.0	131	32.6	25.0	9.1
2	8.5	------	62	77.0	22.5	14.0	17	14.6	55.0	118	28.7	25.8	9.4
3	8.5	------	65	80.0	21.8	14.0	18	13.6	56.0	94	27.1	24.5	9.8
4	8.5	------	66	80.0	21.8	13.0	19	12.3	55.0	73	25.8	23.1	9.4
5	8.5	------	53	73.0	20.5	13.0	20	12.0	55.0	68	24.5	22.5	9.1
6	8.8	31.0	57	65.0	18.4	13.0	21	------	55.0	69	24.5	22.5	9.8
7	10.0	31.0	76	55.0	17.3	13.0	22	------	54.0	70	29.5	21.2	9.8
8	47.2	34.2	64	44.0	28.7	13.0	23	------	55.0	69	27.1	20.0	9.4
9	49.4	38.0	54	41.0	32.6	13.0	24	------	55.0	61	26.4	18.4	9.1
10	34.4	47.2	72	35.0	27.9	12.4	25	------	56.0	62	27.9	17.8	8.8
11	25.2	64.0	86	34.2	23.8	11.0	26	------	56.0	75	29.5	17.8	8.0
12	20.8	72.0	102	35.0	23.1	10.0	27	------	57.0	83	32.6	17.0	8.0
13	17.5	70.0	123	35.0	23.0	9.0	28	------	50.0	70	31.8	17.0	8.0
14	15.4	69.0	130	34.2	23.0	8.5	29	------	42.0	61	28.7	16.0	8.0
15	14.6	79.0	138	35.0	24.0	8.8	30	------	40.0	64	25.1	16.0	8.0
							31	------	45.0	------	23.8	15.0	------

NOTE.—Daily discharge estimated for following days of missing gage height: June 10–12, July 13, Aug. 13–16, 26–31, Sept. 1–13, 26–30.

Monthly discharge of Canyon Creek near Many Glacier, Mont., for the year ending September 30, 1924

[Drainage area, 7.0 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October 1-20	49.4	8.5	17.7	2.53	1.88	702
May 6-31	80	31.0	53.9	7.70	7.45	2,780
June	138	53.0	79.1	11.3	12.61	4,710
July	80	23.8	39.9	5.70	6.57	2,450
August	32.6	15.0	21.6	3.09	3.56	1,330
September	15.0	8.0	10.5	1.50	1.67	625

RED RIVER AT FARGO, N. DAK.

LOCATION.—In sec. 7, T. 139 N., R. 48 W., at Island Park Dam, half a mile above highway bridge connecting Front Street, Fargo, Cass County, N. Dak., with Moorhead, Minn., and 10 miles above confluence with Sheyenne River.

DRAINAGE AREA.—6,420 square miles (revised).

RECORDS AVAILABLE.—May 27, 1901, to September 30, 1924.

GAGES.—Vertical staff attached to piling at upper end of fishway, left end of dam. Auxiliary gages for high stages on bank adjoining. Gage read by city engineer.

DISCHARGE MEASUREMENTS.—Made from footbridge above dam or from Front Street Bridge.

CHANNEL AND CONTROL.—Bed of clay and silt. Control is steel and timber crib dam; rock filled. Dam has slipped and changed form during past 10 years, until now the lowest point of steel crest is at gage height 0.3 foot. Control for low stage at the Front Street gage is the channel contraction at the Northern Pacific Railway bridge 200 feet below, and the obstruction there has been increasing for 10 years past. At low stage the fall over dam is now about 4 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.5 feet April 30 (discharge, 530 second-feet); minimum stage during period, 0.5 foot September 3 (discharge, 8 second-feet).

1901–1924: Maximum open-water stage recorded, 17.34 feet at 3 p. m. July 11, 1916, discharge, 7,740 second-feet; minimum stage, 0.5 foot September 3, 1924 (discharge, 8 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter, caused by repairing dam. Rating curves well defined. Staff gage read to tenths or occasionally to half-tenths once daily except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

COOPERATION.—Gage-height record furnished by city engineer of Fargo.

Discharge measurements of Red River at Fargo, N. Dak., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 17	1.35	104	Feb. 23	0.88	32	Aug. 11	0.93	56
Dec. 28	.60	12	Apr. 19	1.53	188			

Daily discharge, in second-feet, of Red River at Fargo, N. Dak., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	98	98	78		125	490	235	175	100	43
2	98	98	83		125	450	235	205	90	24
3	88	98	88		138	430	235	235	108	8
4	98	98	88		175	402	228	220	125	24
5	98	98	88		205	375	220	205	112	35
6	88	98	88		235	340	235	190	100	125
7	88	98	88		252	305	235	175	100	102
8	88	98	88		340	270	228	150	80	80
9	78	98	88		450	270	220	150	63	63
10	78	98	88		450	305	205	150	56	48
11	78	98	88		358	305	205	150	48	63
12	88	98	88		270	305	205	175	48	80
13	88	104	88		252	305	190	190	42	100
14	83	109	88		235	288	190	205	63	100
15	78	109	88		220	270	190	175	72	100
16	78	109	83		235	270	190	150	63	100
17	78	109	78		246	270	190	138	56	125
18	78	109	73		205	270	190	112	48	125
19	78	109	69		205	270	190	100	48	175
20	78	99	72		205	270	190	168	48	125
21	78	88	75		205	270	190	235	42	102
22	78	85	78		205	252	190	235	125	80
23	98	82	78		190	270	190	235	112	80
24	98	78	78		205	270	190	205	116	125
25	98	75	73		235	288	175	150	121	125
26	98	72	69		270	305	175	112	125	150
27	98	69	40	125	340	270	190	112	162	125
28	98	71	12	125	410	261	252	112	125	112
29	98	73	18	125	490	252	214	112	100	100
30	88	76	24	125	530	244	175	100	80	100
31	88		30	125		235		100	61	

NOTE.—Discharge interpolated on account of missing gage height: Oct. 7, 11, 16–18, 21, 27–28, Nov. 2, 4, 6, 8, 10–11, 13, 15–16, 18, 20, 22–23, 25–26, 28–30, Dec. 2, 4–7, 9, 11–14, 16, 18, 20, 21, 23, 25, 27, 29–31, Mar. 28, 30, Apr. 1, 13, 20, 27, May 4, 11, 18, 25, 28, 30, June 1, 4, 8, 15, 19, 22, 28, July 4, 6, 13, 20, 27, Aug. 3, 10, 18, 24–25, 28, Sept. 1, 7, 14, 21, and 28. Discharge not computed Jan. 1 to Mar. 26 on account of repairs to dam which changed stage-discharge relation.

Monthly discharge of Red River at Fargo, N. Dak., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	98	78	87.8	5,400
November	109	69	93.4	5,560
December	88	12	72.8	4,480
March 27–31	125	125	125	1,240
April	530	125	267	15,900
May	490	235	302	18,600
June	252	175	205	12,200
July	235	100	165	10,100
August	162	42	85.1	5,230
September	175	8	91.5	5,440

RED RIVER AT GRAND FORKS, N. DAK.

LOCATION.—In sec. 3, T. 151 N., R. 50 W., at Northern Pacific Railway bridge between Grand Forks, Grand Forks County, N. Dak., and East Grand Forks, Minn., half a mile below mouth of Red Lake River.

DRAINAGE AREA.—25,500 square miles (revised).

RECORDS AVAILABLE.—May 28, 1901, to September 30, 1924; at same point gage-height records were kept from 1882 to 1901 by the United States Engineer Corps, and a few discharge measurements made by them.

GAGE.—Vertical staff attached to ice breaker below center pier of bridge; read by Alex Slattery and Harold Bowes.

DISCHARGE MEASUREMENTS.—Made from Great Northern Railway bridge one-fourth mile above gage or from Demers Avenue Bridge.

CHANNEL AND CONTROL.—Clay and silt; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.2 feet May 2 (discharge, 2,530 second-feet); minimum stage, 2.2 feet September 9 (discharge, 189 second-feet); minimum discharge, about 174 second-feet January 28 (stage-discharge relation affected by ice).

1882–1924: Maximum stage recorded, 50.2 feet April 10, 1897 (discharge, 43,000 second-feet); minimum discharge, about 100 second-feet during early part of February, 1912 (stage-discharge relation affected by ice).

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

DIVERSIONS.—None.

REGULATIONS.—None.

ACCURACY.—Stage-discharge relation changed slightly during winter; affected by ice December 1 to April 4. Rating curves fairly well defined. Gage read to tenths twice weekly during January, February, and March, and daily during remainder of year. Daily discharge ascertained by applying rating table to daily gage height. Discharge for days of missing gage height estimated. Records fair.

Discharge measurements of Red River at Grand Forks, N. Dak., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 31	3.34	397	Jan. 26	3.60	[a]181	May 3	8.19	2,540
Dec. 16	3.75	[a]358	Feb. 16	3.72	[a]217	June 6	5.20	1,120
Jan. 5	3.89	[a]297	Mar. 8	4.35	[a]293	Sept. 6	2.34	210

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Red River at Grand Forks, N. Dak., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	505	424	526	311	200	300	1,400	2,420	1,350	970	443	345
2	505	424	526	322	205	311	1,400	2,530	1,310	1,050	443	345
3	477	424	526	315	205	322	1,400	2,470	1,260	1,090	443	322
4	477	424	526	307	205	322	1,440	2,360	1,220	1,130	443	279
5	477	424	555	300	197	322	1,580	2,300	1,220	1,180	443	240
6	477	424	585	300	189	313	1,630	2,250	1,180	1,180	443	205
7	477	450	615	300	189	307	1,680	2,200	1,180	1,130	470	205
8	477	450	615	300	189	300	1,730	2,090	1,180	1,050	470	205
9	450	477	585	300	189	311	1,780	1,980	1,180	970	498	189
10	450	505	585	280	189	322	1,830	1,930	1,130	930	470	224

Daily discharge, in second-feet, of Red River at Grand Forks, N. Dak., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
11	450	505	555	260	189	334	1,880	1,880	1,130	891	470	240
12	450	533	555	240	206	345	1,930	1,980	1,090	891	443	259
13	450	533	498	231	222	353	1,980	2,090	1,090	780	443	279
14	450	561	417	222	222	360	2,140	2,140	1,050	745	443	300
15	477	561	392	214	222	368	2,140	2,200	1,050	711	443	300
16	477	590	392	205	222	380	2,090	2,200	1,010	678	417	300
17	505	590	368	205	222	392	1,980	2,140	1,010	646	417	322
18	533	619	368	205	222	431	1,830	2,090	970	615	417	368
19	533	619	345	205	222	470	1,680	2,090	930	585	417	368
20	505	590	345	197	222	518	1,680	2,040	891	585	417	368
21	505	561	322	189	211	567	1,780	1,980	930	555	417	417
22	477	533	322	197	200	615	1,930	1,930	970	555	417	443
23	477	505	322	205	189	663	2,090	1,880	970	526	392	443
24	477	477	322	200	197	711	1,980	1,830	970	526	392	443
25	477	477	322	194	205	782	1,730	1,780	930	498	392	443
26	477	450	345	189	232	853	1,580	1,730	930	498	392	417
27	477	450	337	182	259	945	1,540	1,680	891	470	368	417
28	477	477	329	174	273	1,040	1,580	1,630	891	470	368	443
29	477	477	322	182	286	1,130	1,880	1,540	853	470	368	470
30	450	505	323	189	-------	1,220	2,200	1,490	853	443	368	47 0
31	450	-------	300	194	-------	1,310	-------	1,400	-------	443	345	-------

Monthly discharge of Red River at Grand Forks, N. Dak., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	533	450	478	29,400
November	619	424	501	29,800
December	615	300	434	26,700
January	322	174	236	14,500
February	286	189	213	12,300
March	1,310	300	546	33,600
April	2,200	1,400	1,780	106,000
May	2,530	1,400	2,010	124,000
June	1,350	853	1,050	62,500
July	1,180	443	750	46,100
August	498	345	423	26,000
September	470	189	336	20,000
The year	2,530	174	731	531,000

MUSTINKA RIVER ABOVE WHEATON MINN.

LOCATION.—On line between secs. 7 and 8, T. 127 N., R. 46 W., 1 mile above Chicago, Milwaukee & St. Paul Railway bridge, 1½ miles northeast o Wheaton, Traverse County, and 8 miles above Lake Traverse into which river discharges.

DRAINAGE AREA.—776 square miles.

RECORDS AVAILABLE.—March 23 to September 30, 1917; June 25, 1919, to September 30, 1924. June 7 to September 30, 1916, at a point 3½ miles downstream.

GAGE.—Chain gage attached to bridge; read by Vernon Heggen. Staff gage at railway bridge for convenient comparison.

DISCHARGE MEASUREMENTS.—Made from highway bridge near Chicago, Milwaukee & St. Paul Railway bridge, from highway bridge at chain gage, from highway bridge midway between them or by wading.

CHANNEL AND CONTROL.—Bed dredged in or near hardpan; practically permanent. Slope of river from lowest stage at gage to ordinary stage of Lake Traverse is only about 5 feet, so that at rare intervals flood stage in lake may affect stage at gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, 2.65 feet April 5 (discharge, 45 second-feet); no flow during first half of October.

1917; 1919–1924: Maximum stage recorded, 14.7 feet April 1, 1917 (discharge, about 2,340 second-feet); no flow August 28–31, September 30, August 17–19, October 1–15 1923.

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

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined. Gage read to hundredths once daily except as explained in footnote to daily-discharge table. Daily discharge ascertained by applying daily gage height to rating table. Open-water records good; winter estimates probably fair.

The following discharge measurements were made:

April 17, 1924: Gage height, 1.75 feet; discharge, 5.6 second-feet.

August 12, 1924: Gage height, 1.31 feet; discharge, 0.1 second-foot.

Daily discharge, in second-feet, of Mustinka River above Wheaton, Minn., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1							12.0	7.4	0.6	4.6	0.2	0.2
2							19.5	6.6	.7	5.5	.2	.2
3							21.5	5.5	.5	4.6	.2	.2
4							34.5	4.2	.4	3.7	.2	.3
5							45.0	3.7	.5	2.9	.2	.3
6							37.2	3.7	.5	2.1	.2	.5
7							27.5	4.2	.5	1.5	.2	.5
8	0.0						24.5	3.9	1.3	2.7	.1	.6
9							21.5	3.8	2.1	1.9	.1	.7
10							14.0	3.7	3.0	1.1	.1	.8
11							11.7	3.7	3.4	.9	.1	.9
12							9.4	4.2	4.2	.7	.1	.9
13							7.1	3.9	5.0	.6	.1	1.1
14							6.0	3.6	4.4	.4	.1	1.3
15							6.0	3.4	3.5	.4	.1	1.3
16		0.4	0.2	0.1	0.1	1.0	8.9	3.0	1.9	.2	.1	1.3
17							4.2	2.7	1.4	.2	.1	1.3
18							1.9	2.3	.9	.2	.7	1.4
19							3.0	1.9	1.1	.3	.5	1.5
20							2.7	1.6	1.3	.3	.4	1.5
21							3.4	1.3	1.4	.7	.2	3.4
22							4.2	1.3	2.7	.6	.2	3.0
23	.3						4.2	1.9	2.1	.5	.2	2.6
24							4.6	1.4	1.8	.4	.2	2.2
25							5.0	.8	1.6	.3	.2	1.8
26							8.9	.8	1.3	.2	.3	1.5
27							12.0	.9	1.5	.2	.3	2.2
28							12.4	.9	1.5	.2	.3	5.0
29							8.9	.8	4.2	.2	.4	3.4
30					-------		8.3	.7	3.4	.1	.4	3.4
31		-------			-------		-------	.5	-------	.1	.3	-------

NOTE.—Gage read once or twice weekly during October and November, and two or three times weekly July to September; discharge interpolated for intervening days. Gage not read; discharge estimated December to March.

Monthly discharge of Mustinka River above Wheaton, Minn., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October		0.0	[a] 0.13	May	7.4	0.5	2.85
November			[a] .38	June	5.0	.4	1.96
December			[a] .2	July	5.5	.1	1.24
January			[a] .1	August	.7	.1	.23
February			[a] .1	September	5.0	.2	1.51
March			[a] 1.0				
April	45.0	1.9	13.0	The year	45	.0	1.88

[a] Estimated.

RED LAKE RIVER AT THIEF RIVER FALLS, MINN.

LOCATION.—In sec. 33, T. 154 N., 43 W. one-third mile below dam at Thief River Falls, Pennington County, and 1 mile below mouth of Thief River.

DRAINAGE AREA.—3,430 square miles.

RECORDS AVAILABLE.—July 1, 1909, to September 30, 1918, and March 25, 1920, to September 30, 1924.

GAGE.—Inclined staff gage on right bank, installed August 19, 1920; read by Thomas Hastad.

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

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, 5.6 feet April 20 (discharge, 845 second-feet); minimum discharge, estimated 7 second-feet April 6 (stage-discharge relation affected by ice.

1909–1918; 1920–1924: Maximum open-water stage recorded 12.2 feet April 19–21, 1916 (discharge, 7,040 second-feet); minimum discharge, no flow July 17 and August 27, 1911; caused by regulation.

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

REGULATION.—A short distance above station is a dam owned by Hanson & Barzen Milling Co. and city lighting plant. The variation in load on the turbines due to operation of lighting plant (at night) and of the mill (chiefly during day) causes fluctuations in stage at gage.

ACCURACY.—Stage-discharge relation not permanent; affected by ice during winter. Rating curves well defined. Gage read to half-tenths once daily except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying daily gage height to rating table. Open-water records at medium and high stages good; at low stages diurnal fluctuation due to operation of power plants above station impairs accuracy of mean gage height and results only fair. Winter records poor.

Discharge measurements of Red Lake River at Thief River Falls, Minn., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 20	4.17	284	Apr. 21	4.76	534	Sept. 3	3.46	50
Dec. 28	[a] 4.68	270	June 19	4.29	290			

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Red Lake River at Thief River Falls, Minn., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	289	129	229	192	172	140	35	484	406	177	236	99
2	229	258	229	189	188	95	44	388	464	335	206	99
3	289	243	152	158	205	84	53	464	464	370	99	99
4	129	229	176	126	222	74	64	352	406	236	221	99
5	229	229	229	95	238	64	163	370	444	236	252	124
6	152	273	215	102	255	53	7	484	236	236	177	124
7	320	258	85	110	271	43	124	464	444	206	150	301
8	152	229	152	117	288	32	150	505	150	284	236	35
9	258	258	229	135	304	46	99	505	425	388	236	23
10	289	304	258	153	294	61	53	464	388	206	99	23
11	289	229	304	171	283	75	53	352	388	284	206	124
12	289	243	229	189	273	86	15	444	425	268	236	124
13	258	336	229	177	234	96	150	425	425	206	124	35
14	289	353	258	165	195	106	464	388	425	236	236	236
15	258	304	229	153	156	117	352	425	236	221	236	99
16	336	289	106	142	117	83	425	464	425	206	236	35
17	129	320	152	130	128	48	425	484	406	236	99	35
18	38	229	229	118	143	14	150	352	352	236	236	35
19	353	320	258	106	157	34	505	548	370	252	236	150
20	38	336	176	142	171	54	845	370	206	206	221	99
21	289	336	258	179	185	75	660	484	388	236	236	150
22	38	229	128	215	199	95	444	484	236	206	177	99
23	38	229	106	190	214	74	335	464	464	236	177	99
24	38	152	128	166	228	53	526	444	236	236	206	150
25	229	152	202	142	243	32	444	425	150	221	221	236
26	229	152	229	117	222	27	425	464	301	236	23	150
27	258	128	229	112	202	23	548	464	236	99	23	99
28	229	128	202	106	181	19	615	464	150	137	23	236
29	289	85	199	122	161	14	660	444	236	163	35	177
30	229	85	197	139	-------	44	570	425	335	177	35	35
31	152	-------	194	155	-------	75	-------	406	-------	236	177	-------

NOTE.—Stage-discharge relation affected by ice Dec. 1 to Apr. 13. Gage read twice weekly Dec. 28 to Apr. 1; discharge determined from one meter measurement and gage height and temperature records.

Monthly discharge of Red Lake River at Thief River Falls, Minn., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	353	38	214	May	548	352	442
November	353	85	235	June	464	150	341
December	304	85	200	July	370	99	233
January	215	95	146	August	252	23	171
February	304	117	211	September	301	23	114
March	140	14	62				
April	845	7	313	The year	845	7	223

RED LAKE RIVER AT CROOKSTON, MINN.

LOCATION.—In sec. 30, T. 150 N., R. 46 W., at Sampson's Addition steel highway bridge in Crookston, Polk County, one-fourth mile below dam and power house of Crookston Light, Water & Power Co. No tributaries enter within several miles.

DRAINAGE AREA.—5,320 square miles.

RECORDS AVAILABLE.—May 19, 1901, to September 30, 1924.

GAGE.—Chain gage attached to middle span of highway bridge; installed July 1 1909; read by J. A. McLean.

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

CHANNEL AND CONTROL.—Bed composed of silt, gravel, and small boulders; control not well defined. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.1 feet April 23 and May 19 (discharge, 1,090 second-feet); minimum stage, 2.5 feet September 23 and 30 (discharge, 30 second-feet).

1901–1924: Maximum discharge recorded, 14,700 second-feet, July 5, 1919; minimum discharge, 10 second-feet, by discharge measurement January 27, 1912, but the flow is controlled to such an extent that minimum discharge has no bearing on minimum natural flow.

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

REGULATION.—Diurnal fluctuation in stage, particularly at low water, is caused by operation of power plant immediately above station and by another 8 miles above. Storage at these plants is small, so that mean monthly flow should represent nearly natural flow.

ACCURACY.—Stage-discharge relation not permanent; affected by ice during greater part of winter and by growth of vegetation in channel. Standard rating curve well defined. Gage read to tenths once daily except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying daily gage height to rating table. At low stages mean daily gage height may be considerably in error on account of regulation. Shifting-control method used October 1–10 and June 5 to September 30. Open-water records probably fair; winter records poor.

Discharge measurements of Red Lake River at Crookston, Minn., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Apr. 22	4.75	944	July 15	3.92	115	Sept. 3	2.81	88
June 1	3.98	588	Aug. 7	3.61	96	Sept. 5	2.81	90
June 20	4.36	538						

Daily discharge, in second-feet, of Red Lake River at Crookston, Minn., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	115						430	755	550	395	215	90
2	90						395	670	590	260	215	90
3	200		260				360	590	470	300	165	90
4	325						510	590	510	285	140	90
5	430						590	510	510	270	190	90
6	140	300				180	630	395	510	300	140	90
7	230						590	630	490	270	140	70
8	200						590	590	470	190	140	50
9	290						670	590	510	215	165	70
10	470		320				755	710	510	240	165	70
11	510	325					800	590	510	460	165	90
12	470	290		170	170		630	590	510	240	190	70
13	510						630	670	510	215	190	70
14	510						590	630	470	215	190	70
15	510						590	670	470	215	190	70
16	550					200	755	800	470	215	190	70
17	290						710	845	470	190	190	70
18	230		280				710	940	550	190	190	70
19	230						755	1,090	550	215	140	70
20	230	325					710	710	550	215	140	70
21	325						670	670	470	215	190	70
22	360						1,040	710	395	215	190	70
23	510		240			300	1,090	710	470	215	190	30
24	430						800	710	360	215	140	50
25	510						755	755	360	215	140	50
26	430				180		470	670	395	215	165	70
27	340					420	845	755	430	215	115	70
28	260		220	160			1,040	710	590	190	115	50
29	325	290				430	800	550	395	190	115	50
30	290				-------	510	800	590	290	190	115	30
31	290	-------	200		-------	510	-------	590	-------	190	90	-------

NOTE.—No gage reading Jan. 9 to Mar. 26 and only an occasional reading Nov. 1 to Jan. 8. Mean discharge from November to March estimated from precipitation and temperature records and comparison with records for adjacent streams. Gage not read October 26, 27, 31, June 7, 19, 21, and July 4; discharge interpolated. July 3 to Aug. 2 power plant above gage was run only about 4 hours each evening and Aug. 3–26 about 2 hours each evening. This operation resulted in gage readings being systematically too low to represent mean daily discharge, and, to correct for this error, 100 second-feet has been added to daily discharge July 3 to Aug. 2 and 50 second-feet Aug. 3–26.

Monthly discharge of Red Lake River at Crookston, Minn., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	550	90	342	May	1,090	395	677
November	-------	-------	312	June	590	290	478
December	-------	-------	271	July	460	190	237
January	-------	-------	168	August	215	90	162
February	-------	-------	172	September	90	30	69
March	-------	-------	258				
April	1,090	360	690	The year	1,090	30	320

THIEF RIVER NEAR THIEF RIVER FALLS, MINN.

LOCATION.—In sec. 3, T. 154 N., R. 43 W., 1,000 feet above steel highway bridge in Marshall County, 5 miles north of Thief River Falls, Pennington County, and 5 miles above mouth of river.

DRAINAGE AREA.—1,010 square miles.

RECORDS AVAILABLE.—July 1, 1909, to September 30, 1917; April 1, 1920, to September 30, 1921; October 1, 1923, to September 30, 1924.

GAGE.—Chain gage on cantilever timber fastened to a tree on right bank; read by Margaret Hillyer.

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

CHANNEL AND CONTROL.—Bed composed of heavy gravel and boulders; practically permanent. One channel at all stages. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.25 feet April 20 and 21 (discharge, 132 second-feet); minimum stage, 3.5 feet September 5–30 (discharge, 0.1 second-foot.)

1909–1917; 1920–1921; 1923–1924: Maximum stage recorded, 14.5 feet April 23, 1916 (discharge, 4,080 second-feet); no flow October 1, 1910, to March 12, 1911, August 2–13, 22–26, September 1–3, 5–12, 14–18, 1911, November 10, 1911, to March 26, 1912, and November 16–21, 1920.

Flood of July, 1919, reached a stage of about 16.3 feet (discharge, about 4,900 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice. Rating curve well defined below 3,800 second-feet. Gage read to half-tenths once daily except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

The following discharge measurements were made:

April 19, 1924: Gage height, 4.82 feet; discharge, 52 second-feet.

June 17, 1924: Gage height, 4.56 feet; discharge, 20 second-feet.

September 3, 1924: Gage height, 3.58 feet; discharge, 0.1 second-foot.

Daily discharge, in second-feet, of Thief River near Thief River Falls, Minn., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1	3					4	42	20	30	6.0	0.2
2	1	3					5	42	20	30	6.0	.2
3	1	3					6	30	30	30	4.5	.2
4	1	4					8	30	20	30	4.5	.2
5	1	4					13	30	20	30	4.5	.1
6	1	4					20	25	20	20	4.5	.1
7	1	4					13	20	20	20	4.5	.1
8	1	4				1	20	20	20	20	4.5	.1
9	1	4					30	16	20	20	4.5	.1
10	1	4					20	13	20	20	3.5	.1
11	1	4					20	13	20	20	3.5	.1
12	1	4					20	16	20	20	3.0	.1
13	1	3					20	16	20	13	3.0	.1
14	2	3					20	20	20	13	3.0	.1
15	2	3			0.7		25	20	20	13	3.0	.1
16	2	2	1.5	1.0		2	30	20	20	13	3.5	.1
17	2	2				2	42	20	20	13	1.5	.1
18	2	2				2	56	20	20	13	1.5	.1
19	2	2				2	109	20	20	13	1.5	.1
20	2	2				3	132	30	20	8	1.5	.1
21	2	2				5	132	30	20	8	1.5	.1
22	2	2				7	109	30	13	8	1.5	.1
23	2	2				5	109	30	13	8	1.5	.1
24	2	2				3	71	36	13	8	1.0	.1
25	2	2				2	71	36	13	8	1.0	.1
26	2	2				2	71	30	13	8	.5	.1
27	2	2				2	88	30	13	6	.5	.1
28	3	2				2	88	30	13	6	.5	.1
29	3	2				2	71	20	30	6	.5	.1
30	3	2			-------	3	56	20	30	6	.5	.1
31	3	-------			-------	3	-------	20	-------	6	.2	-------

NOTE.—Stage-discharge relation affected by ice Dec. 1 to Apr. 8. Mean monthly discharge December to March estimated from temperature and precipitation records, and comparison with flow of adjacent streams. Gage not read Nov. 11–17, 25–30, and March 23–29; discharge interpolated.

Monthly discharge of Thief River near Thief River Falls, Minn., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	3	1	1.71	May	42	13	25.0
November	------	------	2.80	June	30	13	19.0
December	------	------	[a] 1.5	July	30	6	15.1
January	------	------	[a] 1.0	August	6	.2	2.6
February	------	------	[a] .7	September	------	------	.1
March	------	------	2.0				
April	132	4	49.3	The year	132	------	10.0

[a] Estimated.

PEMBINA RIVER AT NECHE, N. DAK.

LOCATION.—In sec. 36, T. 164 N., R. 54 W. at Great Northern Railway bridge, one-third of a mile above Great Northern Railway dam, and two-thirds mile north of Neche, Pembina County.

DRAINAGE AREA.—2,960 square miles (revised).

RECORDS AVAILABLE.—May 1, 1903, to September 30, 1915; April 1, 1919, to September 30, 1924.

GAGE.—Vertical staff bolted to concrete abutment at north end of railway bridge; read by P. J. Horgan.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of clay and silt, nearly permanent. Control is loose rock dam 4 feet high, one-third mile below gage; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.7 feet April 20 (discharge, 674 second-feet); minimum open-water stage, 3.1 feet several days in September (discharge, 3 second-feet);

1903–1915; 1919–1924: Maximum discharge recorded, 3,870 second-feet May 2, 1904 (gage-height, 20.9 feet); minimum stage, 1.3 feet several days in September, 1911 (discharge, 1.0 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Water is raised at low stages from 1 to 3 feet at gage by loose rock dam 4 feet high one-third mile below, constructed to give sufficient depth of water for the intake of Great Northern Railway water tank. There is considerable leakage through dam, and no permanent determination of the effect of dam can be made because its crest is sometimes somewhat changed by the ice-run or spring floods. There are no reservoirs or power plants that affect flow.

ACCURACY.—Stage-discharge relation changed during winter; affected by ice January 1 to March 26. Rating curves fairly well defined. Gage read to tenths once daily during period except November 25–30. Daily discharge ascertained by applying rating table to daily gage height. Discharge November 25–30 estimated. Records fair.

The following discharge measurements were made:

April 22, 1924: Gage height, 4.93 feet; discharge, 282 second-feet.

August 1, 1924: Gage height, 3.57 feet; discharge, 27.5 second-feet.

August 2, 1924: Gage height, 3.54 feet; discharge, 20 second-feet.

Daily discharge, in second-feet, of Pembina River at Neche, N. Dak., for the year ending September 30, 1924

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	121	104		30	259	117	84	30	5
2	121	104		42	237	117	84	20	5
3	121	104		55	237	117	69	20	5
4	121	88		69	215	117	69	20	5
5	121	88		100	215	100	69	20	5
6	121	88		117	194	100	69	20	3
7	121	88		117	194	100	69	20	3
8	121	88		117	174	100	69	20	3
9	121	88		117	154	100	69	20	3
10	121	88		117	154	100	69	20	3
11	121	88		135	154	100	69	20	3
12	121	88		135	154	100	55	20	3
13	121	88		135	154	100	55	20	3
14	121	104		135	135	100	55	20	3
15	121	104		174	135	100	55	13	5
16	121	104		174	135	100	55	13	5
17	121	104		215	135	100	55	13	5
18	121	104		282	135	100	55	13	5
19	104	104		400	135	100	55	8	5
20	104	104		674	135	100	55	8	5
21	104	88		471	135	100	42	8	8
22	104	88		424	135	100	42	8	13
23	104	88		376	135	100	42	8	20
24	104	88		328	135	84	42	8	30
25	104	83		282	135	84	42	8	42
26	104	79		282	135	84	30	8	69
27	104	75	13	282	135	84	30	8	84
28	104	71	20	282	117	84	30	8	84
29	104	67	30	259	117	84	30	8	84
30	104	63	30	259	117	84	30	8	100
31	104		30		117		30	8	

Monthly discharge of Pembina River at Neche, N. Dak., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	121	104	114	7,010
November	104	63	90.3	5,370
March 27–31	30	13	24.6	244
April	674	30	220	13,100
May	259	117	157	9,650
June	117	84	98.5	5,860
July	84	30	54.0	3,320
August	30	8	14.4	885
September	100	3	20.5	1,220

ROSEAU RIVER AT CARIBOU, MINN.

LOCATION.—In sec. 34, T. 164 N., R. 45 W. at highway bridge at Caribou, Kittson County, 1 mile south of international boundary and 3 miles above crossing of boundary line by river.

DRAINAGE AREA.—1,650 square miles (revised).

RECORDS AVAILABLE.—April 1 to October 6, 1917; April 12, 1920, to September 30, 1924.

GAGE.—Chain gage fastened to downstream handrail of bridge, 60 feet from left abutment; read by James A. McKibbin.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Channel is artificial, of trapezoidal cross-section, about 100 feet wide and 10 feet deep. Bed composed of hardpan with a few scattered large boulders.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.9 feet April 29 (discharge, 1,230 second-feet); minimum discharge probably occurred in January.

1917; 1920–1924: Maximum stage recorded, 12.5 feet May 1 and 2, 1923, (discharge, 2,980 second-feet); minimum discharge, 4 second-feet, September 10–12, 29, 30, 1917.

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

DIVERSIONS.—No diversions involving storage or loss of water. A small channel 3½ miles long was dredged some years ago from a point 4 miles above station to a point 1 mile below station. At all stages above approximately 6 feet, water flows in this channel and is measured and included with all measurements of main channel.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as indicated in footnote to daily-discharge table. Open-water records good; winter estimates poor.

The following discharge measurements were made:

October 21, 1923: Gage height, 3.73 feet; discharge, 55 second-feet.

June 18, 1924: Gage height, 4.39 feet; discharge, 149 second-feet.

September 4, 1924: Gage height, 3.66 feet; discharge, 50 second-feet.

Daily discharge, in second-feet, of Roseau River at Caribou, Minn., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	34	42				68	164	1,190	255	134	239	103
2	34	42				68	159	1,190	239	128	255	79
3	34	38				68	154	1,190	224	115	255	62
4	34	38				68	167	1,160	212	103	255	54
5	31	38				68	181	1,120	200	85	239	47
6	31	38				68	195	1,010	188	79	224	42
7	31	38				68	239	878	188	68	239	38
8	31	38				68	288	760	174	57	239	38
9	31	39				74	323	678	160	47	224	38
10	31	39				79	341	599	160	52	209	34
11	31	40				91	360	527	160	57	188	34
12	38	41				103	341	527	154	57	188	34
13	47	41				103	323	527	154	57	174	34
14	57	42				103	305	550	154	57	174	34
15	63	42	33	30	59	103	341	625	148	52	160	42
16	68	42				103	461	732	148	47	160	47
17	68	42				97	379	760	134	42	148	47
18	63	42				91	419	760	141	38	141	47
19	63	42				91	550	760	167	34	115	47
20	63	42				91	599	732	188	34	128	47
21	57	42				91	788	678	202	34	154	52
22	57	41				101	788	678	224	38	195	57
23	52	41				111	732	599	239	42	224	62
24	52	40				121	678	550	255	52	239	68
25	47	40				131	732	505	255	62	224	85
26	47	39				141	1,010	440	224	62	224	103
27	42	39				154	1,190	399	181	68	209	103
28	42	38				167	1,190	360	160	109	195	103
29	31	38				181	1,230	323	148	148	167	115
30	38	38			-------	176	1,190	288	141	181	141	154
31	47	-------			-------	168	-------	271	-------	209	122	-------

NOTE.—Stage-discharge relation affected by ice Nov. 29 to Apr. 21; discharge estimated from a few scattered gage heights, weather records, and a comparison with discharge in other drainage basins.

Monthly discharge of Roseau River at Caribou, Minn., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	68	31	45	May	1,190	271	689
November	42	38	40	June	255	134	186
December	------	------	[a] 33	July	209	34	75.7
January	------	------	[a] 30	August	255	115	195
February	------	------	[a] 59	September	154	34	62
March	181	68	104				
April	1,230	154	527	The year	1,230	------	171

[a] Estimated.

MOUSE RIVER AT MINOT, N. DAK.

LOCATION.—At Anne Street footbridge, northeast of Great Northern Railway roundhouse, at Minot, Ward County.

DRAINAGE AREA.—10,270 square miles (revised).

RECORDS AVAILABLE.—May 5, 1903, to March 31, 1924, when station was discontinued.

GAGE.—Vertical staff in several sections attached to pier of bridge; read by Ephraim Cox.

DISCHARGE MEASUREMENTS.—Made from Anne Street Bridge, North Street Bridge, South Sixth Street Bridge, or by wading.

CHANNEL AND CONTROL.—Channel is clay and silt, nearly permanent, but changed somewhat in recent years by the constructions encroaching into the channel through the city. The usual control has been a 5-foot dam of timbers and loose rock 1 mile below gage, at the Soo Railway water tank intake, which raises water at gage at low stages about 3 feet when the water is exactly at crest of dam. When flow is less than 5 second-feet, the leakage allows the water level to fall below crest. During the winter of 1922–23, the city park board completed a 10-foot concrete dam 4⅔ miles below gage, the crest of which is at the same elevation as the 9.07-foot point of Anne Street gage; during flood stages this affects the height at the gage, but at ordinary and low stages it does not affect the height at the gage unless the Taintor gate is closed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 6.3 feet March 23 (stage-discharge relation affected by ice, discharge 281 second-feet); minimum stage, 3.8 feet February 23 (discharge, 0.7 second-foot).

1903–1924: Maximum stage recorded, 21.9 feet April 20, 1904 (discharge, estimated 12,000 second-feet); minimum stage, 1.8 feet February 28, 1913 (discharge, 0.1 second-foot).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—None.

REGULATION.—No regulation above gage. Dam at Minneapolis, St. Paul, and Sault St. Marie raised the water at gage about 5 feet at ordinary low stage. This dam, designed to give enough depth of water for the intake pipe, has no sluices and is not tight, and water falls below level of crest when discharge is less than 6 second-feet. The new city park dam will cause backwater when the Taintor gate is closed.

ACCURACY.—Stage-dischage relation probably permanent during year; affected by ice March 19–31 and by backwater from city park dam October 1–15. Rating curve fairly well defined. Gage read to tenths once daily October 1 to

November 24 and March 15–31; once a week for intervening period. Daily discharge ascertained by applying daily gage height to rating table. Records probably fair.

The following discharge measurements were made:
March 8, 1924: Gage height, 4.62 feet; discharge, 52 second-feet.
June 25, 1924: Gage height, 6.00 feet; discharge, 241 second-feet.

Daily discharge, in second-feet, of Mouse River at Minot, N. Dak., for the period October 1, 1923, to March 31, 1924

Day	Oct.	Nov.	Mar.	Day	Oct.	Nov.	Mar.	Day	Oct.	Nov.	Mar.
1	30	13	13	11	30	13	36	21	10	10	170
2		13	28	12		17	31	22	13	10	240
3		10	44	13		17	25	23	17	10	281
4		10	60	14		13	19	24	21	10	240
5		13	75	15		10	13	25	21	10	221
6		13	67	16	13	10	13	26	17	11	203
7		10	59	17	17	10	26	27	17	11	194
8		10	51	18	17	7	49	28	13	11	194
9		10	46	19	13	7	69	29	13	12	186
10		10	41	20	10	10	141	30	10	12	186
								31	10	-------	170

NOTE.—Daily discharge Oct. 1–15, Nov. 25–30, Mar. 2–4, 6, 7, 9–14, estimated or interpolated.

Monthly discharge of Mouse River at Minot, N. Dak., for the period October 1 1923, to March 31, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	[a]30	10	22.0	1,350
November	17	7	11.1	660
December	-------	-------	[a]10.0	615
January	-------	-------	[a]6.0	369
February	-------	-------	[a]1.3	75
March	281	13	103	6,330

[a] Estimated.

UPPER MISSISSIPPI RIVER BASIN

MISSISSIPPI RIVER NEAR ROYALTON, MINN.

LOCATION.—In sec. 8, T. 127 N., R. 29 W. at highway bridge 3 miles west of Royalton, Morrison County, and 7 miles below mouth of Swan River.

DRAINAGE AREA.—11,600 square miles.

RECORDS AVAILABLE.—March 8 to September 30, 1924.

GAGE.—Au water-stage recorder installed March 8, 1924, just below right end of bridge.

CHANNEL AND CONTROL.—Bed composed of sand and gravel with some boulders. Control not well defined; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 9.02 feet at 3 a. m. August 7 (discharge, 7,640 second-feet); minimum stage, 6.20 feet at 11 a. m. July 14 (discharge, 910 second-feet).

REGULATION.—Little Falls Dam, 8 miles upstream, produces a systematic diurnal fluctuation at gage. During period of these records there is being constructed a dam 3 miles upstream but no material regulation of flow at this dam occurred prior to September 30. Flow of river is controlled by Government reservoirs on upper river for purpose of increasing low-water open-season flow in the interests of navigation.

ACCURACY.—Stage-discharge relation changed during summer. Rating curves fairly well defined. Operation of water-stage recorder satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height as determined from recorder charts by inspection. Records poor.

COOPERATION.—Expense of installing and maintaining station paid by Pike Rapids Power Co.

Discharge measurements of Mississippi River near Royalton, Minn., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.ft.*
Mar. 8	[a] 8.15	1,250	July 8	7.30	2,590	Sept. 7	7.29	2,210
Apr. 12	7.38	2,940	Aug. 5	8.22	4,360	Sept. 20	7.84	3,260
May 7	7.34	2,720						

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Mississippi River near Royalton, Minn., for the year ending September 30, 1924

Day	Mar.	Apr.	May	June	July	Aug.	Sept.
1			3,330	1,980	3,180	2,590	2,980
2			2,520	1,720	2,900	2,590	2,780
3			2,640	1,630	3,040	2,780	2,980
4		2,500	2,180	1,630	1,980	2,780	3,190
5			1,980	1,800	1,800	3,950	3,080
6			2,080	1,800	2,400	5,740	2,780
7		4,140	2,180	1,800	2,180	6,380	2,410
8		2,520	2,180	1,410	2,640	6,380	2,250
9		3,480	1,980	1,340	2,400	5,340	2,410
10		2,400	2,080	1,720	2,290	4,100	2,330
11		2,400	2,520	1,980	1,890	3,420	2,680
12		2,640	2,080	1,560	2,290	3,950	2,780
13		1,890	3,800	1,630	1,630	4,100	2,980
14		2,400	3,330	1,800	1,210	3,950	3,420
15		1,890	3,180	2,180	1,550	3,950	2,780
16		1,480	3,480	1,890	1,550	3,950	4,100
17		1,800	3,480	2,080	1,490	3,950	3,810
18		1,720	2,900	2,080	1,430	3,420	3,190
19	1,280	1,800	2,640		1,820	3,670	2,680
20		1,210	2,770		1,430	3,950	3,190
21		1,720	2,640		1,690	3,420	3,670
22		1,800	2,520		1,760	3,670	3,300
23		1,800	2,640	2,360	2,590	4,100	3,300
24		1,890	2,520		2,590	4,430	3,300
25		2,180	2,400		2,590	4,260	3,420
26		2,180	1,980		2,590	4,780	3,950
27		2,290	2,180		2,500	3,950	4,260
28		2,180	2,770		2,180	3,420	4,100
29		2,640	2,900	2,640	2,410	3,420	3,670
30		3,180	2,400	2,640	2,590	3,540	4,600
31		-------	2,520	-------	3,190	3,300	-------

NOTE.—Recorder not operating satisfactorily Mar. 10–15, Mar. 30 to Apr. 6 and June 19–28. Stage-discharge relation affected by ice Mar. 8 to about Apr. 7 and discharge estimated from gage heights and one discharge measurement. Discharge June 19–28 interpolated. Braced figures show mean discharge or periods indicated.

Monthly discharge of Mississippi River near Royalton, Minn., for the year ending September 30, 1924

[Drainage area, 11,600 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
March 8–31			[a] 1,280	0.110	0.10
April	4,140	1,210	2,290	.197	.22
May	3,800	1,980	2,610	.225	.26
June	2,640	1,340	2,030	.175	.20
July	3,190	1,210	2,190	.189	.22
August	6,380	2,590	3,980	.343	.40
September	4,600	2,250	3,210	.277	.31

[a] Estimated.

MISSISSIPPI RIVER AT ELK RIVER, MINN.

LOCATION.—In sec. 3, T. 121 N., R. 23 W., at highway bridge in Elk River, Sherburne County, 2,500 feet below mouth of Elk River.

DRAINAGE AREA.—14,500 square miles.

RECORDS AVAILABLE.—July 22, 1915, to September 30, 1924.

GAGE.—Chain gage bolted to handrail of bridge, downstream side near right bank; read by W. H. Ebner.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Banks high and not subject to overflow. Control poorly defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.60 feet at 5.30 p. m. August 7 (discharge, 6,400 second-feet); minimum discharge, estimated 1,250 second-feet January 20, February 9, and March 9 (stage-discharge relation affected by ice).

1915–1924: Maximum open-water stage recorded, 10.8 feet April 7, 1916 (discharge, 27,000 second-feet); minimum discharge same as for 1924.

Maximum discharge probably occurred on April 5, 1917, and has been estimated at about 34,000 second-feet from records of discharge at Coon Rapids power plant.

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

REGULATION.—Nearest dam above station is at St. Cloud 40 miles upstream. An observed systematic diurnal fluctuation at the gage of about 0.1 foot is doubtless due to regulation at St. Cloud, but most of the effect of regulation is eliminated before reaching station. Flow of river is controlled by Government dams on upper river for the purpose of increasing the low-water open-season flow in the interests of navigation. Daily and monthly discharge somewhat affected by regulation but yearly discharge represents very nearly the natural flow.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined above 2,000 second-feet and extended below. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to table of daily discharge. Open-water records excellent; winter records fair.

COOPERATION.—Gage records furnished by United States Engineer Corps.

The following discharge measurement was made:

June 17, 1924: Gage height, 3.27 feet; discharge, 2,990 second-feet.

Daily discharge, in second-feet, of Mississippi River at Elk River, Minn., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3,030	3,210	2,300	1,320	1,530	1,320	3,210	4,080	3,030	3,610	3,210	3,400
2	3,030	3,030	2,000	1,390	1,600	1,390	3,030	4,080	2,420	3,610	3,210	3,030
3	3,400	3,210	2,190	1,530	1,530	1,460	3,610	3,400	3,030	3,610	3,210	3,030
4	3,400	3,030	2,300	1,600	1,460	1,320	4,910	3,210	2,860	3,210	2,860	2,860
5	3,400	3,030	1,820	1,600	1,390	1,390	3,400	2,860	2,860	2,860	3,210	3,030
6	3,210	3,210	1,820	1,530	1,460	1,600	3,030	3,210	2,700	2,700	3,840	3,210
7	3,210	3,030	1,820	1,530	1,460	1,460	3,210	3,210	2,860	2,550	5,500	2,860
8	2,860	2,860	2,090	1,670	1,460	1,320	3,610	3,030	2,700	3,210	5,500	2,860
9	2,860	2,700	1,910	1,530	1,250	1,250	3,400	3,400	2,550	3,030	5,800	2,700
10	3,210	2,860	1,910	1,320	1,250	1,530	3,610	3,400	2,700	3,030	5,200	2,860
11	3,210	2,550	1,910	1,390	1,390	1,600	3,400	3,210	2,550	3,030	3,610	2,700
12	3,400	2,420	2,090	1,390	1,460	1,600	3,030	3,400	2,860	2,700	3,610	2,550
13	3,210	2,420	1,910	1,530	1,390	1,600	3,210	3,610	3,030	2,550	3,610	3,030
14	3,210	2,550	1,740	1,460	1,390	1,600	3,030	4,340	2,700	2,420	3,840	3,210
15	3,030	2,420	1,910	1,460	1,390	1,670	2,860	4,080	2,860	2,300	3,610	3,210
16	3,210	2,700	1,670	1,460	1,390	1,910	3,030	3,610	3,030	2,090	3,840	3,400
17	3,210	2,700	1,740	1,530	1,320	2,000	3,030	3,840	3,210	2,300	3,840	4,080
18	3,400	2,550	1,670	1,390	1,390	1,910	2,860	3,840	2,860	2,700	3,610	3,840
19	3,400	2,420	1,740	1,390	1,320	1,740	2,860	3,400	3,030	2,550	3,400	3,210
20	3,400	2,420	2,000	1,250	1,320	2,300	2,700	3,400	3,030	2,420	3,840	3,030
21	3,400	2,300	2,000	1,320	1,320	2,700	2,420	3,210	2,860	2,300	4,910	3,400
22	2,860	2,550	1,910	1,390	1,320	2,190	2,700	3,210	3,030	2,420	3,610	4,080
23	2,860	2,420	1,820	1,320	1,320	2,090	2,860	3,210	3,610	2,000	3,840	4,080
24	2,860	2,550	1,910	1,390	1,320	2,300	2,860	3,400	3,400	3,210	4,620	3,400
25	3,210	2,300	2,000	1,320	1,320	2,190	3,030	3,210	3,610	2,860	3,610	3,400
26	3,610	2,420	2,420	1,390	1,320	1,910	3,210	3,030	3,210	2,860	4,340	3,610
27	3,400	2,300	2,190	1,390	1,320	2,190	3,210	2,860	3,210	3,030	4,080	4,620
28	3,030	2,300	1,740	1,390	1,320	2,700	3,400	2,860	3,610	2,860	3,610	4,620
29	3,030	2,190	1,530	1,390	1,320	2,860	3,400	3,400	4,340	2,860	3,210	4,340
20	2,860	2,190	1,460	1,320	-------	3,030	4,080	3,210	3,610	2,860	3,400	4,080
31	3,030	-------	1,390	1,460	-------	4,080	-------	2,860	-------	3,030	3,610	-------

NOTE.—Stage-discharge relation affected by ice Dec. 2 to Mar. 22; discharge estimated from comparison with computed flow at Coon Rapids power plant of Northern States Power Co.

Monthly discharge of Mississippi River at Elk River, Minn., for the year ending September 30, 1924

[Drainage area, 14,500 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,610	2,860	3,180	0.219	0.25
November	3,210	2,190	2,630	.181	.20
December	2,420	1,390	1,900	.131	.15
January	1,670	1,250	1,430	.099	.11
February	1,600	1,250	1,380	.095	.10
March	4,080	1,250	1,940	.134	.15
April	4,910	2,420	3,210	.221	.25
May	4,340	2,860	3,390	.234	.27
June	4,340	2,420	3,050	.210	.23
July	3,610	2,000	2,800	.193	.22
August	5,800	2,860	3,910	.270	.31
September	4,620	2,550	3,390	.234	.26
The year	5,800	1,250	2,690	.186	2.50

MISSISSIPPI RIVER AT ST. PAUL, MINN.

LOCATION.—At Chicago Great Western Railroad bridge near foot of Robert Street, St. Paul, Ramsay County, 6 miles below mouth of Minnesota River.

DRAINAGE AREA.—35,700 square miles.

RECORDS AVAILABLE.—March 22, 1887, to September 30, 1924. Observation of stage was begun in 1873 by United States Signal Service and continued by United States Weather Bureau. Many discharge measurements made prior to 1900 by United States Engineer Corps.

GAGE.—Chain gage installed May 9, 1913, on downstream handrail of Chicago Great Western Railroad bridge; read by employee of United States Weather Bureau.

DISCHARGE MEASUREMENTS.—Made from Wabasha Street Bridge 1,000 feet above gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.0 feet August 26–28 (discharge, 12,900 second-feet); minimum discharge, estimated 1,850 second-feet January 20 (stage-discharge relation affected by ice).

1887–1924: Maximum stage recorded, 18.0 feet April 6, 1897 (discharge, 80,800 second-feet); minimum discharge, 1,060 second-feet February 4, 1895.

Greatest known discharge, 117,000 second-feet July 22, 1867.

CHANNEL AND CONTROL.—Channel fairly permanent. Banks moderately high; not subject to overflow. Control poorly defined.

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

REGULATION.—During extremely low water regulation of flow through turbines at nearest dam in Minneapolis may cause diurnal fluctuation of stage at St. Paul. Flow is regulated by Government reservoirs on headwaters at Lake Winnebigoshish, Leach Lake, Pokegama Lake, Sandy Lake, Pine River, and Gull Lake to increase low-water open-season flow in the interests of navigation, but the effect of this regulation is very gradual at St. Paul.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Shifting-control method used throughout year. Open-water records fair; winter records poor.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

The following discharge measurements were made:

June 17, 1924: Gage height 0.20 foot; discharge, 4,690 second-feet.

September 9, 1924: Gage height, 0.07 foot; discharge, 4,510 second-feet.

Daily discharge, in second-feet, of Mississippi River at St. Paul, Minn., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4,630	3,480	3,020	1,950	2,630	2,310	3,020	7,640	5,070	6,450	3,960	8,950
2	4,920	3,720	2,920	2,060	2,750	2,380	3,130	7,640	4,350	5,910	4,220	7,640
3	4,490	3,600	2,380	2,260	2,630	2,380	3,360	7,430	4,630	6,090	4,220	6,830
4	4,220	3,720	2,720	2,370	2,510	2,460	4,490	6,450	4,090	7,640	4,090	6,450
5	4,350	3,600	2,540	2,370	2,390	2,380	5,390	5,910	4,220	7,430	4,090	5,560
6	4,090	3,480	2,460	2,260	2,510	2,310	5,910	5,730	4,090	7,030	4,490	5,560
7	3,960	3,600	2,540	2,260	2,510	2,310	5,730	5,730	4,220	6,090	4,630	6,090
8	3,840	3,130	2,820	2,470	2,510	2,380	6,450	5,560	3,960	6,640	5,560	5,230
9	3,960	3,240	2,820	2,260	2,150	2,460	6,640	5,390	3,720	6,090	6,640	4,770
10	3,840	3,130	2,630	1,950	2,150	2,380	5,730	6,270	3,840	5,730	6,270	4,490
11	3,600	3,130	2,630	2,060	2,380	2,460	6,830	5,910	4,350	5,390	6,640	4,220
12	4,220	2,630	2,540	2,060	2,310	2,630	6,640	5,230	3,840	5,070	5,390	4,630
13	4,220	3,130	2,460	2,260	2,310	2,540	5,730	5,730	4,060	4,770	4,770	4,490
14	4,090	3,020	2,380	2,160	2,310	2,630	5,230	5,560	3,960	3,960	4,630	4,770
15	4,090	3,020	2,310	2,160	2,240	2,540	5,390	6,450	5,070	4,220	5,070	4,920

Daily discharge, in second-feet, of Mississippi River at St. Paul, Minn., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
16	3,960	2,820	2,820	2,160	2,240	2,540	5,560	6,450	3,960	3,720	4,770	5,070
17	3,840	3,240	2,380	2,260	2,310	2,820	5,560	6,090	4,490	3,480	4,920	4,920
18	3,720	3,360	2,540	2,060	2,310	2,920	4,920	6,450	4,920	3,480	4,920	5,390
19	4,220	2,720	2,630	2,060	2,310	3,240	4,630	5,910	5,230	4,220	5,560	5,730
20	4,220	3,480	2,630	1,850	2,310	2,630	5,070	5,910	5,070	3,480	5,070	4,230
21	4,220	3,020	2,820	1,950	2,380	2,630	4,220	5,730	5,070	3,600	6,640	4,770
22	3,840	2,920	2,920	2,060	2,310	3,020	4,770	5,390	4,920	3,360	8,060	4,770
23	3,840	3,130	2,820	1,950	2,310	3,240	4,490	5,390	5,390	3,720	7,030	6,270
24	3,720	3,020	2,460	2,060	2,380	2,630	4,490	5,070	5,070	3,360	9,180	5,910
25	3,600	3,130	2,630	1,950	2,310	3,130	5,390	5,390	6,090	4,350	11,500	5,560
26	3,960	2,920	2,460	2,060	2,380	3,020	5,910	4,770	6,270	4,350	12,900	6,270
27	4,090	3,360	2,960	2,060	2,310	2,920	7,230	4,920	6,090	4,350	12,900	7,640
28	4,090	2,820	2,350	2,060	2,380	3,480	7,230	4,920	5,730	4,090	12,900	8,720
29	4,090	2,720	2,060	2,060	2,380	3,480	8,060	4,220	6,270	3,720	12,000	8,500
30	4,090	2,820	1,970	1,950	-------	2,380	7,230	4,770	6,830	4,490	10,700	8,280
31	3,720	-------	1,880	2,160	-------	2,460	-------	4,770	-------	4,490	9,660	-------

NOTE.—Stage-discharge relation affected by ice Dec. 27 to Feb. 10; discharge estimated from comparison with discharge of Mississippi River at Elk River.

Monthly discharge of Mississippi River at St. Paul, Minn., for the year ending September 30, 1924

[Drainage area, 35,700 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	4,920	3,600	4,060	0.114	0.13
November	3,720	2,630	3,170	.089	.10
December	3,020	1,880	2,560	.072	.08
January	2,470	1,850	2,120	.059	.07
February	2,750	2,150	2,380	.067	.07
March	3,480	2,310	2,680	.075	.09
April	8,060	3,020	5,480	.154	.17
May	7,640	4,220	5,770	.162	.19
June	6,830	3,720	4,830	.135	.15
July	7,640	3,360	4,860	.136	.16
August	12,900	3,960	6,880	.193	.22
September	8,950	4,220	5,920	.166	.19
The year	12,900	1,850	4,230	.118	1.62

MINNESOTA RIVER NEAR MONTEVIDEO, MINN.

LOCATION.—In sec. 17, T. 117 N., R. 40 W. at highway bridge 1 mile south of Montevideo, Chippewa County, and 500 feet below mouth of Chippewa River.

DRAINAGE AREA.—6,300 square miles.

RECORDS AVAILABLE.—July 22, 1909, to September 30, 1924.

GAGE.—Chain gage attached to upstream handrail of bridge near left bank; read by Elizabeth Hendricks.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of heavy gravel and sand; fairly permanent. There is a slight riffle just below gage, but control section poorly defined. Banks fairly high but subject to overflow at stage of about 14 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.30 feet April 9 (discharge, 759 second-feet); minimum stage, 1.54 feet at 6 p. m. August 16 (discharge, 36 second-feet).

1909–1924: Maximum stage recorded, about 18.85 feet June 25, 1919 (discharge, about 22,000 second-feet); minimum discharge, 6.8 second-feet by current-meter measurement, February 9, 1912.

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

The following discharge measurement was made:

June 18, 1924: Gage height, 4.34 feet; discharge, 490 second-feet.

Daily discharge, in second-feet, of Minnesota River near Montevideo, Minn., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June	July	Aug.	Sept.
1	71	58	75	-------	78	619	216	338	71	171
2	66	64	75	-------	78	566	189	338	76	138
3	64	61	75	-------	62	514	189	316	71	116
4	79	74	75	-------	81	488	171	316	69	109
5	83	78	74	-------	100	462	114	294	67	110
6	79	74	71	-------	115	436	225	274	76	108
7	74	78	67	-------	362	410	198	244	78	84
8	66	77	65	54	675	462	189	264	71	100
9	65	73	68	54	759	462	180	294	65	109
10	71	71	72	53	703	462	234	274	65	99
11	75	65	77	53	619	386	254	207	61	87
12	75	71	76	54	514	436	386	198	58	123
13	97	68	77	54	514	514	436	189	55	146
14	78	73	78	54	436	514	462	171	54	116
15	67	83	78	53	410	410	540	154	53	112
16	78	82	78	52	362	386	514	130	36	114
17	65	80	76	50	488	410	540	123	38	111
18	66	71	78	48	436	436	514	114	116	104
19	79	68	79	46	410	410	436	100	115	92
20	86	67	75	44	386	386	462	102	47	86
21	66	63	71	43	410	362	386	102	316	146
22	62	64	-------	42	362	362	362	123	362	244
23	59	54	-------	46	338	338	362	104	264	146
24	62	64	-------	50	338	316	362	105	254	130
25	60	67	-------	54	338	316	386	123	274	123
26	63	69	-------	55	362	316	386	100	234	180
27	63	77	-------	56	436	284	362	96	216	198
28	59	72	-------	60	514	284	362	93	180	244
29	62	65	-------	65	592	274	362	87	146	189
30	59	68	-------	69	647	225	338	81	138	171
31	59	-------	-------	74	-------	234	-------	81	207	-------

NOTE.—Stage-discharge relation affected by ice Dec. 2, 3, 13, Dec. 22 to Mar. 7, and Mar. 28–31. Discharge interpolated Dec. 2, 3, 13, and Mar. 9, 10, 12, 14, 16, 17, 19, 21, 23, 24, 26, 28–31. Discharge not determined Dec. 22 to Mar. 7.

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Monthly discharge of Minnesota River near Montevideo, Minn., for the year ending September 30, 1924

[Drainage area, 6,300 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	97	59	69.6	0.011	0.01
November	83	54	70.0	.011	.01
December 1–21	79	65	74.3	.012	.01
March 8–31	74	42	53.5	.008	.01
April	759	62	398	.063	.07
May	619	225	403	.064	.07
June	540	114	337	.053	.06
July	338	81	179	.028	.03
August	362	36	127	.020	.02
September	244	84	134	.021	.02

MINNESOTA RIVER AT MANKATO, MINN.

LOCATION.—In sec. 7, T. 108 N., R. 26 W., at Main Street highway bridge in Mankato, Blue Earth County, 2 miles below mouth of Blue Earth River.

DRAINAGE AREA.—14,600 square miles.

RECORDS AVAILABLE.—March 15, 1922, to September 30, 1924, at present site; May 20, 1903, to October 19, 1921, at Sibley Park 2 miles upstream. Records comparable.

GAGE.—Chain gage attached to downstream side of bridge over center of left channel; read by J. J. Pihale.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of sand and light gravel; shifts badly during high stages. Banks moderately high and not subject to overflow. Control poorly defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period March 15 to September 30, 1922, 13.5 feet; March 16 (discharge about 9,040 second-feet); minimum stage, 3.3 feet September 16, 22–30 (discharge, 133 second-feet).

Maximum stage recorded during year ending September 30, 1923, 5.49 feet May 4 (discharge, 1,630 second-feet); minimum stage, 3.24 feet October 6, September 15, 16 (discharge, 96 second-feet).

Maximum stage recorded during year ending September 30, 1924, 7.8 feet July 2 (discharge, 3,540 second-feet); minimum stage, 3.3 feet October 5, December 2–4, 26 (discharge, 133 second-feet).

1903–1924: Maximum stage recorded, 21.2 feet at old site at Sibley Park June 26, 1908 (discharge, 43,800 second-feet); minimum discharge, 89 second-feet August 31 and September 1 and 2, 1911. Highest known stage occurred in 1881 and is shown in Mankato by a well-marked line, which was approximately 27 feet above the zero of Sibley Park gage. This stage is corroborated by M. B. Haynes, city engineer of Mankato, who states that high water occurred after ice went out and was not caused by back water. The corresponding discharge was estimated at 65,000 second-feet.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Nearest dam is at Minnesota Falls, 140 miles upstream. A dam on Blue Earth River at Rapidam, a few miles above mouth, controls the flow of that river, which is approximately 20 per cent of that at Mankato station, and produces considerable daily fluctuation at gage, amounting at times to over 1 foot.

ACCURACY.—Stage-discharge relation probable permanent since gage has been installed at present site. Rating curve well defined below 5,000 second-feet and extended above. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.
COOPERATION.—Gage-height record furnished by United States Weather Bureau.

The following discharge measurements were made:
June 20, 1924: Gage height, 4.82 feet; discharge, 1,220 second-feet.
September 10, 1924: Gage height, 4.03 feet; discharge, 567 second-feet.

Daily discharge, in second-feet, of Minnesota River at Mankato, Minn., for the years ending September 30, 1922–1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922										
1					6,140	3,540	1,870	657	725	226
2					6,440	3,720	1,790	657	725	226
3					6,640	4,350	1,790	590	657	226
4					6,740	4,530	1,630	590	590	226
5					6,840	3,360	1,470	525	590	226
6					6,840	3,450	1,390	525	525	226
7					6,640	3,110	1,390	590	525	226
8					6,540	3,110	1,390	525	461	226
9					6,540	3,020	1,470	590	461	226
10					6,940	3,020	1,390	525	399	176
11					7,240	3,020	1,320	525	399	176
12					7,840	3,110	1,240	657	461	176
13					7,840	2,940	1,390	590	399	176
14					8,240	2,860	1,320	590	399	176
15				7,340	8,340	2,860	1,240	525	339	176
16				9,040	8,240	2,770	1,470	461	339	133
17				6,940	8,140	2,770	1,240	461	281	176
18				6,340	7,940	2,770	1,240	361	226	176
19				6,140	7,440	2,680	1,090	525	226	226
20				5,380	6,640	2,600	1,090	525	226	176
21				5,180	6,340	2,520	1,090	461	399	176
22				5,380	5,760	2,520	1,020	399	339	133
23				5,660	5,470	2,430	1,020	339	339	133
24				6,340	5,000	2,270	1,020	399	339	133
25				6,440	4,900	2,270	867	399	339	133
26				5,940	4,800	2,270	795	339	281	133
27				5,660	4,440	2,190	795	399	226	133
28				5,660	4,260	2,190	725	590	226	133
29				5,850	4,080	2,110	725	725	226	133
30				5,660	3,900	1,950	725	725	176	133
31				6,040		1,870		725	176	
1922–23										
1	133	226	461		1,160	1,470	725	725	226	176
2	133	339	399		1,090	1,470	657	725	226	176
3	133	281	399		1,090	1,550	657	657	226	176
4	133	339	399		940	1,630	657	657	226	176
5	133	339	281		1,020	1,550	657	590	226	176
6	96	339	281		1,020	1,550	590	590	226	176
7	176	339	281		940	1,550	657	590	281	176
8	133	339			940	1,550	657	590	281	133
9	133	339			940	1,470	657	590	281	133
10	133	399			1,240	1,390	657	525	226	133
11	133	399			1,240	1,320	590	525	226	133
12	133	399			1,160	1,320	590	525	226	176
13	133	399			1,240	1,320	590	461	176	176
14	133	525			1,390	1,160	590	461	226	133
15	133	461			1,240	1,160	590	461	226	96
16	133	399			1,320	1,090	590	461	176	96
17	133	399			1,390	1,090	590	399	176	96
18	133	657			1,390	1,020	590	281	176	133
19	133	657			1,390	1,020	590	281	226	133
20	133	525			1,390	1,090	590	281	226	176
21	133	461		1,090	1,550	940	525	281	226	176
22	133	525		1,090	1,550	940	525	339	226	133
23	133	461		940	1,550	867	525	339	226	133
24	133	461		940	1,550	867	657	281	176	133
25	133	461		940	1,550	795	657	281	226	133

Daily discharge, in second-feet, of Minnesota River at Mankato, Minn., for the years ending September 30, 1922–1924—Continued

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922–23										
26	176	399		1,160	1,550	725	590	281	226	176
27	133	399		1,550	1,550	725	657	226	226	176
28	133	461		1,550	1,550	725	725	226	226	176
29	133	461		1,550	1,550	795	725	226	176	176
30	133	461		1,470	1,550	795	725	226	176	176
31	133			1,320		725		226	133	
1923–24										
1	176	226	176		725	1,090	725	2,940	399	1,390
2	176	226	133		725	1,160	657	3,540	339	1,390
3	176	281	133		795	1,020	657	3,200	339	1,160
4	176	281	133		940	940	657	2,770	339	1,090
5	133	281	176		1,630	940	657	2,600	339	940
6	176	226	176		2,770	1,160	590	2,350	461	795
7	176	226	226		2,770	1,160	525	2,030	399	725
8	176	226	226		2,520	1,090	461	1,790	461	657
9	281	226	176	590	2,030	1,020	461	1,550	399	657
10	399	226	176	590	1,790	940	461	1,390	399	657
11	461	226	176	525	1,790	940	525	1,240	339	590
12	461	226	176	461	1,790	867	525	1,160	339	657
13	399	281	176	399	1,870	867	725	1,090	281	657
14	339	281	176	399	1,790	867	725	867	281	525
15	339	281	226	461	1,710	940	725	867	339	461
16	399	281	226	461	1,620	1,020	795	795	339	399
17	399	281	226	399	1,550	1,020	795	795	281	399
18	339	226	226	339	1,320	940	1,320	657	281	525
19	339	226	226	399	1,090	867	1,320	657	657	525
20	339	226	226	461	940	940	1,160	590	657	525
21	281	226	226	461	867	940	1,160	657	940	525
22	281	226	226	461	940	940	1,160	657	2,520	795
23	281	226	176	399	1,020	940	1,470	590	2,520	1,320
24	281	226	176	399	940	867	1,470	525	3,450	2,350
25	226	226	176	525	867	867	1,390	461	2,940	2,520
26	281	226	133	657	867	795	1,320	525	3,450	2,110
27	281	226	176	725	867	795	1,240	525	3,110	1,950
28	281	226	176	725	940	795	1,240	461	3,020	1,710
29	281	226	176	725	1,020	795	1,160	461	2,270	1,950
30	281	226	226	725	1,020	725	1,470	399	1,870	1,950
31	226			795		725		399	1,470	

NOTE.—Stage-discharge relation affected by ice Dec. 8, 1922, to Mar. 20, 1923, and Jan. 1 to March 8, 1924; no records available.

Monthly discharge of Minnesota River at Mankato, Minn., for the years ending September 30, 1922--1924

[Drainage area, 14,600 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1922					
March 15–31	9,040	5,180	6,180	0.423	0.27
April	8,340	3,900	6,440	.441	.49
May	4,530	1,870	2,840	.195	.22
June	1,870	725	1,230	.084	.09
July	725	339	532	.036	.04
August	725	176	388	.027	.03
September	226	133	178	.012	.01
1922–23					
October	176	96	135	.009	.01
November	657	226	422	.029	.03
December 1–7	461	281	357	.024	.01
March 21–31	1,550	940	1,240	.085	.03
April	1,550	940	1,300	.089	.10
May	1,630	725	1,150	.079	.09
June	725	525	626	.043	.05
July	725	226	429	.029	.03
August	281	133	217	.015	.02
September	176	96	152	.010	.01
1923–24					
October	461	133	285	.020	.02
November	281	226	241	.017	.02
December 1–30	226	133	189	.013	.01
March 9–31	795	----------	525	.036	.03
April	2,770	725	1,380	.095	.11
May	1,160	725	935	.064	.07
June	1,470	461	918	.063	.07
July	3,540	399	1,240	.085	.10
August	3,450	281	1,140	.078	.09
September	2,520	399	1,060	.073	.08

ST. CROIX RIVER AT SWISS, WIS.

LOCATION.—In sec. 33, T. 42 N., R. 15 W., at highway bridge near Swiss, Burnett County, 2 miles above point where St. Croix River becomes boundary line between Wisconsin and Minnesota, 10 miles northeast of Danbury, on Minneapolis, St. Paul & Sault Ste. Marie Railway. Namakagon River enters from left 3½ miles above station.

DRAINAGE AREA.—1,550 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch = 6 miles).

RECORDS AVAILABLE.—March 13, 1914, to September 30, 1924.

GAGE.—Chain gage attached to downstream side of bridge, installed May 16, 1918; read by Capt. Richard Goldschmidt.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed of gravel; smooth. Aquatic plants during summer may cause a small amount of backwater at gage. Left bank high and not subject to overflow; right bank of medium height and may possibly be overflowed during extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.2 feet at 6.20 p. m. May 11 (discharge, 3,060 second-feet); minimum discharge, estimated 530 second-feet January 25 and 26 (stage-discharge relation affected by ice.

1914–1924: Maximum stage recorded, 6.73 feet April 22, 1916 (discharge, 8,480 second-feet); minimum discharge, estimated 530 second-feet, January 25 and 26, 1924 (stage-discharge relation affected by ice).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation permanent except as affected by growth of grass in channel and by ice. Rating curve fairly well defined. 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 grass growth for which it was ascertained by indirect method for shifting channel, and for ice-affected period for which it was ascertained as indicated in footnote to table of daily discharge. Records fair.

Discharge measurements of St. Croix River at Swiss, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Jan. 9	[a] 1.47	684	Feb. 2	[a] 1.59	610	Aug. 30	1.34	1,180
Jan. 10	[a] 1.49	650	June 20	1.06	1,030			

[a] Complete ice cover.

Daily discharge, in second-feet, of St. Croix River at Swiss, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	725	725	675	630	610	725	975	1,950	1,050	1,010	750	1,250
2	725	725	650	630	610	750	1,170	1,720	1,010	975	750	1,210
3	700	700	650	610	610	750	1,210	1,640	975	940	1,130	1,170
4	700	700	675	610	630	750	1,250	1,540	940	905	1,410	1,090
5	700	700	700	630	630	780	1,090	1,410	975	840	1,460	1,050
6	700	700	725	630	650	780	1,090	1,370	975	810	1,460	975
7	700	700	750	650	650	780	1,170	1,330	975	780	1,410	940
8	700	700	780	650	650	810	1,250	1,540	940	750	1,460	1,010
9	700	700	780	650	675	810	1,330	1,950	940	725	1,460	975
10	700	700	780	650	675	810	1,250	2,230	940	725	1,410	940
11	700	700	780	650	675	810	1,170	2,950	940	725	1,410	975
12	725	700	810	650	700	810	1,130	3,060	905	750	1,330	1,010
13	725	700	810	630	700	810	1,090	2,950	905	725	1,250	1,050
14	725	725	840	630	700	810	1,090	2,950	905	725	1,170	1,010
15	725	780	840	610	725	810	1,130	2,730	870	700	1,050	975
16	725	750	870	610	725	810	1,250	2,530	870	700	975	940
17	780	750	870	590	725	810	1,410	2,430	975	675	940	905
18	780	750	870	590	725	825	1,500	2,230	1,050	675	905	870
19	780	750	840	570	725	840	1,500	2,040	1,090	675	940	840
20	750	750	810	570	725	890	1,500	1,860	1,050	675	940	840
21	750	725	780	570	700	940	1,500	1,680	1,010	700	1,090	870
22	750	750	750	550	700	960	1,500	1,500	1,050	725	1,250	1,130
23	750	750	750	550	700	975	1,500	1,460	1,010	700	1,330	1,290
24	725	780	725	550	700	990	1,680	1,460	975	700	1,370	1,330
25	725	810	700	530	700	1,010	2,040	1,410	940	700	1,410	1,290
26	750	780	700	530	700	1,070	2,230	1,370	905	700	1,460	1,250
27	725	780	675	550	725	1,130	2,230	1,330	870	675	1,370	1,410
28	725	750	675	570	725	1,170	2,230	1,250	870	700	1,290	1,640
29	725	750	650	570	725	1,210	2,130	1,210	940	750	1,210	1,640
30	725	725	650	590	-------	995	2,130	1,170	1,050	810	1,210	1,590
31	725	-------	630	590	-------	780	-------	1,090	-------	780	1,210	-------

NOTE.—Stage-discharge relation affected by ice Dec. 9 to Apr. 4. Daily discharge ascertained by applying to rating table daily gage height corrected for ice effect by means of three discharge measurements, observer's notes, and weather records.

Monthly discharge of St. Croix River at Swiss, Wis., for the year ending September 30, 1924

[Drainage area, 1,550 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	780	700	727	0.469	0.54
November	810	700	734	.473	.53
December	870	630	748	.483	.56
January	650	530	600	.387	.45
February	725	610	686	.443	.48
March	1,210	725	877	.566	.65
April	2,230	975	1,460	.942	1.05
May	3,060	1,090	1,850	1.19	1.37
June	1,090	870	963	.621	.69
July	1,010	675	756	.488	.56
August	1,460	750	1,220	.787	.91
September	1,640	840	1,120	.723	.81
The year	3,060	530	978	.631	8.60

ST. CROIX RIVER NEAR GRANTSBURG, WIS.

LOCATION.—Near center of sec. 30, T. 40 N., R. 18 W., at Norway Point ferry, 6 miles above mouth of Kettle River and 10 miles north of Grantsburg, Burnett County. Sand Creek enters half a mile above station.

DRAINAGE AREA.—2,820 square miles.

RECORDS AVAILABLE.—April 18, 1923, to September 30, 1924.

GAGE.—Chain gage fastened to a cantilever arm supported by two trees just above highway and ferry site on left bank; read by Charles Panser.

DISCHARGE MEASUREMENTS.—Made from ferryboat.

CHANNEL AND CONTROL.—Bed composed of sand. Control poorly defined; apparently does not shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period ending September 30, 1923, 7.6 feet at noon April 24 and 25 (discharge, 5,920 second-feet); minimum stage, 3.90 feet at 6 p. m. September 28 and 7 a. m. September 29 (discharge, 1,020 second-feet).

Maximum stage recorded during year ending September 30, 1924, 8.20 feet at 6 p. m. May 13 (discharge, about 7,000 second-feet); minimum discharge, estimated 800 second-feet December 31 (stage-discharge relation affected by ice).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation permanent except as affected by ice and at times by growth of grass in channel. Rating curve fairly well defined between 920 and 5,500 second-feet and extended above and below. Gage read to half-tenths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height. Open-water records good; winter records fair.

COOPERATION.—Gage-height records and results of seven discharge measurements furnished by Northern States Power Co.

Discharge measurements of St. Croix River near Grantsburg, Wis., during the years ending September 30, 1923 and 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
1923	*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Apr. 28	7.05	4,960	Aug. 30	[a] 4.12	1,150	Jan. 18	[b] 4.69	993
May 14	5.55	2,680				Feb. 11	[b] 4.98	1,020
May 31	4.60	1,880	1924			Sept. 14	[a] 4.58	1,690
Aug. 15	3.90	1,160	Nov. 1	4.00	1,110			

[a] Grass in channel. [b] Complete ice cover.

Daily discharge, in second-feet, of St. Croix River near Grantsburg, Wis., for the years ending September 30, 1923 and 1924

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1923													
1	-------	3,560	1,670	3,020	1,420	1,120	16	-------	2,440	1,340	2,240	1,120	1,120
2	-------	3,560	1,580	2,900	1,420	1,120	17	-------	2,340	1,340	2,040	1,120	1,120
3	-------	4,020	1,580	2,780	1,420	1,120	18	4,340	2,240	1,190	1,850	1,120	1,120
4	-------	4,180	1,500	2,660	1,340	1,120	19	3,560	2,140	1,190	1,760	1,120	1,120
5	-------	4,020	1,670	2,340	1,340	1,120	20	4,020	2,660	1,260	1,670	1,190	1,120
6	-------	3,710	1,580	2,340	1,260	1,120	21	4,680	3,150	1,340	1,580	1,120	1,120
7	-------	3,560	1,580	2,440	1,260	1,260	22	5,020	3,150	1,420	1,500	1,190	1,120
8	-------	3,420	1,670	2,440	1,260	1,260	23	5,740	2,780	1,500	1,670	1,260	1,120
9	-------	3,420	1,670	2,340	1,260	1,260	24	5,920	2,660	1,670	1,940	1,190	1,120
10	-------	3,150	1,580	3,560	1,260	1,120	25	5,920	2,440	2,340	2,040	1,120	1,120
11	-------	3,020	1,500	4,680	1,260	1,120	26	5,380	2,240	4,850	1,940	1,120	1,050
12	-------	2,900	1,500	4,510	1,260	1,050	27	5,200	2,140	5,740	1,760	1,120	1,050
13	-------	2,660	1,420	3,710	1,190	1,120	28	5,020	2,040	5,020	1,670	1,260	1,050
14	-------	2,660	1,420	3,020	1,190	1,120	29	4,340	1,940	3,860	1,670	1,260	1,050
15	-------	2,550	1,420	2,440	1,190	1,120	30	3,860	1,850	3,280	1,580	1,120	1,050
							31	-------	1,760	-------	1,420	1,120	------

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1923–24												
1	1,050	1,120	1,420	800		1,120	1,670	3,860	1,850	1,670	1,340	2,040
2	1,050	1,120	1,420	800		1,120	1,670	3,280	1,850	1,580	1,340	1,940
3	1,120	1,120	1,420	800		1,120	1,670	3,020	1,850	1,580	1,760	1,940
4	1,050	1,120	1,420	800		1,120	1,670	2,550	1,760	1,500	3,280	1,850
5	1,050	1,120	1,420	860		1,120	1,760	2,340	1,760	1,420	3,860	1,760
6	1,050	1,190	1,340	860		1,120	1,760	2,140	1,760	1,340	3,860	1,670
7	1,050	1,190	1,340	860		1,120	1,760	2,140	1,760	1,340	3,560	1,670
8	1,050	1,190	1,340	920		1,120	1,760	2,340	1,770	1,260	3,280	1,670
9	1,050	1,190	1,340			1,120	1,850	2,780	1,760	1,260	3,420	1,670
10	1,050	1,190	1,340			1,190	1,850	3,710	1,760	1,260	3,280	1,580
11	985	1,190	1,340			1,190	1,760	4,850	1,670	1,190	3,020	1,580
12	1,050	1,190	1,340			1,190	1,670	6,280	1,670	1,260	2,660	1,580
13	1,120	1,260	1,340			1,190	1,580	7,000	1,580	1,260	2,440	1,670
14	1,120	1,260	1,340			1,190	1,580	6,640	1,580	1,260	2,340	1,670
15	1,120	1,260	1,340		1,050	1,260	1,580	6,640	1,580	1,190	2,140	1,760
16	1,120	1,340	1,260			1,260	1,580	5,920	1,500	1,190	1,940	1,670
17	1,120	1,340	1,260			1,260	1,760	5,020	1,500	1,120	1,760	1,580
18	1,120	1,340	1,260			1,260	1,940	4,340	1,580	1,120	1,670	1,580
19	1,120	1,340	1,260			1,340	1,940	3,560	1,670	1,120	1,760	1,580
20	1,120	1,340	1,260	985		1,340	2,040	3,150	1,760	1,120	1,670	1,500
21	1,190	1,340	1,260			1,340	2,040	2,780	1,760	1,260	1,850	1,580
22	1,190	1,260	1,260			1,420	1,940	2,550	1,670	1,260	2,340	2,780
23	1,190	1,340	1,190			1,420	1,940	2,440	1,670	1,190	2,780	4,510
24	1,190	1,340	1,120			1,420	2,040	2,440	1,670	1,190	2,780	5,380
25	1,120	1,420	1,120			1,420	2,780	2,440	1,580	1,120	2,550	4,850
26	1,120	1,420	1,050			1,500	3,560	2,340	1,580	1,190	2,440	3,710
27	1,120	1,420	985			1,500	4,020	2,240	1,420	1,190	2,340	3,560
28	1,120	1,340	985			1,500	4,180	2,140	1,420	1,120	2,340	4,180
29	1,120	1,420	920			1,580	4,340	2,140	1,580	1,120	2,140	4,340
30	1,120	1,420	860		-------	1,580	4,180	1,940	1,670	1,260	1,940	4,180
31	1,120	-------	800		-------	1,580	-------	1,850	-------	1,340	2,040	-------

NOTE.—Stage-discharge relation affected by ice Dec. 3 to Apr. 6; discharge based on gage height corrected for effect of ice by discharge measurements, observer's notes, and weather records.

Monthly discharge of St. Croix River near Grantsburg, Wis., for the years ending September 30, 1923 and 1924

[Drainage area, 2,820 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1923					
April 18–30	5,920	3,560	4,850	1.72	0.83
May	4,180	1,760	2,850	1.01	1.16
June	5,740	1,190	2,020	.716	.80
July	4,680	1,420	2,370	.840	.97
August	1,420	1,120	1,220	.433	.50
September	1,260	1,050	1,120	.397	.44
1923–24					
October	1,190	985	1,100	.390	.45
November	1,420	1,120	1,270	.450	.50
December	1,420	800	1,240	.440	.51
January	----------	----------	947	.336	.39
February	----------	----------	[a] 1,050	.372	.40
March	1,580	1,120	1,290	.457	.53
April	4,340	1,580	2,200	.780	.87
May	7,000	1,850	3,450	1.22	1.41
June	1,850	1,420	1,670	.592	.66
July	1,670	1,120	1,270	.450	.52
August	3,860	1,340	2,450	.869	1.00
September	5,380	1,500	2,430	.862	.96
The year	7,000	800	1,700	.603	8.20

[a] Estimated.

ST. CROIX RIVER NEAR RUSH CITY, MINN.

LOCATION.—In SW. ¼ sec. 8, T. 37 N., R. 20 W., at Northern Pacific Railway bridge 5 miles east of Rush City, Chisago County, and 10 miles below mouth of Snake River.

DRAINAGE AREA.—5,120 square miles.

RECORDS AVAILABLE.—April 18, 1923, to September 30, 1924.

GAGE.—Chain gage attached to downstream side of railroad bridge near right end; read by Ludwig Lelander.

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

CHANNEL AND CONTROL.—Bed composed of sand and silt; not permanent. Control poorly defined. Aquatic plants during summer cause backwater.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period ending September 30, 1923, 5.4 feet April 24 and 25 (discharge, 10,600 second-feet); minimum discharge, 1,210 second-feet, September 4–30.

Maximum stage recorded during year ending September 30, 1924, 6.3 feet May 14 and 15 (discharge about 13,700 second-feet); minimum discharge, 880 second-feet October 2 and 3.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined between 1,800 and 11,000 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height. Aquatic growth obstructed channel and caused backwater during a part of summer and fall of 1923 and 1924. Discharge for these periods ascertained by indirect method for shifting channel. Open-water records fair; winter records poor.

COOPERATION.—Gage-height record and results of six measurements furnished by Northern States Power Co.

Discharge measurements of St. Croix River near Rush City, Minn., during the years ending September 30, 1923 and 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
1923	*Feet*	*Sec.-ft.*	1924	*Feet*	*Sec.-ft.*	1924	*Feet*	*Sec.-ft.*
Apr. 23	5.2	9,840	Oct. 27	2.6	1,520	Sept. 15	[b] 3.20	2,400
May 15	3.5	4,390	Jan. 22	[a] 3.55	1,150			
June 1	2.92	2,780						
Aug. 16	2.6	1,290						

[a] Stage-discharge relation affected by ice. [b] Grass in channel.

Daily discharge, in second-feet, of St. Croix River near Rush City, Minn., for the years ending September 30, 1923 and 1924

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1923							1923						
1		7,200	2,750	4,390	1,600	1,210	16		4,390	2,030	3,530	1,210	1,210
2		7,200	2,750	4,390	1,600	1,600	17		4,100	1,810	3,260	1,210	1,210
3		8,520	2,500	4,100	1,600	1,400	18	6,560	4,100	1,810	3,000	1,210	1,210
4		9,200	2,500	4,100	1,600	1,210	19	7,530	3,810	1,810	2,500	1,210	1,210
5		9,200	2,500	3,810	1,600	1,210	20	7,200	4,690	1,810	2,260	1,210	1,210
6		8,520	2,500	3,810	1,600	1,210	21	7,860	6,240	1,810	2,030	1,210	1,210
7		7,860	2,500	4,100	1,210	1,210	22	9,200	6,560	1,810	2,030	1,600	1,210
8		7,530	2,500	4,100	1,210	1,210	23	9,880	5,920	2,030	2,260	1,600	1,210
9		7,200	2,500	4,100	1,210	1,210	24	10,600	5,300	2,500	2,750	1,600	1,210
10		6,560	2,500	4,690	1,210	1,210	25	10,600	5,300	2,750	3,000	1,600	1,210
11		6,560	2,260	7,530	1,210	1,210	26	9,880	4,690	4,990	2,750	1,600	1,210
12		5,610	2,260	7,860	1,210	1,210	27	9,540	4,100	7,200	2,500	1,210	1,210
13		5,300	2,260	7,200	1,210	1,210	28	9,200	3,530	7,200	2,260	1,210	1,210
14		4,990	2,260	5,610	1,210	1,210	29	8,520	3,530	5,920	2,030	1,210	1,210
15		4,690	2,260	4,690	1,210	1,210	30	7,860	3,000	5,300	2,030	1,210	1,210
							31		3,000		2,030	1,210	

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1923–24												
1	1,040	1,600	2,260	2,030	1,600	2,030	3,000	7,860	3,530	3,000	2,030	3,000
2	880	1,810	2,260	1,810	1,600	2,030	3,000	7,200	3,530	3,000	2,030	3,000
3	1,210	1,810	2,030	1,600	1,600	2,030	3,000	6,560	3,260	2,750	2,500	3,000
4	1,210	1,810	2,030	1,600	1,600	2,030	3,530	5,920	3,000	2,750	5,300	2,750
5	1,210	1,810	2,030	1,600	1,610	2,030	3,810	5,300	3,000	2,500	7,860	2,500
6	1,210	1,810	2,030	1,400	1,600	2,260	3,530	4,990	3,260	2,500	8,520	2,500
7	1,210	1,810	2,030	1,600	1,810	2,260	3,530	4,690	3,260	2,500	8,190	2,500
8	1,210	1,810	2,030	1,400	1,810	2,030	3,530	4,690	3,000	2,260	7,860	2,500
9	1,210	1,810	2,260	1,400	1,810	2,030	3,530	5,610	3,260	2,260	7,860	2,260
10	1,210	1,810	2,030	1,400	1,810	2,030	3,260	7,200	3,260	2,030	7,860	2,030
11	1,210	2,030	1,600	1,210	1,810	2,030	3,530	9,200	3,260	2,030	6,880	2,030
12	1,210	2,030	2,260	1,210	1,810	2,030	3,260	11,200	3,000	2,750	5,920	2,030
13	1,210	2,030	1,810	1,210	1,810	2,260	3,260	12,600	3,000	2,500	5,300	2,030
14	1,210	2,260	1,810	1,210	1,810	2,500	3,260	13,700	3,000	2,260	4,690	2,260
15	1,210	2,260	1,810	1,400	1,810	2,500	3,260	13,400	3,000	2,260	4,100	2,500
16	1,210	2,260	2,030	1,400	1,810	2,260	3,260	12,600	2,750	2,030	3,810	2,500
17	1,210	2,030	2,030	1,210	1,810	2,260	3,260	11,200	2,750	2,030	3,530	2,030
18	1,210	2,030	2,030	1,040	1,810	2,260	3,530	9,540	2,750	1,810	3,000	2,030
19	1,210	2,030	2,030	1,040	1,810	2,260	3,810	8,520	3,000	1,810	3,000	2,030
20	1,210	2,260	2,030	1,040	1,810	2,500	3,810	7,200	3,000	1,600	3,000	2,030
21	1,210	2,260	2,030	1,040	1,810	2,500	3,810	6,560	3,000	2,030	3,000	2,030
22	1,210	2,030	2,030	1,040	1,810	2,500	3,810	5,920	3,260	2,030	3,810	3,000
23	1,210	2,260	2,030	1,040	1,810	2,500	3,810	5,610	3,260	2,030	4,690	5,300
24	1,210	2,260	1,810	1,210	1,810	2,500	3,810	5,610	3,260	2,030	4,690	6,880
25	1,210	2,260	1,600	1,210	1,810	2,750	5,300	5,300	3,000	2,030	4,690	6,560
26	1,210	2,260	1,600	1,210	1,810	2,750	6,880	5,300	3,000	1,810	4,100	5,300
27	1,210	2,260	1,600	1,210	1,810	2,750	7,530	4,690	2,750	1,600	4,100	5,300
28	1,210	2,260	1,600	1,210	1,810	2,750	7,860	4,690	2,750	1,600	3,810	5,920
29	1,600	2,260	1,600	1,400	1,810	2,750	8,520	4,100	3,000	1,600	3,530	6,880
30	1,600	2,260	1,600	1,600	-------	3,000	8,520	4,100	3,000	1,810	3,000	7,200
31	1,600	-------	1,600	1,600	-------	3,000	-------	3,810	-------	2,030	3,000	-------

NOTE.—Stage-discharge relation affected by ice Nov. 30 to Apr. 10; discharge based on gage heights corrected for effect of ice by one discharge measurement, observer's notes, and weather records.

Monthly discharge of St. Croix River near Rush City, Minn., for the years ending September 30, 1923 and 1924

[Drainage area, 5,120 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1923					
April 18–30	10,600	6,560	8,800	1.72	0.83
May	9,200	3,000	5,750	1.12	1.29
June	7,200	1,810	2,920	.570	.64
July	7,860	2,030	3,700	.723	.83
August	1,600	1,210	1,350	.264	.30
September	1,600	1,210	1,230	.240	.27
1923–24					
October	1,600	880	1,230	.240	.28
November	2,260	1,600	2,050	.400	.45
December	2,260	1,600	1,920	.375	.43
January	2,030	1,040	1,340	.262	.30
February	1,810	1,600	1,770	.346	.37
March	3,000	2,030	2,370	.463	.53
April	8,520	3,000	4,260	.832	.93
May	13,700	3,810	7,250	1.42	1.64
June	3,530	2,750	3,070	.600	67
July	3,000	1,600	2,170	.424	.49
August	8,520	2,030	4,700	.918	1.06
September	7,200	2,030	3,400	.664	.74
The year	13,700	880	2,960	.578	7.89

ST. CROIX RIVER NEAR ST. CROIX FALLS, WIS.

LOCATION.—In W. ½ sec. 18, T. 34 N., R. 18 W., at power plant of Northern States Power Co., on Wisconsin side of St. Croix River near St. Croix Falls, Polk County.

DRAINAGE AREA.—5,930 square miles.

RECORDS AVAILABLE.—January 1, 1910, to September 30, 1924. Discharge measurements for 1903 published in Water-Supply Paper 98, under St. Croix River near Taylors Falls, Minn. Records from January 10, 1902, to December, 1909, published in "Report of water resources investigation of Minnesota, 1909–1912" by Minnesota State Drainage Commission.

DISCHARGE.—Determinations of discharge based on kilowatt output of dynamo and exciters plus flow over dam and spillway considered as a weir.

EXTREMES OF DISCHARGE.—Maximum daily discharge recorded during year, 9,800 second-feet May 15; minimum daily discharge, 595 second-feet March 2.

1902–1905; 1910–1924: Maximum discharge recorded, 35,800 second-feet March 26, 1920; minimum discharge, 75 second-feet July 17, 1910 (caused by regulation).

REGULATION.—Low-water flow controlled by operation of gates of power plant.

ACCURACY.—Three current-meter measurements made in June, 1924, indicate that computed discharges are from 5 to 12 per cent too low. Records probably fair.

COOPERATION.—Records of daily discharge furnished by Northern States Power Co.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,700	1,420	2,040	1,100	1,340	1,900	1,720	6,060	2,550	2,150	1,830	2,350
2	1,740	1,680	2,060	1,360	1,300	595	1,740	5,640	2,920	2,400	2,090	2,300
3	1,440	1,760	1,920	1,540	1,200	1,880	1,980	5,340	2,940	2,370	2,660	2,730
4	1,700	1,460	1,670	1,340	1,360	1,680	3,140	4,320	2,540	2,550	3,550	2,630
5	1,580	1,660	1,820	1,350	1,160	1,640	2,080	4,770	2,660	2,120	4,940	2,460
6	1,780	1,580	1,880	1,480	1,540	1,640	955	4,740	2,680	2,040	6,070	2,490
7	1,740	1,700	1,680	1,520	1,480	1,640	3,820	3,840	3,000	1,950	6,470	2,380
8	1,700	1,760	1,700	1,660	1,440	1,780	3,460	4,180	2,420	2,010	6,480	2,220
9	1,680	1,450	1,390	1,980	1,800	805	3,180	4,880	2,700	1,870	6,200	2,330
10	1,650	1,400	1,680	1,520	1,100	1,980	3,240	5,040	2,660	1,870	6,570	2,340
11	1,720	1,580	1,620	1,380	1,520	1,840	3,300	6,220	2,680	1,810	6,360	2,130
12	1,980	1,540	1,400	2,080	1,260	1,620	2,540	8,280	2,700	1,880	5,790	2,230
13	1,010	1,860	1,580	1,320	1,240	1,780	1,350	8,880	2,660	1,940	4,900	2,860
14	1,740	1,740	1,630	1,300	1,880	1,680	4,040	9,420	2,540	2,030	4,400	1,960
15	1,800	1,620	1,640	1,430	1,240	1,460	4,360	9,800	2,720	1,720	4,860	2,710
16	1,620	1,720	1,250	1,560	1,760	895	3,620	8,420	2,540	1,700	3,990	2,340
17	1,420	1,620	1,640	1,480	970	1,920	2,500	7,660	2,380	1,800	2,530	2,470
18	1,640	1,740	1,600	1,300	1,700	1,960	2,890	7,720	2,220	1,730	3,040	2,240
19	1,530	1,660	1,580	1,700	1,280	1,640	2,720	5,780	2,600	1,420	3,120	2,240
20	1,980	1,680	1,980	695	1,600	1,660	3,420	5,660	2,400	1,520	2,610	2,250
21	1,580	1,580	2,660	1,480	1,600	1,580	3,980	5,280	2,540	1,520	3,310	2,300
22	1,620	1,660	2,300	1,320	1,480	1,960	3,040	4,700	2,420	1,830	2,650	2,500
23	1,430	2,180	1,600	1,350	1,480	1,080	3,460	4,400	3,180	1,730	4,090	4,480
24	1,940	1,780	1,990	1,340	855	2,300	3,240	4,420	2,340	1,760	3,780	4,300
25	1,640	1,820	1,470	1,120	1,580	2,320	3,160	4,500	2,600	1,820	4,630	5,080
26	1,870	2,040	1,960	1,520	1,820	2,280	4,260	4,140	2,400	1,700	3,900	5,160
27	1,650	1,940	2,600	2,240	1,640	2,120	4,780	4,120	2,380	1,610	3,750	4,640
28	1,500	1,460	2,220	1,260	1,500	2,080	5,740	3,580	2,440	1,640	3,820	4,440
29	1,710	1,580	2,700	1,300	1,420	2,060	5,620	3,440	2,480	1,530	3,580	6,150
30	1,340	1,540	1,100	1,300	-------	1,430	6,460	3,360	2,440	1,880	2,690	7,640
31	1,760	-------	2,020	1,420	-------	1,860	-------	3,500	-------	1,680	2,230	-------

Monthly discharge of St. Croix River near St. Croix Falls, Wis., for the year ending September 30, 1924

[Drainage area, 5,930 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,980	1,010	1,650	0.278	0.32
November	2,180	1,400	1,670	.282	31
December	2,700	1,100	1,820	.307	.35
January	2,240	695	1,440	.243	.28
February	1,880	855	1,430	.241	.26
March	2,320	595	1,710	.288	.33
April	6,460	955	3,330	.562	.63
May	9,800	3,360	5,550	.936	1.08
June	3,180	2,220	2,590	.437	.49
July	2,550	1,420	1,860	.314	.36
August	6,570	1,830	4,090	.690	.80
September	7,640	1,960	3,140	.530	.59
The year	9,800	595	2,530	.427	5.80

NOTE.—Computed by United States Geological Survey engineers from daily-discharge records furnished by Northern States Power Co.

NAMAKAGON RIVER AT TREGO, WIS.

LOCATION.—In sec. 35, T. 40 N., R. 12 W., at Chicago & Northwestern Railway bridge at Trego, Washburn County, 20 miles above confluence with Totogatic River.

DRAINAGE AREA.—420 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—March 11, 1914, to September 30, 1924.

GAGE.—Enameled staff gage fastened to retaining wall on left bank just above bridge; read by Patrick Lawton.

DISCHARGE MEASUREMENTS.—Made from lower chords of railroad bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel. Banks medium high and not subject to overflow. Small island downstream with rapids on either side forms control; fairly permanent. A small amount of grass sometimes appears in channel during summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.35 feet May 13 (discharge, 838 second-feet); minimum discharge estimated 255 second-feet January 26–29 (stage-discharge relation affected by ice).

1914–1924: Maximum stage recorded, 3.60 feet April 11, 1922 (discharge, 1,810 second-feet); minimum discharge, estimated 235 second-feet December 19, 1916 (stage-discharge relation affected by ice).

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

ACCURACY.—Stage-discharge relation permanent except for ice and growth of grass. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except for ice-affected period. Open-water records good; winter records fair.

Discharge measurements of Namakagon River at Trego, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
Jan. 11	[a] 2.05	283	Aug. 29	[b] 1.76	426
Feb 5	[a] 2.23	267	Aug. 30	[b] 1.83	463
June 19	1.70	419			

[a] Stage-discharge relation affected by ice.
[b] Stage-discharge relation affected by grass growth on control.

Daily discharge, in second-feet, of Namakagon River at Trego, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	332	332	332	270	260	290	417	630	444	393	332	472
2	332	332	332	260	270	290	417	564	393	369	308	472
3	332	332	350	260	270	290	417	564	417	369	502	472
4	308	332	350	260	270	300	417	532	417	369	532	444
5	308	320	350	260	270	300	444	502	417	350	564	417
6	308	332	350	270	270	300	472	532	393	369	532	393
7	308	332	350	280	270	300	502	532	393	369	502	417
8	308	320	350	280	270	300	532	564	393	350	472	417
9	332	320	350	280	270	300	544	698	393	350	472	393
10	332	332	350	280	270	300	532	768	393	350	444	393
11	320	350	350	280	280	300	472	803	393	350	444	393
12	332	320	369	280	280	300	472	803	393	369	472	417
13	320	332	280	280	280	300	472	838	393	350	444	417
14	320	332	310	280	280	300	444	803	369	332	417	417
15	320	332	350	280	280	300	472	803	350	350	393	417
16	332	332	350	270	280	310	502	803	350	350	369	393
17	332	350	370	270	280	310	544	698	444	350	369	393
18	350	332	370	270	270	320	597	630	444	350	350	393
19	369	332	370	270	270	332	597	597	417	332	369	369
20	350	332	369	270	270	350	630	564	393	332	369	369

Daily discharge, in second-feet, of Namakagon River at Trego, Wis., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
21	350	332	350	270	270	369	630	564	393	332	393	393
22	332	332	350	260	270	332	544	532	502	332	597	532
23	332	350	350	260	270	332	597	532	417	332	630	564
24	332	332	332	260	270	332	597	532	417	332	532	564
25	332	332	350	260	270	350	698	532	393	332	502	532
26	332	350	369	255	270	369	733	502	393	332	532	532
27	332	350	332	255	280	369	733	502	369	332	472	597
28	332	332	308	255	290	350	733	502	369	320	444	664
29	320	350	289	255	290	393	733	564	444	332	417	733
30	332	350	280	260	-------	395	698	444	417	393	472	698
31	332	-------	270	260	-------	395	-------	444	-------	369	502	-------

NOTE.—Stage-discharge relation affected by ice Nov. 29–30, Dec. 3–8, 14–19, 30–31, Jan. 1 to March 18, and Mar. 30, 31; daily discharge ascertained by means of gage heights, two discharge measurements, observer's notes, and weather records. Stage-discharge relation affected by growth of grass at control Aug. 1 to Sept. 30; daily discharge ascertained by subtracting 0.05 foot from gage height before entering rating table.

Monthly discharge of Namakagon River at Trego, Wis., for the year ending September 30, 1924

[Drainage area, 420 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	369	308	329	0.783	0.90
November	350	320	335	.798	.89
December	370	270	340	.810	.93
January	280	255	268	.638	.74
February	290	260	274	.652	.70
March	395	290	325	.774	.89
April	733	417	553	1.32	1.47
May	838	444	609	1.45	1.67
June	502	350	404	.962	1.07
July	393	320	350	.833	.96
August	630	308	456	1.09	1.26
September	733	369	469	1.12	1.25
The year	838	255	393	.936	12.73

APPLE RIVER NEAR SOMERSET, WIS.

LOCATION.—In sec. 21, T. 31 N., R. 19 W., at power plant of St. Croix Power Co., 3½ miles below Somerset, St. Croix County, and 2 miles above mouth.

DRAINAGE AREA.—550 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch= 6 miles).

RECORDS AVAILABLE.—January, 1901, to September 30, 1924.

GAGE.—Vertical staff gages are used in determining head on wheel.

DETERMINATION OF DISCHARGE.—This discharge through plant was determined from tables computed from data collected by a series of tests at a sharp-crested weir, in September, 1920. Discharge of the turbines in second-feet, corresponding to the number of kilowatts, is determined for each hour during day from a record of the number of wheels in operation and the load. To average discharge through turbine is added leakage through the average number of wheels idle each day, the sum giving the daily flow through power house. Water is seldom wasted over spillway of dam, but when it is so wasted the quantity is computed from weir formulae and added to flow through plant. Records do not include the constant leakage of 3 second-feet through gate and flashboards.

EXTREMES OF DISCHARGE.—Maximum daily discharge during year, 537 second-feet April 8; minimum daily discharge, 69 second-feet July 21.

1904–1924: Maximum daily discharge recorded, 2,280 second-feet in June, 1905; minimum daily discharge, 20 second-feet June 26, 1921. Owing to regulation computed minimum discharge has no bearing on natural minimum flow.

REGULATION.—There are a number of power plants above station. The pondage of these plants is small, and though daily flow may be controlled to some extent, mean monthly flow probably represents nearly the natural flow.

COOPERATION.—Records furnished by St. Paul Gas Light Co., of St. Paul, Minn., D. W. Flowers, engineer.

No discharge measurements were made during year.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	189	199	190	74	197	169	261	440	195	188	118	178
2	193	175	154	185	240	187	255	418	192	200	172	170
3	185	172	177	238	170	175	345	243	153	204	157	202
4	159	151	208	185	188	253	455	228	182	129	165	203
5	195	152	179	163	159	127	396	233	157	171	180	209
6	200	174	177	154	183	188	482	280	162	142	181	238
7	168	186	160	213	186	206	527	396	152	195	182	150
8	172	175	189	239	192	227	537	389	206	157	162	156
9	189	178	166	167	205	154	475	414	186	180	189	215
10	171	174	165	189	173	201	409	476	181	157	129	227
11	197	198	165	194	175	212	273	444	200	178	161	177
12	197	167	188	208	193	202	223	433	159	164	184	231
13	203	184	161	137	191	182	254	448	175	163	185	212
14	117	173	176	173	221	200	303	308	205	206	165	153
15	196	185	190	197	173	228	399	303	216	141	156	225
16	199	164	147	194	234	154	294	298	188	148	144	215
17	169	225	191	128	146	189	130	379	223	139	143	180
18	191	159	194	182	153	235	378	351	205	160	181	197
19	191	172	187	195	185	201	301	362	183	135	286	194
20	184	189	191	166	210	179	220	259	204	166	267	211
21	140	183	192	112	181	197	331	216	149	69	362	171
22	174	191	189	187	176	205	427	219	250	103	399	212
23	178	196	164	170	211	194	316	211	229	154	435	258
24	182	213	181	185	160	181	251	361	321	146	231	218
25	165	133	141	175	165	217	328	205	229	125	267	184
26	196	179	173	184	177	188	494	242	211	134	334	219
27	206	179	205	152	175	249	478	207	214	104	200	279
28	176	171	161	148	187	315	441	209	237	111	134	247
29	176	166	178	197	191	151	521	311	193	148	188	362
30	176	164	114	179	-------	175	479	147	176	162	196	261
31	184	-------	112	183	-------	289	-------	309	-------	162	139	-------

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

[Drainage area, 550 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	206	117	181	0.329	0.38
November	225	133	178	.324	.36
December	208	112	173	.315	.36
January	238	74	176	.320	.37
February	240	146	187	.340	.37
March	289	127	201	.365	.42
April	537	130	366	.665	.74
May	476	147	314	.571	.66
June	321	149	198	.360	.41
July	206	69	153	.278	.32
August	435	118	206	.375	.43
September	362	150	212	.385	.43
The year	537	69	212	.385	5.25

CHIPPEWA RIVER AT BISHOP'S BRIDGE, NEAR WINTER, WIS.

LOCATION.—In sec. 23, T. 39 N., R. 6 W., at highway bridge 4 miles by road northwest of Winter, Sawyer County. East Fork of Chippewa River enters on left 3 miles above station.

DRAINAGE AREA.—775 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—February 23, 1912, to September 30, 1924.

GAGE.—Chain gage fastened to bridge; installed May 23, 1916; read by William Negaard and Gladys Negaard.

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

CHANNEL AND CONTROL.—Bed composed of gravel; free from vegetation; practically permanent. Control is head of rapids 1,000 feet below gage. One channel at all stages. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet at 8.45 a. m. September 14 (discharge, 2,180 second-feet); minimum stage, 3.35 feet September 20 and 21 (discharge, 20 second-feet). Both maximum and minimum stages are result of regulation and have no bearing on natural flow.

1912–1924: Maximum stage recorded, 9.56 feet April 22, 1916 (discharge, 6,940 second-feet); minimum stage, 3.28 feet May 17, 1923 (discharge, 17 second-feet).

REGULATION.—In April 1923, the Chippewa Reservoir owned by Northern States Power Co. began operations. This reservoir is located just below confluence of East and West Forks of Chippewa River 3 miles above station and has a capacity of about 10 billion cubic feet. Operation of this reservoir regulates the entire flow at station in the interest of power developments below. There is also a reservoir 16 miles above station with a capacity of 550 million cubic feet.

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

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

The following discharge measurement was made:

March 5, 1924: Gage height, 4.75 feet; discharge, 443 second-feet.

Daily discharge, in second-feet, of Chippewa River at Bishop's Bridge, near Winter, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	675	675	610	750	520	470	420	173	580	184	640	1,570
2	675	675	610	750	495	445	398	115	550	187	675	1,570
3	675	675	610	790	495	445	330	58	550	180	675	1,570
4	675	675	610	960	495	445	109	74	580	180	580	1,570
5	675	675	610	1,250	520	445	30	82	580	201	398	1,520
6	675	675	640	1,300	495	445	32	98	580	187	310	1,520
7	675	675	790	640	495	470	40	87	398	187	420	1,520
8	675	675	790	610	495	610	44	130	420	420	550	1,460
9	675	675	790	580	495	520	44	121	420	495	550	1,460
10	675	675	790	550	495	420	44	87	420	520	580	1,460
11	675	675	790	550	495	420	28	121	398	550	580	1,000
12	675	675	790	520	470	420	29	127	398	610	675	1,680
13	675	640	790	520	495	420	42	104	420	640	870	1,920
14	675	640	790	520	470	520	35	109	398	610	1,050	2,050
15	675	640	790	520	495	520	38	93	420	610	1,250	1,920
16	675	640	790	520	580	520	59	82	470	610	1,400	1,920
17	675	640	790	550	495	420	148	71	470	610	1,400	1,920
18	675	640	790	550	470	420	74	66	470	640	1,400	550
19	675	640	790	550	470	420	54	74	470	640	1,400	21
20	675	640	790	550	470	420	47	77	470	640	1,400	20
21	675	640	750	550	520	398	47	82	445	640	1,400	20
22	675	640	750	550	675	398	47	71	470	640	1,400	46
23	675	640	750	550	675	398	40	82	310	640	710	43
24	675	640	750	520	675	398	58	310	198	640	290	43
25	675	640	750	520	580	398	109	640	194	640	290	44
26	675	610	750	580	470	420	58	580	190	640	290	36
27	675	610	750	520	445	398	54	580	190	640	290	69
28	675	610	830	520	445	398	51	580	198	640	750	49
29	675	610	915	520	445	420	51	580	198	640	1,570	41
30	675	610	915	520	-------	445	145	580	187	640	1,570	36
31	675	-------	915	520	-------	470	-------	580	-------	640	1,570	-------

Monthly discharge of Chippewa River at Bishop's Bridge, near Winter, Wis., for the year ending September 30, 1924

[Drainage area, 775 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	675	675	675	0.871	1.00
November	675	610	649	.837	.93
December	915	610	760	.981	1.13
January	1,300	520	626	.808	.93
February	675	445	512	.661	.71
March	610	398	444	.573	.66
April	420	28	90.2	.116	.13
May	640	58	213	.275	.32
June	580	187	401	.517	.58
July	640	180	514	.663	.76
August	1,570	290	869	1.12	1.29
September	2,050	20	955	1.23	1.37
The year	2,050	20	560	.723	9.81

CHIPPEWA RIVER NEAR BRUCE, WIS.

LOCATION.—In sec. 4, T. 35 N., R. 7 W., at Minneapolis, St. Paul & Sault Ste. Marie Railway bridge 1 mile east of Bruce, Rusk County. Thornapple River enters from left immediately above station, and Flambeau River from left 21 miles below.

DRAINAGE AREA.—1,600 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch = 6 miles).

RECORDS AVAILABLE.—December 31, 1913, to September 30, 1924.

GAGE.—Chain gage attached to downstream side of bridge; read by M. Pavlak.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of sand and small gravel; free from vegetation. First and second channels from west fairly permanent; third channel nearest east bank has a tendency to fill with sand deposited by Thornapple River. Flow except during extremely high stages is confined within banks.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.5 feet at 8 a. m. April 26 (discharge, 10,600 second-feet); minimum stage, 1.45 feet September 26 and 27 (discharge, 440 second-feet).

1914–1924: Maximum stage recorded, 13.7 feet at 4.30 p. m. April 10, 1922 (discharge, 14,900 second-feet). Minimum discharge, estimated 230 second-feet March 14, 1923. (Stage-discharge relation affected by ice.)

REGULATION.—The flow at the station is quite largely controlled by reservoirs above gaging station at Bishop's Bridge. (See description of that station.)

ACCURACY.—Stage-discharge relation shifted slightly during winter. Rating curve well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of Chippewa River near Bruce, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 25	2.13	896	Feb. 6	[a] 3.92	653	July 25	2.04	885
Jan. 12	[a] 4.73	726	June 18	2.50	1,230	Aug. 29	2.31	1,130

[a] Stage-discharge relation affected by ice.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	882	925	882	880	640	720	1,460	2,320	968	1,280	882	2,130
2	882	925	882	840	640	720	1,560	1,840	968	720	882	1,840
3	882	925	840	760	640	680	1,750	1,460	968	570	1,240	1,750
4	800	925	840	720	640	680	1,840	1,190	968	535	2,220	1,750
5	760	925	840	720	640	680	1,940	1,100	925	535	1,750	1,660
6	720	925	882	680	640	680	2,620	1,190	1,010	535	1,370	1,660
7	800	925	1,060	680	680	680	3,620	2,320	968	570	1,190	1,660
8	882	925	1,140	680	680	680	4,770	2,820	925	642	1,100	1,660
9	840	925	1,060	720	680	680	3,930	4,980	840	760	1,060	1,660
10	800	882	1,010	720	680	680	2,720	6,920	840	882	1,010	1,660
11	800	882	925	720	680	680	1,940	5,640	800	840	968	1,560
12	925	882	1,240	720	680	680	1,840	4,240	800	1,190	968	1,660
13	925	925	1,370	720	720	720	1,750	3,120	800	1,140	968	2,220
14	925	968	1,370	720	720	720	1,560	2,720	760	1,010	1,010	2,320
15	882	968	1,370	720	720	720	1,750	2,320	760	968	1,370	2,200
16	968	925	1,370	720	720	720	2,620	1,940	800	925	1,460	2,130
17	1,140	925	1,370	680	760	720	5,970	1,660	1,190	882	1,560	2,130
18	1,240	882	1,370	680	760	760	6,560	1,370	1,140	840	1,560	2,130
19	1,190	882	1,370	640	760	760	5,090	1,100	1,100	840	1,560	2,040
20	1,140	882	1,370	640	760	800	3,820	968	1,010	840	1,560	642

Daily discharge, in second-feet, of Chippewa River near Bruce, Wis., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
21	1,060	882	1,370	640	760	800	2,520	840	925	882	1,840	605
22	968	840	1,240	640	760	840	1,940	720	925	840	2,920	642
23	968	840	1,140	605	760	840	1,840	720	840	840	3,320	680
24	968	882	1,100	605	760	880	3,420	720	680	925	2,520	605
25	968	882	1,060	605	720	925	9,800	925	535	882	1,190	470
26	925	882	1,190	570	720	970	9,800	1,240	502	840	925	440
27	925	882	1,100	570	720	1,060	5,530	1,140	502	840	840	440
28	968	882	1,100	570	720	1,100	4,460	1,100	470	840	1,010	1,100
29	968	925	1,060	605	720	1,140	3,620	1,060	2,130	800	1,460	1,750
30	968	925	970	605	-------	1,240	2,820	1,010	2,040	968	1,940	1,190
31	925	-------	925	640	-------	1,370	-------	1,010	-------	840	2,320	-------

NOTE.—Stage-discharge relation affected by ice Dec. 14–22 and Dec. 28 to Apr. 6; discharge ascertained by means of gage heights, two discharge measurements, observer's notes, and weather records.

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

[Drainage area, 1,600 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,240	720	935	0.584	0.67
November	968	840	905	.566	.63
December	1,370	840	1,120	.700	.81
January	880	570	678	.424	.49
February	760	640	706	.441	.48
March	1,370	680	817	.511	.59
April	9,800	1,460	3,500	2.19	2.44
May	6,920	720	1,990	1.24	1.43
June	2,130	470	936	.585	.65
July	1,280	535	839	.524	.60
August	3,320	840	1,480	.925	1.07
September	2,320	440	1,480	.925	1.03
The year	9,800	440	1,280	.800	10.89

CHIPPEWA RIVER AT CHIPPEWA FALLS, WIS.

LOCATION.—In SE. ¼ sec. 6, T. 28 N., R. 8 W., at highway bridge at Chippewa Falls, Chippewa County, 2,500 feet below mouth of Duncan Creek which enters from right.

DRAINAGE AREA.—5,600 square miles.

RECORDS AVAILABLE.—June 22, 1888, to September 30, 1924.

GAGE.—Gurley water-stage recorder installed July 27, 1916, on web between caisson piers supporting first right-hand span; inspected by F. M. Leslie.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of heavy gravel; fairly permanent. Banks high and seldom overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.4 feet at 2 p. m. April 26 (discharge, 60,000 second-feet); minimum stage, −0.58 foot at 8 p. m. January 27 (discharge, 396 second-feet). Minimum discharge was the result of regulation and does not represent natural flow.

1888–1924: Maximum stage recorded, 26.94 feet September 10, 1884; December 6, 1896, a stage of 26.03 feet was reached. It is believed that the above high stages in 1884 and 1896 were caused in part by backwater from

log jams and that the volume of discharge was considerably less than the stage would indicate if channel had been unobstructed.

Exclusive of these floods, maximum stage recorded, 17.0 feet March 27, 1920 (discharge, 78,000 second-feet); minimum discharge, approximately 40 second-feet February 4, 1917.

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

REGULATION.—Flow past station controlled to a considerable extent by operation of Wissota power plant of Northern States Power Co. Large diurnal fluctuation.

In April, 1923, the reservoir on Chippewa River above Bishop's Bridge began operations; see station description for that station.

ACCURACY.—Stage-discharge relation changed during year. Standard rating curve fairly well defined. Indirect method for shifting control used. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by means of discharge integrators. Records good.

The following discharge measurements were made:
February 1, 1924: Gage height, 1.00 foot; discharge, 3,020 second-feet.
June 16, 1924: Gage height, 1.49 feet; discharge, 3,960 second-feet.

Daily discharge, in second-feet, of Chippewa River at Chippewa Falls, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,040	2,610	2,070	1,120	2,010	2,200	4,240	16,900	1,530	5,830	2,230	590
2	2,180	2,650	890	1,500	1,830	1,110	4,010	12,600	4,050	5,680	2,200	2,960
3	2,130	2,180	2,660	1,640	680	2,100	4,100	12,300	3,240	5,500	1,300	3,970
4	2,130	1,000	2,120	1,580	1,420	2,540	4,520	7,490	2,820	954	3,950	4,690
5	2,220	1,950	1,830	1,580	2,130	2,650	6,770	9,130	2,870	2,910	5,290	4,160
6	2,090	2,490	1,990	1,710	1,990	2,120	5,360	9,850	3,670	1,160	5,650	4,780
7	1,100	2,410	2,060	2,700	2,100	2,140	7,850	8,470	5,400	1,910	5,870	1,220
8	2,160	1,900	1,600	2,140	1,810	1,840	7,880	8,420	1,090	2,490	6,120	3,130
9	2,160	2,340	610	1,660	1,260	1,380	10,400	17,500	3,520	2,320	3,820	3,750
10	1,660	1,640	1,660	1,180	745	1,890	16,900	29,800	3,840	2,120	4,980	3,150
11	1,800	1,120	1,780	1,030	1,560	2,100	13,700	25,600	3,010	2,130	4,960	3,050
12	1,570	1,960	2,220	1,650	1,890	2,170	12,100	26,200	3,770	2,440	3,800	3,160
13	1,330	2,48 (	2,170	740	1,880	1,920	7,440	19,400	4,360	979	3,310	3,720
14	1,060	2,07 (	1,690	2,540	1,470	1,900	8,200	17,100	5,690	2,950	4,330	1,050
15	1,550	2,000	1,670	2,010	1,740	1,800	11,500	17,200	1,740	2,740	4,250	3,190
16	1,440	2,280	869	1,990	1,750	1,210	15,100	14,600	2,280	2,680	3,720	4,720
17	1,700	2,360	1,750	2,020	1,080	3,640	24,400	12,400	3,750	2,520	1,570	3,350
18	2,470	1,150	1,980	1,840	1,410	3,020	35,000	10,700	5,390	2,200	8,300	4,550
19	2,320	2,020	2,120	1,930	1,660	3,020	35,500	10,100	5,830	2,270	6,240	4,640
20	2,630	2,190	2,680	1,330	1,460	3,210	28,200	8,080	5,100	1,030	5,440	4,840
21	1,640	2,340	2,450	2,560	2,150	3,160	24,300	7,980	5,610	1,910	4,100	1,630
22	3,200	2,060	2,820	2,230	1,560	3,550	17,600	7,510	1,320	2,050	6,520	4,120
23	2,690	2,120	823	1,810	1,500	1,330	17,900	7,590	6,820	2,090	6,050	4,260
24	2,910	2,090	2,820	2,230	612	3,080	19,000	6,260	7,140	2,100	7,240	4,860
25	2,610	1,210	1,440	1,730	1,750	4,040	37,100	2,120	5,480	1,810	6,820	5,840
26	1,780	1,720	2,580	1,750	2,490	4,280	46,000	8,380	3,540	1,980	5,670	6,130
27	2,720	1,390	2,600	610	2,550	4,810	32,900	8,200	2,690	1,450	5,220	5,880
28	1,280	1,830	2,270	1,850	2,300	3,930	34,100	8,560	2,950	2,250	4,790	4,400
29	2,500	1,610	2,320	1,720	2,340	3,370	15,900	7,170	1,030	2,730	5,120	6,970
30	2,360	2,500	735	1,450	-------	1,600	15,200	2,160	4,160	2,580	4,000	8,530
31	2,410	-------	1,660	1,620	-------	3,690	--------	3,990	-------	2,670	1,090	-------

NOTE.—Recording gage not operating satisfactorily Dec. 13–15, 29–31, Jan. 1–5, 7, Feb. 5–9, 22–29, Apr. 26 to May 3, May 10–17, Sept. 12 and 13; discharge estimated from a study of power output of Wissota plant.

Monthly discharge of Chippewa River at Chippewa Falls, Wis., for the year ending September 30, 1924

[Drainage area, 5,600 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,200	1,060	2,060	0.368	0.42
November	2,650	1,000	1,990	.355	.40
December	2,820	610	1,900	.339	.39
January	2,700	610	1,720	.307	.35
February	2,550	612	1,690	.302	.33
March	4,810	1,110	2,610	.466	.54
April	46,000	4,010	17,400	3.11	3.47
May	29,800	2,120	11,700	2.09	2.41
June	7,140	1,030	3,790	.677	.76
July	5,830	954	2,470	.441	.51
August	8,300	1,090	4,640	.829	.96
September	8,530	590	4,060	.725	.81
The year	46,000	590	4,670	.834	11.35

FLAMBEAU RIVER NEAR BUTTERNUT, WIS.

LOCATION.—In lot 10, sec. 28, T. 41 N., R. 1 E., 6 miles southeast of Butternut, Ashland County, and 7 miles above Park Falls.

DRAINAGE AREA.—660 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—July 30, 1914, to September 30, 1924.

GAGE.—Standard chain gage supported by a built-up cantilever attached to post set in right bank, installed May 26, 1916, read by Carl G. Elm.

DISCHARGE MEASUREMENTS.—Made from cable 1,500 feet below gage.

CHANNEL AND CONTROL.—Bed at gage composed of mud and rock. Left bank low and subject to overflow; right bank slopes back gradually to high-water mark. At cable site bed is rock and banks are high. Control is at head of Schultz Rapids 1,700 feet below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet April 27–30, May 14 and 15 (discharge, 2,140 second-feet); minimum discharge, estimated 220 second-feet several days in February and March (stage-discharge relation affected by ice.

1914–1924: Maximum stage recorded, 9.0 feet April 22 and 23, 1916 (discharge, 5,430 second-feet); Minimum stage, 0.90 foot August 27 and 28, 1920 (discharge, 204 second-feet).

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

REGULATION.—Storage reservoirs, having an effective capacity of 1.15 billion cubic feet, are maintained by the Chippewa & Flambeau Improvement Co. on the headwaters of Flambeau River.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Open-water records good; winter records fair.

The following discharge measurements were made:

December 29, 1923: Gage height, 1.60 feet;[3] discharge, 313 second-feet.

April 12, 1924: Gage height, 2.24 feet;[3] discharge, 261 second-feet.

[3] Stage-discharge relation affected by ice.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	416	385	330	290	240	220	250	1,740	805	673	518	554
2	416	356	330	290	240	220	240	1,620	760	716	466	554
3	385	356	330	280	250	220	240	1,560	760	716	673	518
4	400	356	315	280	250	230	240	1,440	716	673	850	518
5	400	356	315	270	250	230	240	1,330	760	673	850	466
6	400	370	315	270	250	230	240	1,280	805	592	850	449
7	385	385	315	270	250	240	240	1,280	805	554	760	432
8	385	385	305	260	250	240	250	1,330	805	554	716	416
9	385	370	305	260	250	240	250	1,280	850	518	716	466
10	385	370	305	260	250	250	250	1,940	850	518	716	416
11	385	356	305	260	250	250	250	2,070	850	518	673	400
12	385	342	305	250	250	260	260	2,070	850	518	716	416
13	356	329	305	250	250	260	305	2,070	805	518	632	449
14	329	329	305	250	250	260	485	2,140	805	483	592	518
15	292	329	305	250	250	260	715	2,140	760	483	554	518
16	304	329	305	250	250	260	805	2,000	716	466	554	483
17	400	329	305	240	250	260	895	1,940	716	449	518	466
18	466	316	315	240	250	260	1,030	1,800	716	432	518	449
19	466	316	330	240	250	260	1,170	1,680	805	400	466	432
20	449	329	340	240	240	260	1,330	1,560	805	385	483	432
21	432	316	355	240	240	260	1,500	1,500	850	385	518	432
22	416	316	370	240	230	260	1,620	1,380	805	400	592	449
23	400	316	355	240	230	260	1,740	1,380	805	400	592	432
24	400	330	340	240	220	260	1,870	1,280	760	400	632	432
25	385	340	330	230	220	260	1,940	1,280	673	385	592	432
26	385	340	330	230	220	260	2,000	1,220	632	385	518	432
27	385	355	315	230	220	260	2,140	1,170	592	400	483	449
28	400	292	315	230	220	260	2,140	1,170	632	449	466	449
29	400	316	305	230	220	260	2,140	1,170	673	518	449	466
30	416	330	305	230	-------	260	1,870	1,080	716	518	554	518
31	400	-------	305	230	-------	260	-------	895	-------	518	554	-------

NOTE.—Stage-discharge relation affected by ice Nov. 24–27 and Nov. 30 to Apr. 22; daily discharge ascertained from gage heights, two discharge measurements, observer's notes, and weather records.

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

[Drainage area, 660 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	466	292	394	0.597	0.69
November	385	292	341	.517	.58
December	370	305	320	.485	.56
January	290	230	251	.380	.44
February	250	220	241	.365	.39
March	260	220	251	.380	.44
April	2,140	240	955	1.45	1.62
May	2,140	895	1,540	2.33	2.69
June	850	592	763	1.16	1.29
July	716	385	503	.762	.88
August	850	449	606	.918	1.06
September	554	400	461	.698	.78
The year	2,140	220	553	.838	11.42

FLAMBEAU RIVER NEAR LADYSMITH, WIS.

LOCATION.—In sec. 35, T. 36 N., R. 5 W., at Big Falls power plant of Lake Superior District Power Co., 6 miles northeast of Tony and 14 miles northeast of Ladysmith, Rusk County.

DRAINAGE AREA.—1,910 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—October 1, 1923, to September 30, 1924. January 2, 1914, to September 30, 1923, 8 miles below present site, and February 15, 1903, to December 2, 1906, at Ladysmith, 6 miles farther downstream.

DISCHARGE MEASUREMENTS.—Made from boat or by wading.

DETERMINATION OF DISCHARGE.—Discharge of turbines in second-feet corresponding to the number of kilowatts is determined for the day; to this quantity is added discharge through waste gates and over spillway which is computed from theoretical formula.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge, 9,320 second-feet April 18; minimum mean daily discharge, 536 second-feet December 14.

REGULATION.—Diurnal fluctuation is caused by operation of power plant at which station is located. Chippewa & Flambeau Improvement Co. operates storage reservoirs at headwaters having an effective capacity of 1.15 billion cubic feet. Weekly fluctuations are caused by operation of power plants at Park Falls and storage reservoirs above Park Falls.

ACCURACY.—The computation of discharge through turbines is good. Computation of waste is poor. Records fair, becoming poor at high stages.

COOPERATION.—Power-house data is furnished by Lake Superior District Power Co.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	740	909	819	545	664	672	775	4,670	962	1,600	932	1,450
2	775	927	749	553	689	672	766	4,670	1,820	1,810	883	929
3	793	936	655	672	681	723	758	4,590	1,340	1,550	1,500	1,330
4	802	802	802	681	681	681	882	2,310	1,130	1,360	1,750	1,240
5	672	775	775	672	698	706	1,840	2,810	1,350	1,060	2,560	1,210
6	758	864	882	689	681	664	1,670	2,930	1,380	1,650	2,260	1,070
7	758	900	793	732	681	698	1,810	3,730	1,470	1,350	2,040	998
8	819	802	793	775	672	664	3,070	4,150	1,360	1,230	1,930	1,010
9	810	819	706	810	681	689	2,800	5,790	1,390	1,100	1,870	843
10	793	882	766	766	689	698	3,010	7,350	1,720	1,020	1,830	883
11	758	846	723	766	681	681	2,830	7,550	1,650	961	1,580	870
12	810	927	837	758	689	621	2,560	7,270	1,310	1,130	1,560	924
13	810	855	646	732	706	681	2,500	7,240	1,450	1,180	1,520	1,020
14	784	882	536	740	672	681	2,440	7,210	1,050	990	1,510	1,340
15	758	882	740	749	664	681	3,080	7,180	1,330	993	1,410	1,390
16	793	891	766	715	672	672	4,770	5,770	1,190	938	1,470	1,220
17	882	882	740	732	689	664	8,440	5,200	1,600	893	1,160	1,240
18	810	715	706	698	681	681	9,320	4,290	1,520	860	1,240	1,200
19	1,120	855	775	689	689	672	8,320	3,750	1,570	945	1,160	996
20	1,060	828	837	638	689	664	6,470	3,380	1,720	790	1,090	1,060
21	1,060	810	864	664	723	655	5,780	3,300	1,730	814	1,240	849
22	1,020	740	873	681	698	692	5,840	2,980	1,510	715	1,980	1,150
23	918	810	837	664	689	698	3,890	2,680	1,700	726	2,050	1,070
24	955	819	810	672	672	723	6,860	2,680	1,780	798	2,020	1,080
25	891	775	810	638	681	681	8,320	2,500	1,650	798	2,210	1,130
26	918	864	802	646	672	706	8,220	2,640	1,460	769	2,020	1,120
27	766	810	749	655	689	758	6,690	2,260	1,300	787	997	1,150
28	992	638	758	655	655	758	5,830	2,320	1,060	728	1,380	1,880
29	882	740	749	646	706	758	5,470	2,140	1,130	801	1,390	1,550
30	936	918	723	664	-------	720	5,460	1,870	1,810	893	1,610	1,340
31	955	-------	672	621	-------	681	-------	1,730	-------	1,050	1,350	-------

NOTE.—Daily discharge computed from power-house data furnished by Lake Superior District Power Co.

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

[Drainage area, 1,910 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,120	740	858	0.449	0.52
November	936	638	837	.438	.49
December	882	536	764	.400	.46
January	810	545	688	.360	.42
February	723	655	684	.358	.39
March	758	621	690	.361	.42
April	9,320	758	4,350	2.28	2.54
May	7,550	1,730	4,160	2.18	2.51
June	1,820	962	1,450	.759	.85
July	1,810	715	1,040	.545	.63
August	2,560	883	1,600	.838	.97
September	1,880	843	1,150	.602	.67
The year	9,320	536	1,520	.796	10.87

JUMP RIVER AT SHELDON, WIS.

LOCATION.—In sec. 26, T. 33 N., R. 5 W., at highway bridge in Sheldon, Rusk County, 11 miles above mouth.

DRAINAGE AREA.—510 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—July 22, 1915, to September 30, 1924.

GAGE.—Chain gage bolted to downstream handrail of bridge; read by Mrs. Elsa Clark.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of heavy gravel, clean and free from vegetation. Right bank high and not subject to overflow; left bank may be overflowed occasionally.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.55 feet at 8 a. m. April 26 (discharge, 7,300 second-feet); minimum discharge, estimated 14 second-feet January 25–31 (stage-discharge relation affected by ice).

1915–1924: Maximum stage recorded, 11.48 feet March 26, 1920 (discharge, 15,600 second-feet revised). Minimum discharge that of 1924.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined above 50 second-feet. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to table of daily discharge. Open-water records good; winter records fair.

The following discharge measurements were made:

January 13, 1924: Gage height, 3.37 feet;[4] discharge, 22.4 second-feet.

February 7, 1924: Gage height, 3.90 feet;[4] discharge, 19.3 second-feet.

June 18, 1924: Gage height, 3.38 feet; discharge, 226 second-feet.

[4] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Jump River at Sheldon, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	108	75	75	16	30	380	1,740	195	240	290	222
2	50	100	75	60	16	30	405	1,200	208	222	290	195
3	50	92	75	60	16	35	460	800	186	186	380	186
4	43	92	75	50	16	45	510	760	178	222	540	154
5	43	92	75	50	16	50	1,060	645	195	195	610	138
6	43	92	75	45	19	60	1,620	800	166	195	680	108
7	43	92	75	45	19	60	2,650	1,160	154	186	680	116
8	43	92	75	45	19	75	3,100	2,650	195	178	610	108
9	43	82	75	35	19	90	2,950	5,880	195	186	485	100
10	43	75	68	30	19	110	2,650	6,080	186	186	430	116
11	43	75	62	30	19	125	1,860	6,080	195	186	330	100
12	35	75	62	25	19	145	1,740	3,880	195	154	290	100
13	35	92	62	23	19	165	1,620	2,950	178	178	255	82
14	35	92	62	23	19	185	1,510	2,370	186	154	240	92
15	35	92	62	19	23	210	2,370	2,110	186	138	330	154
16	35	92	62	19	23	230	3,880	1,980	222	108	680	240
17	35	92	62	19	23	230	6,960	1,400	255	116	840	270
18	35	92	62	19	23	255	7,180	1,250	270	100	885	222
19	50	92	62	19	23	255	5,480	840	222	75	1,110	186
20	62	92	77	16	23	280	3,560	610	186	82	1,020	166
21	70	92	92	16	23	305	3,250	540	195	82	840	240
22	92	92	92	16	23	305	2,370	485	222	75	760	1,160
23	116	92	92	16	23	305	1,980	485	305	100	610	1,620
24	127	92	92	16	23	330	2,800	430	380	138	680	1,510
25	116	92	92	14	25	330	7,180	380	380	127	610	1,400
26	108	92	92	14	25	330	7,180	355	355	108	485	1,300
27	108	92	92	14	30	330	6,960	330	320	108	380	1,250
28	108	75	92	14	30	330	4,540	305	290	108	330	1,300
29	108	75	92	14	30	330	3,560	270	255	116	320	1,200
30	108	75	92	14	-------	330	2,240	240	280	166	280	760
31	108	-------	90	14	-------	330	-------	222	-------	240	240	-------

NOTE.—Stage-discharge relation affected by ice Nov. 29 to Dec. 6 and Dec. 31 to Mar. 24; daily discharge ascertained by means of gage heights, two discharge measurements, observer's notes, and weather records. Gage not read April 1–5; discharge estimated by comparison with discharge in adjacent drainage areas.

Monthly discharge of Jump River at Sheldon, Wis., for the year ending September 30, 1924

[Drainage area, 510 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	127	35	65.2	0.128	0.15
November	108	75	89.1	.175	.20
December	92	62	77.0	.151	.17
January	75	14	28.0	.055	.06
February	30	16	21.4	.042	.05
March	330	30	201	.394	.45
April	7,180	380	3,130	6.14	6.85
May	6,080	222	1,590	3.12	3.60
June	380	154	231	.453	.51
July	240	75	150	.294	.34
August	1,110	240	533	1.05	1.21
September	1,620	82	493	.967	1.08
The year	7,180	14	549	1.08	14.67

EAU CLAIRE RIVER NEAR AUGUSTA, WIS.

LOCATION.—In sec. 12, T. 26 N., R. 6 E., at Trouble Water Bridge, 7 miles northeast of Augusta, Eau Claire County. South Fork of Eau Claire River enters from left 4 miles above station.

DRAINAGE AREA.—500 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—July 16, 1914, to September 30, 1924.

GAGE.—Chain gage on downstream side of bridge; read by Albert Wagner.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed at bridge and above is sandy and shifting; a short distance below gage channel narrows and a rock outcrop overlain with large boulders forms control. Banks are high and not subject to overflow.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.85 feet 3 p. m. April 26 (discharge, 6,520 second-feet); minimum discharge, estimated 35 second-feet January 22–24 and 28 (stage-discharge relation affected by ice).

1914–1924: Maximum open-water stage recorded, 11.98 feet at 9 a. m. March 27, 1920 (discharge, 8,720 second-feet); minimum discharge, 3.5 second-feet, January 27, 1918 (stage-discharge relation affected by ice).

ACCURACY.—Stage-discharge relation changed slightly during summer. Rating curve fairly well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table, except as indicated in footnote to table of daily discharge. Records fair.

Discharge measurements of Eau Claire River near Augusta, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
Oct. 26	0.11	79	Jan. 31	[a] 0.78	42.5	July 24	0.40	123
Jan. 8	[a] .47	45.2	June 15	.52	173			

[a] Stage-discharge relation affected by ice.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	94	94	83	40	40	50	745	970	185	260	465	190
2	83	88	94	40	40	60	745	745	177	231	275	169
3	79	88	118	40	45	60	780	640	177	217	305	159
4	79	108	88	40	50	60	1,250	588	169	204	588	164
5	75	88	88	40	60	60	2,780	518	164	190	605	164
6	70	83	88	40	60	60	3,990	430	177	177	710	140
7	70	88	79	40	60	65	3,710	395	204	172	605	164
8	70	88	75	45	60	70	3,990	430	190	177	850	177
9	65	88	75	45	55	75	3,100	1,470	190	164	745	164
10	65	79	83	45	50	80	1,950	2,500	190	140	465	140
11	65	79	164	45	45	85	1,250	2,080	185	129	350	140
12	65	75	98	60	45	90	890	1,710	185	140	275	305
13	65	83	118	70	45	75	815	930	164	140	231	430
14	65	94	118	60	50	60	1,050	1,050	164	118	190	365
15	61	129	118	55	60	50	930	1,650	169	108	164	335
16	70	108	114	50	60	45	815	970	190	88	320	275
17	88	102	108	45	60	60	1,470	675	365	79	465	177
18	129	98	98	40	60	80	2,290	552	1,300	70	275	145
19	136	94	94	40	60	70	1,530	465	930	70	269	145
20	122	88	108	40	60	60	970	395	1,590	70	500	129
21	108	88	108	40	55	95	1,050	350	970	70	482	75
22	98	83	108	35	50	130	1,410	320	745	70	4,230	745
23	94	98	79	35	45	150	2,220	305	1,590	61	5,720	815
24	88	88	102	35	45	175	2,360	335	2,360	108	1,890	570
25	88	88	88	40	45	215	4,460	335	1,100	98	970	380
26	83	88	88	40	40	320	6,520	305	710	79	588	305
27	88	88	98	40	40	500	2,860	275	535	70	482	275
28	88	118	80	35	40	890	2,360	269	395	58	365	552
29	98	114	60	40	45	1,010	2,010	239	335	305	290	745
30	102	102	60	40	-------	890	1,350	217	305	970	245	570
31	98	-------	45	40	-------	675	-------	204	-------	850	204	-------

NOTE.—Stage-discharge relation affected by ice Dec. 28 to Apr. 2; daily discharge ascertained from gage heights, two discharge measurements, observer's notes, and weather records.

Monthly discharge of Eau Claire River near Augusta, Wis., for the year ending September 30, 1924

[Drainage area, 500 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	136	61	85.5	0.171	0.20
November	129	75	93.2	.186	.21
December	164	45	94.4	.189	.22
January	70	35	43.2	.086	.10
February	60	40	50.7	.101	.11
March	1,010	45	205	.410	.47
April	6,520	745	2,060	4.12	4.60
May	2,500	204	720	1.44	1.66
June	2,360	164	537	1.07	1.19
July	970	58	183	.366	.42
August	5,720	164	780	1.56	1.80
September	815	75	304	.608	.68
The year	6,520	35	428	.856	11.66

RED CEDAR RIVER NEAR COLFAX, WIS.

LOCATION.—In sec. 27, T. 30 N., R. 11 W., at highway bridge 4½ miles north of Colfax, Dunn County. Hay River enters from right 11 miles below and Trout Creek, also from right, 3½ miles above station.

DRAINAGE AREA.—1,100 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles.

RECORDS AVAILABLE.—March 19, 1914, to September 30, 1924.

GAGE.—Chain gage attached to downstream side of bridge; read by Andrew Lundequam.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of rock and gravel; small amount of grass growth during summer. Left bank high and not subject to overflow; right bank medium high and may be overflowed during extremely high water. Control poorly defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.20 feet at 5 p. m. April 5 (discharge, 3,380 second-feet); minimum stage, 0.82 foot at 8.30 a. m. November 1 (discharge, 297 second-feet).

1914–1924: Maximum stage recorded, 6.95 feet at 8 a. m. March 26, 1920 (discharge, 7,610 second-feet); minimum discharge, about 233 second-feet December 18, 1921 (stage-discharge relation probably affected by ice).

REGULATION.[5]—The following dams and reservoirs are used to regulate flow in Red Cedar River. Owing to operation of these reservoirs, the flow at the station is not natural.

[5] From data on file in engineering department of Railroad Commission of Wisconsin.

Reservoirs used to regulate flow of Red Cedar River

Dam	Location	Approximate capacity (millions of cubic feet)
Long Lake	Sec. 24, T. 37 N., R. 11 W.	400
Cedar Lake	Sec. 21, T. 36 N., R. 10 W.	400
Birch Lake	Sec. 25, T. 37 N., R. 10 W.	475
Bear Lake	Sec. 7, T. 36 N., R. 11 W.	150
		1,425

ACCURACY.—Stage-discharge relation slightly affected by backwater from dam at Colfax. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records fair; winter records poor.

Discharge measurements of Red Cedar River near Colfax, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 25	0.90	336	Feb. 8	[a] 3.00	620
Jan. 9	[a] 3.22	441	June 17	1.42	576

[a] Stage-discharge relation affected by ice.

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

Date	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	470	325	642				1,200	1,690	400	550	642	550
2	445	356	550				1,120	1,380	495	470	522	522
3	400	360	550				782	1,070	522	550	580	550
4	400	422	610				1,980	782	522	550	610	710
5	353	422	580				3,380	710	495	422	580	675
6	380	495	642				3,120	942	580	580	580	610
7	353	346	610				2,200	1,200	495	350	642	675
8	380	422	610				1,870	1,350	495	380	675	675
9	360	445	610				1,550	1,870	495	522	642	642
10	380	610	642			520	1,400	1,870	550	470	580	610
11	380	642					1,300	1,760	580	522	580	580
12	339	610					1,200	1,760	580	522	610	642
13	350	642					820	1,350	550	580	675	675
14	380	745					860	1,200	580	495	642	610
15	400	675			550		1,120	1,200	550	580	710	580
16	422	642		380			1,450	900	445	550	642	642
17	550	642					1,350	782	710	522	710	642
18	580	642				550	1,160	782	900	470	550	675
19	495	642	610			550	1,350	675	745	495	675	610
20	470	642				580	1,200	675	710	458	710	642
21	422	580				580	1,030	642	745	422	782	860
22	380	550				675	1,160	610	820	550	1,300	820
23	356	642				675	1,120	610	782	550	1,030	900
24	353	580				610	1,200	642		580	675	900
25	380	610				675	2,200	675		522	642	860
26	346	522				782	2,200	580	900	470	710	860
27	328	610	550			860	2,420	550		422	675	942
28	422	580	495			1,120	2,420	445		445	610	942
29	360	610	495			1,300	2,310	400	522	470	580	1,160
30	360	642	495		-------	1,030	2,000	400	580	710	610	1,400
31	350	-------	495		-------	942	-------	380	-------	745	610	-------

NOTE.—Stage-discharge relation affected by ice Dec. 11–26 and Dec. 29 to Mar. 19; mean discharge estimated from occasional gage heights, two discharge measurements, weather records, and a study of discharge in adjacent drainage basins. Gage not read Nov. 17–19 and Apr. 30 to May 2; discharge interpolated. Gage not read June 24–28; mean discharge estimated from precipitation records and a comparison with flow in adjacent drainage basins.

Monthly discharge of Red Cedar River near Colfax, Wis., for the year ending September 30, 1924

[Drainage area, 1,100 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	580	328	398	0.362	0.42
November	745	325	555	.505	.56
December	642	----------	591	.537	.62
January	----------	----------	[a] 380	.345	.40
February	----------	----------	[a] 550	.500	.54
March	1,300	----------	638	.580	.67
April	3,380	782	1,620	1.47	1.64
May	1,870	380	964	.876	1.01
June	----------	400	645	.586	.65
July	745	359	514	.467	.54
August	1,300	522	670	.609	.70
September	1,400	522	739	.672	.75
The year	3,380	----------	687	.625	8.50

[a] Estimated.

BLACK RIVER AT NEILLSVILLE, WIS.

LOCATION.—In sec. 15, T. 24 N., R. 2 W., at lower highway bridge in Neillsville, Clark County. O'Neill Creek enters from left 1 mile above gage and Cunningham Creek, also from left, 1½ miles below.

DRAINAGE AREA.—774 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—April 6, 1905, to March 31, 1909; December 11, 1913, to September 30, 1924.

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

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of heavy gravel and rock. Control at head of rapids, a few hundred feet below gage. Banks high and rocky; water will not overflow banks.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.4 feet at 7 a. m. and 5 p. m. April 26 (discharge, 11,200 second-feet); minimum discharge, estimated 10 second-feet February 26 (stage-discharge relation affected by ice.

1905–1909; 1913–1924: Maximum stage recorded, 19.8 feet June 6, 1905 (discharge, about 29,400 second-feet); minimum open-water stage recorded 1.9 feet August 8, 1920 (discharge, approximately 26 second-feet); an estimated minimum discharge of 5 second-feet during frozen periods in February, 1918.

The flood that occurred October 6, 1911, probably exceeded 29,000 second-feet, although data are not available regarding stage at gage section during this flood.

REGULATION.—Several dams on Black River and tributaries above Neillsville are used to create a head for developing power. Operation of these plants causes a slight diurnal fluctuation at gage, especially during winter when the flow is at a minimum.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice. Rating curve well defined. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records good except at extremely low stages, for which they are fair; records for winter poor.

The following discharge measurements were made:
January 8, 1924: Gage height, 2.77 feet; [6] discharge, 16.1 second-feet.
February 9, 1924: Gage height, 3.44 feet; [6] discharge, 20.6 second-feet.
May 17, 1924: Gage height, 5.49 feet; discharge, 1,290 second-feet.

Daily discharge, in second-feet, of Black River at Neillsville, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	60	63	72	30	15	25	360	1,720	154	205	235	105
2	51	68	53	30	15	20	480	1,290	154	220	154	84
3	47	72	50	20	15	20	320	940	147	205	190	68
4	44	68	45	20	20	30	1,220	680	124	163	440	72
5	42	62	50	20	15	20	3,160	540	119	147	420	68
6	41	61	45	15	20	30	5,160	460	151	126	420	68
7	38	61	40	15	20	25	7,730	500	140	142	235	72
8	39	53	40	15	20	25	8,090	740	165	190	540	62
9	38	51	40	15	20	30	5,160	3,460	178	138	220	72
10	35	52	35	20	20	25	3,260	4,560	165	119	265	65
11	36	51	35	15	20	25	2,160	4,030	165	107	205	62
12	38	52	35	15	20	25	1,640	2,760	178	107	151	87
13	38	60	25	15	20	25	1,890	1,890	132	90	119	99
14	38	63	40	20	20	30	1,800	3,460	124	134	107	112
15	39	68	30	15	25	30	1,640	2,560	147	178	108	93
16	41	65	30	15	20	35	1,980	1,890	138	140	345	138
17	47	68	30	20	20	15	4,700	1,290	1,430	114	250	122
18	55	65	30	20	15	30	5,320	870	1,570	87	178	108
19	60	62	30	20	20	45	4,160	630	1,500	75	380	105
20	90	58	30	15	20	40	2,760	500	1,150	65	400	98
21	90	62	30	15	25	35	2,260	400	680	51	280	132
22	84	58	35	15	25	40	2,070	362	540	52	11,200	178
23	78	61	40	15	20	50	3,260	310	2,560	49	5,640	250
24	72	62	50	15	20	60	3,910	310	1,150	65	2,660	380
25	65	65	40	15	15	75	7,370	280	740	56	1,430	310
26	62	63	50	15	10	100	11,200	310	420	61	740	235
27	61	63	35	15	20	115	7,010	280	280	53	362	190
28	61	78	40	15	25	140	5,000	250	220	60	280	190
29	62	75	40	20	25	180	3,160	220	165	345	220	190
30	63	75	35	20	-------	235	2,260	190	165	680	165	220
31	62	-------	30	20	-------	280	-------	165	-------	362	132	-------

NOTE.—Stage-discharge relation affected by ice Dec. 3 to Apr. 1; discharge ascertained by means of gage heights, discharge measurements, observer's notes, and weather records.

[6] Stage-discharge relation affected by ice.

Monthly discharge of Black River at Neillsville, Wis., for the year ending September 30, 1924

[Drainage area, 774 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	90	35	54.1	0.070	0.08
November	78	51	62.8	.081	.09
December	72	25	39.0	.050	.06
January	30	15	17.7	.023	.03
February	25	10	19.5	.025	.03
March	280	15	60.0	.078	.09
April	11,200	320	3,680	4.75	5.30
May	4,560	165	1,220	1.58	1.82
June	2,560	119	498	.643	.72
July	680	49	148	.191	.22
August	11,200	107	918	1.19	1.37
September	380	62	134	.173	.19
The year	11,200	10	569	.735	10.00

LA CROSSE RIVER NEAR WEST SALEM, WIS.

LOCATION.—In sec. 32, T. 17 N., R. 6 W., at highway bridge 2 miles west of West Salem, La Crosse County, and 10 miles above mouth of river. Dutch Creek enters from right 6 miles above station.

DRAINAGE AREA.—412 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles.

RECORDS AVAILABLE.—December 22, 1913, to September 30, 1924.

GAGE.—Chain gage attached to concrete guardrail on upstream side of bridge; read by J. R. Carlson.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of heavy gravel and rock; free from vegetation. Right bank high and not subject to overflow; left bank above gage low, and subject to overflow at flood stages. Control for low stages is a rocky riffle with a fall of about 6 inches, which is apparently drowned out at a stage of about 2.2 feet, causing a reversal in the rating curve.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.9 feet at 6 p. m. August 20 (discharge, 2,540 second-feet); minimum discharge, estimated 90 second-feet January 6 (stage-discharge relation affected by ice).

1913–1924: Maximum stage recorded, 8.45 feet March 16, 1919 (discharge about 3,620 second-feet); minimum discharge same as for 1924.

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

REGULATION.—Diurnal fluctuation at gage, amounting at low stages from 0.10 to 0.40 foot, is caused by operation of power plants, especially at Neshonoc Dam a few miles above.

ACCURACY.—Stage-discharge relation changed slightly. Standard rating curve well defined between 180 and 2,300 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to daily-discharge table. Records poor.

Discharge measurements of La Crosse River near West Salem, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 24	1.34	170	Feb. 28	[a]2.46	182	July 23	1.60	264
Jan. 25	[a]2.26	144	May 16	1.70	338	July 24	1.52	242

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of La Crosse River near West Salem, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	181	162	187	140	195	210	350	328	216	678	371	416
2	179	175	131	90	170	150	268	288	248	416	350	416
3	181	200	153	120	115	250	328	268	230	371	484	394
4	160	132	168	135	210	290	506	268	209	350	1,430	371
5	166	151	160	135	195	270	638	268	223	308	2,060	416
6	160	149	136	90	195	250	779	268	237	230	1,390	394
7	129	166	160	140	180	230	807	248	209	288	1,000	371
8	160	190	160	140	195	210	807	248	190	308	862	394
9	179	175	147	140	195	160	779	248	184	308	715	394
10	184	177	146	150	120	230	658	248	268	288	506	371
11	168	132	147	140	210	290	528	308	216	288	484	394
12	168	179	153	140	210	290	394	308	212	350	416	506
13	168	184	164	115	210	290	350	288	223	595	371	573
14	131	187	193	130	195	290	328	328	234	461	350	484
15	164	184	193	140	195	290	328	308	203	308	394	394
16	177	170	136	140	170	230	328	308	288	288	438	371
17	177	170	153	140	135	270	328	288	350	268	371	350
18	166	132	181	135	140	248	438	248	1,090	234	416	350
19	175	162	181	135	150	219	371	288	1,230	248	1,310	350
20	168	162	177	120	170	219	308	288	678	244	2,240	328
21	131	166	181	135	195	216	350	268	416	328	1,510	638
22	164	155	181	135	210	230	350	268	308	350	1,120	616
23	166	158	181	135	170	196	350	241	528	288	972	595
24	170	158	173	135	100	268	328	268	807	241	916	506
25	160	125	181	140	140	288	350	223	749	248	889	394
26	173	155	177	180	170	288	371	268	484	234	678	350
27	177	155	168	100	180	371	350	268	371	164	595	308
28	134	158	162	195	180	416	438	268	484	153	461	308
29	153	147	149	210	195	371	506	268	715	248	438	371
30	168	175	146	210	-------	268	438	268	1,060	416	416	350
31	164	-------	135	195	-------	416	-------	268	-------	616	350	-------

NOTE.—Stage-discharge relation affected by ice Jan. 1 to Mar. 17; daily discharge ascertained by means of gage heights, two discharge measurements, observer's notes, and weather records.

Monthly discharge of La Crosse River near West Salem, Wis., for the year ending September 30, 1924

[Drainage area, 412 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	184	129	165	0.400	0.46
November	200	125	163	.396	.44
December	193	131	163	.396	.46
January	210	90	141	.342	.39
February	210	100	176	.427	.46
March	416	150	265	.643	.74
April	807	268	448	1.09	1.22
May	328	223	275	.667	.77
June	1,230	184	429	1.04	1.16
July	678	153	326	.791	.91
August	2,240	350	784	1.90	2.19
September	638	308	416	1.01	1.13
The year	2,240	90	313	.760	10.33

UPPER IOWA RIVER NEAR DECORAH, IOWA

LOCATION.—In sec. 13, T. 98 N., R. 8 W., 500 feet above highway bridge in Freeport, Winneshiek County, 3 miles below Decorah, and 4 miles above upper power plant of Interstate Power Co. Trout Run enters 1 miles above station.

DRAINAGE AREA.—560 square miles (measured on United States Geological Survey map; scale, 1:500,000).

RECORDS AVAILABLE.—August 27, 1913, to November 21, 1914; May 12, 1919, to September 30, 1924.

GAGE.—Gurley graph water-stage recorder on left bank; inspected by Mrs. W. D. Gross.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—A rock ledge probably forms permanent control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.98 feet at 2 a. m. August 19 (discharge, 7,140 second-feet); minimum discharge by extension of rating curve, 40 second-feet on December 31 and several days in January.

1913–1914; 1919–1922: Maximum stage recorded, 10.42 feet at 2 p. m. February 22, 1922 (discharge, 14,700 second-feet); minimum discharge, 21 second-feet February 15, 1923.

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

REGULATIONS.—Several mills at Decorah may cause slight diurnal fluctuations.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined above 80 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph except as explained in footnote to table of daily discharge. Records good.

The following discharge measurements were made:

May 13, 1924: Gage height, 1.91 feet; discharge, 161 second-feet.

August 21, 1924: Gage height, 4.82 feet; discharge, 1,980 second-feet.

Daily discharge, in second-feet, of Upper Iowa River near Decorah, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	118	66	80	44	84	97	455	166	120	579	249	383
2	106	62	68	52	78	120	1,200	160	125	392	220	360
3	95	64	64	56	76	184	2,510	157	123	317	200	338
4	106	70	61	56	68	288	2,710	157	106	309	890	313
5	106	74	61	56	70	309	2,080	146	102	280	288	288
6	106	72	59	50	72	272	1,120	144	106	227	224	260
7	104	66	66	47	60	210	860	138	120	238	190	256
8	99	66	88	46	47	197	746	141	144	210	2,310	288
9	95	66	72	43	47	190	614	144	338	207	710	252
10	86	70	80	45	54	169	502	146	163	194	383	256
11	86	68	64	47	59	152	435	144	144	175	338	242
12	82	76	66	50	60	157	402	144	133	172	309	370
13	82	78	80	50	60	152	378	154	144	157	288	388
14	80	74	59	47	60	146	370	154	138	144	249	383
15	80	70	62	41	80	133	338	149	470	138	860	300
16	91	70	66	40	82	128	388	175	325	135	535	276
17	82	74	68	40	82	144	356	172	475	133	338	256
18	82	70	64	40	84	135	325		304	130	330	249
19	74	74	64	40	82	130	294		234	130	4,950	238
20	74	72	64	40	80	146	263		200	383	3,570	234
[illegible]								160				
21	70	68	68	42	82	141	231		184	590	2,030	296
22	74	68	76	44	82	172	220		184	213	2,920	860
23	78	76	70	47	78	309	224		374	194	1,860	590
24	74	78	70	47	82	579	217	138	1,160	207	1,230	435
25	68	80	61	50	88	830	210	133	535	169	1,060	360
26	74	78	62	54	84	1,090	194	133	579	146	985	296
27	74	70	62	64	80	2,710	190	133	383	135	758	440
28	69	64	62	72	80	2,360	187	130	680	130	620	1,200
29	64	59	56	82	84	1,230	175	128	710	480	530	1,370
30	70	72	56	84	-------	722	175	130	860	480	455	740
31	64	-------	40	93	-------	518	-------	125	-------	280	416	-------

NOTE.—Stage-discharge relation affected by ice Dec. 31 to Feb. 14; discharge based on temperature and gage-height records. Discharge Apr. 17–20 interpolated. Braced figure shows estimated mean daily discharge for period indicated.

Monthly discharge of Upper Iowa River near Decorah, Iowa, for the year ending September 30, 1924

[Drainage area, 560 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	118	64	84.3	0.151	0.17
November	80	59	70.5	.126	.14
December	80	40	65.8	.118	.14
January	93	40	51.9	.093	.11
February	88	47	73.3	.131	.14
March	2,710	97	455	.812	.94
April	2,710	175	612	1.09	1.22
May	175	125	148	.264	.30
June	1,160	102	322	.575	.64
July	579	130	248	.443	.51
August	4,950	190	977	1.74	2.01
September	1,370	234	417	.745	.83
The year	4,950	40	294	.525	7.15

WISCONSIN RIVER AT WHIRLPOOL RAPIDS, NEAR RHINELANDER, WIS.

LOCATION.—In sec. 4, T. 35 N., R. 8 E., at head of Whirlpool Rapids, 1 mile below outlet of Crescent Lake, 3 miles below power station of Rhinelander Power Co., and 10 miles southwest of Rhinelander, Lincoln County.

DRAINAGE AREA.—1,160 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—September 15, 1915, to September 30, 1924. December 1, 1905, to September 30, 1915, 3 miles upstream.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by Clarence Jewell.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet above gage.

CHANNEL AND CONTROL.—Bed of heavy gravel and rock. Banks medium high and not subject of overflow. Control is head of rapids, 100 feet below gage; well defined and permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.55 feet at 6 p. m. April 18 (discharge, 3,480 second-feet); minimum stage, 1.00 foot at 8 p. m. July 20 (discharge, 279 second-feet).

1905–1924: Maximum stage recorded, 5.61 feet April 22, 1916 (discharge, 5,250 second-feet); minimum discharge, no flow at old location during August and September, 1907, and June and July, 1908. Minimum flow is caused almost entirely by regulation and at present location probably some discharge will always occur. Minimum stage at new location 0.65 foot July 7, 1918 (discharge, 165 second-feet).

REGULATION.—Flow is regulated by 14 reservoirs [7] and three power plants above station. The aggregate capacity of reservoirs is 2.8 billion cubic feet during summer and 3.6 billion cubic feet during winter.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Water-stage recorder operated satisfactorily except as indicated in footnote to table of daily discharge. Daily discharge ascertained by use of discharge integrator, except as explained in footnote to table of daily discharge. Records fair.

Discharge measurements of Wisconsin River at Whirlpool Rapids, near Rhinelander, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 11	1.78	633	Mar. 17	[a] 2.18	740
Jan. 11	[a] 2.26	822	May 24	3.40	2,000
Feb. 23	[a] 2.11	539			

[a] Hat Rapids gage and measurement.

[7] Information concerning these reservoirs, based on maps and data furnished by W. E. Brooks, manager of the Wisconsin Valley Improvement Co. and data collected by the engineering department of Railroad Commission of Wisconsin, is contained in United States Geological Survey Water Supply Paper 405, p. 127.

Daily discharge, in second-feet, of Wisconsin River at Whirlpool Rapids, near Rhinelander, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	594	667	710	710	475	430	525	2,180	1,040	1,050	1,160	1,620
2	773	667	710	710	525	430	580	2,320	1,090	1,710	1,120	1,280
3	750	630	390	640	580	430	580	2,080	1,240	1,360	1,160	1,280
4	750	479	785	710	315	475	785	1,370	1,200	1,250	1,120	1,200
5	750	580	710	580	525	430	710	1,390	1,120	950	1,160	1,200
6	750	710	525	580	475	390	580	1,720	1,050	1,050	1,630	1,120
7	630	710	640	315	475	475	865	1,720	1,130	865	1,320	683
8	643	580	710	865	475	430	1,150	1,720	750	1,470	1,490	673
9	643	580	475	580	475	390	710	1,770	1,050	1,590	2,020	1,090
10	586	580	430	710	475	350	710	1,940	1,280	1,590	1,880	1,010
11	535	710	710	580	350	525	1,250	1,880	1,240	1,590	1,580	855
12	586	430	640	580	525	430	1,250	1,880	1,280	1,590	1,440	820
13	586	710	640	580	525	475	1,210	2,180	1,200	1,050	1,490	890
14	315	950	710	315	525	475	1,370	2,680	864	373	1,360	1,470
15	439	640	580	580	475	525	1,670	2,420	855	872	1,320	865
16	511	640	430	525	475	475	1,830	2,110	1,130	1,080	1,330	1,470
17	560	602	1,050	580	430	390	2,200	2,870	1,280	1,080	1,320	1,000
18	558	501	710	580	350	475	2,710	2,870	1,280	928	1,400	890
19	586	390	640	475	580	430	2,960	1,970	1,240	750	1,440	965
20	555	785	710	525	475	475	2,680	1,710	1,320	540	1,440	855
21	397	580	525	390	475	475	2,550	2,110	1,170	554	1,490	779
22	608	710	710	580	475	475	2,420	2,560	1,320	720	1,780	1,080
23	580	580	950	475	430	580	2,300	1,970	1,130	727	1,880	1,160
24	564	640	1,050	525	430	430	2,300	1,720	1,240	793	2,120	1,200
25	588	865	950	525	475	580	2,550	1,900	1,470	1,000	1,960	1,200
26	560	390	640	475	430	475	2,680	1,300	1,150	975	2,080	1,200
27	586	865	640	640	390	580	2,680	1,530	1,250	586	2,000	1,240
28	373	710	785	785	390	640	2,550	1,490	1,200	591	1,830	1,170
29	608	950	640	640	390	580	2,300	1,400	1,200	928	1,940	1,360
30	667	710	580	580	-------	525	2,240	1,320	765	1,040	2,120	1,200
31	720	-------	390	390	-------	315	-------	1,200	-------	1,120	1,430	-------

NOTE.—Water-stage recorder not operating satisfactorily Nov. 6–16, Nov. 19 to Apr. 12, May 16–23 June 25–27, July 1–13, and Sept. 14–16; discharge ascertained by applying gage heights at Hat Rapids to a rating curve developed by plotting Whirlpool Rapids discharge for days when available against Hat Rapids gage heights for same days.

Monthly discharge of Wisconsin River at Whirlpool Rapids, near Rhinelander, Wis., for the year ending September 30, 1924

[Drainage area, 1,160 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	773	315	592	0.510	0.59
November	950	390	651	.561	.63
December	1,050	390	670	.578	.67
January	865	315	572	.493	.57
February	580	315	462	.398	.43
March	640	315	470	.405	.47
April	2,960	525	1,700	1.47	1.64
May	2,870	1,200	1,910	1.65	1.90
June	1,470	750	1,150	.991	1.11
July	1,710	373	1,020	.879	1.01
August	2,120	1,120	1,570	1.35	1.56
September	1,620	673	1,090	.940	1.05
The year	2,960	315	990	.853	11.63

WISCONSIN RIVER AT MERRILL, WIS.

LOCATION.—At highway bridge at east end of Merrill, Lincoln County, 1,000 feet below power house of Merrill plant of Wisconsin Valley Electric Co., and half a mile below mouth of Prairie River.

DRAINAGE AREA.—2,630 square miles (measured on Wisconsin Geological and Natural History Survey map, edition of 1911; scale, 1 inch = 6 miles).

RECORDS AVAILABLE.—November 16, 1902, to September 30, 1924.

GAGE.—Gurley water-stage recorder installed July 1, 1923; inspected by Otto Lueck.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of heavy gravel and rock; nearly permanent. Small island below gage and small rapids on either side probably constitute control. Banks fairly high and seldom overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.65 feet at 7 a. m. April 17 (discharge, 13,300 second-feet); minimum stage, 3.1 feet December 11 and July 28 (discharge, 480 second-feet; caused by regulation.)

1902–1924: Maximum stage recorded, approximately 17.5 feet July 24, 1912 (discharge, 45,000 second-feet). Minimum stage, 2.45 feet September 26, 1908 (discharge, about 90 second-feet).

REGULATION.—Above the gaging station are 17 reservoirs, [8] which are operated by Wisconsin Valley Improvement Co. for the purpose of regulating flow in Wisconsin River. The aggregate capacity of these reservoirs is about 6¼ billion cubic feet.

In addition to the above reservoirs, there are eight dams on the Wisconsin and Tomahawk Rivers above station operated for power.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice. Rating curve well defined above 1,000 second-feet. Water-stage recorder operated satisfactorily except as noted in footnote to daily-discharge table throughout year. Daily discharge determined by means of discharge integrator. Records good.

Discharge measurements of Wisconsin River at Merrill, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Jan. 9	[a] 4.51	1,200	Mar. 14	[a] 4.25	1,170
Feb. 21	[a] 4.08	1,040	May 22	5.81	3,370

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Wisconsin River at Merrill, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,080	1,420	1,360	1,100	1,200	1,160	1,310	7,110	2,170	2,460	1,800	2,010
2	1,000	1,240	1,250	1,400	1,220	1,200	1,560	5,000	2,320	2,180	1,930	2,550
3	1,180	1,370	1,140	1,200	1,200	1,130	1,550	6,680	2,040	2,170	2,170	1,800
4	1,190	1,380	1,250	1,250	1,100	1,340	1,630	4,750	2,260	2,320	1,510	1,800
5	1,060	950	1,410	1,260	1,190	1,220	1,940	3,880	2,050	1,460	2,050	1,920
6	1,260	1,040	1,430	1,170	1,480	1,230	3,040	4,850	2,780	1,800	1,830	2,050
7	1,080	1,280	1,300	1,020	1,400	1,220	3,840	5,670	2,300	1,140	2,040	1,550
8	955	1,400	1,380	1,090	1,350	1,270	4,510	7,280	2,300	2,070	2,040	1,560
9	1,200	1,280	1,440	1,240	1,300	1,080	4,560	9,540	2,320	1,790	2,480	1,790
10	1,270	974	1,340	1,540	1,200	1,120	4,270	11,300	2,060	1,920	2,780	1,670
11	1,250	1,260	1,100	1,400	1,170	1,260	4,350	10,100	2,180	1,790	2,350	1,670
12	1,080	1,050	996	1,420	1,040	1,250	4,330	7,550	2,040	2,050	2,050	1,790
13	1,140	1,170	1,170	1,180	1,340	1,180	4,480	6,120	1,680	1,930	2,040	1,790
14	1,140	1,440	850	1,130	1,070	1,180	5,380	7,370	2,170	1,690	1,930	1,580
15	1,030	1,560	1,310	1,180	1,160	1,200	7,120	7,120	1,920	1,560	2,060	1,810

[8] Information concerning these reservoirs, based on maps and data furnished by the manager of the Wisconsin Valley Improvement Co., and data collected by the engineering department of the Wisconsin Railroad Commission, is contained in Water Supply Paper 405, p. 127.

Daily discharge, in second-feet, of Wisconsin River at Merrill, Wis., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
16	1,000	1,460	1,330	1,260	1,240	1,220	9,260	6,360	1,930	1,560	2,320	1,810
17	1,290	1,300	1,180	1,140	1,180	1,140	12,500	5,410	1,930	1,370	2,040	1,670
18	1,140	1,320	1,250	1,040	1,060	1,230	11,000	5,180	1,810	1,580	2,040	1,800
19	1,180	1,030	1,340	950	1,020	1,330	11,000	4,180	2,050	1,470	2,170	1,670
20	1,320	1,300	1,480	941	1,200	1,300	9,330	3,520	2,190	1,150	2,320	1,930
21	1,040	1,300	1,190	1,030	1,240	1,320	8,160	3,720	2,050	1,390	5,870	1,790
22	810	1,280	1,150	1,070	1,080	1,340	7,240	3,920	2,170	1,670	3,940	2,080
23	895	1,260	1,400	1,100	1,060	1,220	6,740	3,300	2,060	1,570	4,510	2,320
24	1,050	1,240	1,400	1,140	970	1,170	7,890	3,300	2,240	1,470	3,880	2,440
25	1,080	1,320	1,300	1,180	1,230	1,240	9,540	3,500	1,920	1,480	2,920	2,890
26	1,240	1,320	1,250	1,160	1,060	1,330	11,000	2,960	1,920	1,920	4,080	2,170
27	1,330	1,380	1,390	1,160	1,260	1,540	12,200	2,490	1,790	1,800	3,880	2,040
28	1,180	1,700	1,340	1,040	1,120	1,700	9,820	2,620	2,060	920	2,600	2,300
29	1,050	1,590	1,240	1,040	1,340	1,320	8,480	2,620	2,140	1,580	1,930	1,940
30	1,170	1,480	1,000	1,200	-------	1,230	7,890	2,520	2,070	1,560	2,590	2,070
31	1,300	-------	600	1,220	-------	1,650	-------	2,150	-------	2,040	2,460	-------

NOTE.—Stage-discharge relation affected by ice Dec. 28 to Mar. 16. Water-stage recorder not operating satisfactorily Oct. 30, 31, Nov. 29 to Dec. 2, and Sept. 1, 2; discharge interpolated.

Monthly discharge of Wisconsin River at Merrill, Wis., for the year ending September 30, 1924

[Drainage area, 2,630 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,330	810	1,130	0.430	0.50
November	1,700	950	1,300	.494	.55
December	1,480	600	1,240	.471	.54
January	1,540	941	1,170	.445	.51
February	1,480	970	1,190	.452	.49
March	1,700	1,080	1,270	.483	.56
April	12,500	1,310	6,530	2.48	2.77
May	11,300	2,150	5,230	1.99	2.29
June	2,780	1,680	2,100	.798	.89
July	2,460	920	1,710	.650	.75
August	5,870	1,510	2,600	.989	1.14
September	2,890	1,550	1,940	.738	.82
The year	12,500	600	2,280	.867	11.81

WISCONSIN RIVER AT KNOWLTON, WIS.

LOCATION.—In N. ½ sec. 29, T. 26 N., R. 7 E., 50 feet below left end of a combination railroad-highway bridge of Chicago, Milwaukee & St. Paul Railway on State trunk highway No. 73 at Knowlton, Marathon County, 1½ miles below mouth of Big Eau Pleine River which enters from right.

DRAINAGE AREA.—4,360 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—July 13, 1921, to September 30, 1924. Gage heights obtained since May 1, 1915, by United States Weather Bureau.

GAGE.—Gurley water-stage recorder on left bank; installed August 6, 1921; inspected by W. T. Guenther.

DISCHARGE MEASUREMENTS.—Made from bridge, from boat, or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and light gravel. Control not well defined; there is, however, a decided contraction of channel at an island 2,500 feet below gage. Right bank high and seldom overflowed; left bank of medium height and is overflowed at extreme flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.8 feet at 8 a. m. April 18 (discharge, about 32,500 second-feet); minimum stage, 1.44 feet at 6 a. m. December 17 (discharge, 890 second-feet).

1921–1924: Maximum stage recorded, 19.5 feet at 10 p. m. April 10, 1922 (discharge, 49,800 second-feet); minimum stage, 1.0 foot at 2 a. m. August 15, 1921 (discharge about 670 second-feet; revised).

REGULATION.—No storage reservoirs discharge into Wisconsin River between Knowlton and Merrill. See "Regulation" in station description of Wisconsin River at Merrill. Between Knowlton and Merrill are four dams operated for power.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined between 1,600 and 30,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge obtained by applying rating table to mean daily gage height. Open-water records fair when automatic gage was operating satisfactorily; records for other periods poor.

The following discharge measurement was made:
May 20, 1924: Gage height, 4.96 feet; discharge, 6,190 second-feet.

Daily discharge, in second-feet, of Wisconsin River at Knowlton, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,520	1,580	1,830				2,950	11,800	3,110	3,590	2,660	2,800
2	2,800	1,830	1,830				2,520	10,200	3,110	3,430	3,110	2,520
3	2,800	1,700	1,700				1,580	5,280	3,110	2,950	3,110	2,660
4	2,800	1,470	1,580				1,700	9,960	3,430	2,800	3,110	2,800
5	2,520	2,100	1,270				2,800	7,010	2,950	2,800	2,800	2,660
6	1,960	1,700	1,470				4,940	7,010	3,270	2,950	2,660	2,380
7	1,960	1,580	1,470				10,200	9,530	3,750	2,950	3,110	2,520
8	1,830	1,580	1,470				14,300	9,530	3,430	3,110	3,110	2,520
9	2,240	1,960	1,030				17,600	14,000	3,270	2,800	3,920	2,800
10	1,960	2,240	1,270				14,000	21,600	3,270	2,800	3,270	2,800
11	2,520	1,470	1,470				12,700	22,200	3,430	2,800	3,590	2,800
12	1,960	1,470	1,470				11,100	18,700	3,110	3,110	2,800	2,660
13	2,240	1,700	1,700				10,600	12,700	3,110	3,750	2,950	2,660
14	1,700	1,270	1,700				11,100	11,300	3,110	2,660	2,800	2,520
15	1,960	1,700	1,700		1,280		15,100	14,000	2,800	2,950	3,110	2,520
16	2,240	1,700	1,180	1,260		1,360	19,600	13,700	2,800	2,240	3,110	2,800
17	1,960	1,960	1,100				24,400	10,800	2,800	2,380	3,270	2,800
18	1,960	1,700	1,100				32,500	8,690	3,110	2,520	3,270	2,520
19	1,830	1,700	1,270				24,000	8,060	3,110	2,100	3,430	2,660
20	1,700	1,370	1,470				19,000	7,010	2,950	1,830	3,430	2,520
21	1,470	1,830	1,700				16,100	5,280	2,520	2,240	3,110	2,800
22	1,700	1,470	1,960				14,000	5,280	2,950	2,520	6,600	2,950
23	1,580	1,580	1,470				11,500	5,280	2,950	2,240	9,110	3,270
24	1,270	1,700	1,370				13,700	5,630	3,110	2,100	9,110	3,430
25	1,830	1,470	1,180				16,100	5,280	2,950	2,100	7,220	3,590
26	1,700	1,470	1,470				22,200	5,110	2,950	2,240	5,450	3,590
27	1,700	1,180	1,370				25,000	5,280	2,800	2,240	4,940	3,430
28	1,700	1,270	1,300				21,100	3,920	2,800	2,520	4,430	3,430
29	1,830	1,700	1,300				17,900	3,110	2,520	2,520	3,750	3,110
30	1,580	1,470	1,300				14,800	3,920	2,950	2,240	3,110	3,110
31	1,470	-------	1,300		-------		--------	3,750	-------	2,380	3,110	-------

NOTE.—Stage-discharge relation affected by ice Dec. 28 to Mar. 31. Recorder not operating satisfactorily Nov. 4, 6, 7, Dec. 8, 9, Jan. 1 to July 7, and Aug. 5–13; discharge determined by comparison with records on Wisconsin River at Merrill and at Nekoosa.

Monthly discharge of Wisconsin River at Knowlton, Wis., for the year ending September 30, 1924

[Drainage area, 4,360 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,800	1,270	1,980	0.454	0.52
November	2,240	1,180	1,630	.374	.42
December	1,960	1,030	1,450	.333	.38
January	----------	----------	[a] 1,260	.289	.33
February	----------	----------	[a] 1,280	.294	.32
March	----------	----------	[a] 1,360	.312	.36
April	32,500	1,580	14,200	3.26	3.64
May	22,200	3,110	9,190	2.11	2.43
June	3,750	2,520	3,050	.700	.78
July	3,750	1,830	2,640	.606	.70
August	9,110	2,660	3,950	.906	1.04
September	3,590	2,380	2,850	.654	.73
The year	32,500	----------	3,730	.856	11.65

[a] Estimated.

WISCONSIN RIVER NEAR NEKOOSA, WIS.

LOCATION.—In sec. 15, T. 21 N., R. 5 E., 1½ miles below Nekoosa, Wood County. Tenmile Creek enters from left 4 miles below station.

DRAINAGE AREA.—5,500 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch = 6 miles).

RECORDS AVAILABLE.—May 21, 1914, to September 30, 1924.

GAGE.—Gurley water-stage recorder on right bank; installed January 31, 1923; inspected by Henry Mans.

DISCHARGE MEASUREMENTS.—Made from cable just above gage.

CHANNEL AND CONTROL.—Bed composed of gravel; clean, permanent. Banks high and are seldom overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.00 feet at 9 a. m. April 19 (discharge, 38,200 second-feet); minimum discharge, estimated 400 second-feet at 6 p. m. January 13 (stage-discharge relation affected by ice).

1914–1924. Maximum stage recorded, 16.1 feet at 1 a. m. April 12, 1922 (discharge, 61,000 second-feet); minimum discharge same as for 1924. Minimum flow is due to regulation.

ICE. Stage-discharge relation seriously affected by ice.

REGULATION.—No storage reservoirs discharge into Wisconsin River between Nekoosa and Merrill. See "Regulation" in station description of Wisconsin River at Merrill. Between Nekoosa and Merrill are 12 dams operated for power.

ACCURACY.—Stage-discharge relation permanent, except as affected by ice. Rating curve well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by use of discharge integrator. Open-water records excellent; winter records fair.

Discharge measurements of Wisconsin River near Nekoosa, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 12	1.74	2,560	Feb. 19	[a] 2.08	1,500	May 19	5.70	11,250
Jan. 7	[a] 2.78	1,330	Mar. 12	1.42	1,410			

[a] Stage-discharge relation affected by ice.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,040	1,620	1,960	1,820	1,380	1,680	2,040	18,400	4,300	3,920	2,580	3,640
2	2,110	1,820	2,040	1,550	1,210	2,110	2,040	15,400	4,500	3,920	2,750	3,640
3	2,180	1,550	2,420	1,260	1,060	1,820	2,420	12,000	3,920	3,640	5,010	3,740
4	2,580	1,430	1,890	1,380	1,550	1,620	2,580	10,700	3,190	2,840	4,800	2,420
5	2,340	1,890	2,110	1,680	1,960	1,750	4,210	9,650	3,640	3,640	4,120	3,640
6	2,180	1,750	1,680	1,550	1,680	1,750	6,770	8,900	4,120	3,370	4,500	2,840
7	1,750	1,750	1,750	1,550	1,680	1,550	12,500	7,950	4,020	2,840	4,800	2,920
8	1,620	1,820	1,960	1,380	1,820	1,490	20,400	12,000	3,920	3,460	4,400	3,460
9	1,820	1,680	1,750	1,380	1,750	1,060	25,700	16,300	4,400	3,460	4,020	2,340
10	1,750	2,110	1,820	1,890	1,160	1,210	24,600	23,200	4,400	3,190	3,920	3,100
11	1,890	1,680	1,750	1,320	1,320	1,320	20,800	28,200	4,210	2,750	4,120	2,920
12	2,110	1,750	1,680	1,820	1,430	1,620	18,100	27,300	4,300	3,550	4,300	3,190
13	1,820	1,750	1,680	875	1,430	1,750	16,000	21,800	4,120	3,550	3,370	2,840
14	1,620	2,040	1,620	2,110	1,320	1,750	15,700	18,100	4,290	3,920	3,190	2,420
15	1,890	1,750	1,550	1,820	1,320	1,620	18,400	18,100	2,360	2,920	3,370	3,280
16	1,620	1,820	1,490	1,380	1,260	1,380	20,400	19,400	4,290	2,920	4,020	2,500
17	1,820	1,820	1,490	1,620	1,260	1,260	26,900	16,900	4,240	2,580	3,280	2,920
18	1,820	1,750	1,960	1,430	1,320	1,490	33,500	13,600	4,180	2,420	3,830	3,190
19	1,750	2,040	1,680	1,620	1,620	1,210	37,000	11,500	4,280	2,660	4,120	2,500
20	1,680	1,680	1,490	1,620	1,960	1,430	29,500	8,900	4,330	2,110	5,120	2,840
21	1,680	1,820	1,380	1,620	1,430	1,490	24,200	7,460	3,830	1,890	4,210	2,840
22	1,490	2,180	1,820	1,490	1,550	1,430	19,400	6,770	3,550	2,040	8,660	3,550
23	1,620	1,820	1,960	1,430	1,550	1,430	18,100	7,000	4,600	2,180	15,400	3,460
24	1,750	1,890	1,430	1,320	1,430	1,210	18,100	7,230	4,400	2,420	16,000	3,460
25	1,490	2,110	1,170	1,260	1,820	1,490	21,100	5,870	3,830	2,340	12,800	3,830
26	1,620	1,820	1,620	1,380	1,750	1,750	24,200	6,770	3,550	2,260	9,650	4,120
27	1,680	1,750	1,890	1,320	1,550	1,680	30,300	6,770	3,460	2,180	7,700	3,830
28	1,620	1,960	1,620	1,380	1,550	1,620	32,600	6,090	3,830	2,040	6,540	3,370
29	1,490	1,380	1,820	1,260	1,680	2,110	26,100	5,010	3,100	2,500	5,870	3,920
30	1,750	1,620	1,890	1,320	-------	1,260	22,800	3,460	3,100	3,010	5,430	3,190
31	1,750	-------	1,820	1,380	-------	1,620	-------	4,800	-------	2,420	3,280	-------

NOTE.—Stage-discharge relation affected by ice Jan. 1 to Apr. 2; discharge ascertained by applying to rating table gage height corrected for ice effect by means of three discharge measurements, observer's notes, and weather records. No gage height record June 14-20; discharge ascertained from a study of records for Nekoosa power plant.

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

[Drainage area, 5,500 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,580	1,490	1,820	0.331	0.38
November	2,180	1,380	1,800	.327	.36
December	2,420	1,170	1,750	.318	.37
January	2,110	875	1,490	.271	.31
February	1,960	1,060	1,510	.275	.30
March	2,110	1,060	1,550	.282	.33
April	37,000	2,040	19,200	3.49	3.89
May	28,200	3,460	12,400	2.25	2.59
June	4,600	2,360	3,940	.716	.80
July	3,920	1,890	2,870	.522	.60
August	16,000	2,580	5,650	1.03	1.19
September	4,120	2,340	3,200	.582	.65
The year	37,000	875	4,760	.865	11.77

WISCONSIN RIVER AT MUSCODA, WIS.

LOCATION.—In sec. 1, T. 8 N., R. 1 W., at highway bridge 1 mile north of Muscoda, Grant County. Eagle Mill Creek enters from right half a mile below and Underwood Creek from left 4½ miles above station.

DRAINAGE AREA.—10,300 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—December 21, 1902, to December 31, 1903; December 1, 1913, to September 30, 1924. Gage heights November 1, 1908, to December 31, 1912, published in United States Weather Bureau bulletin, "Daily river stages," pts. 9–11.

GAGE.—Chain gage fastened to handrail on upstream side of bridge; read by Bud Rice.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 789 feet at 5 p. m. April 24 (discharge, 41,400 second-feet); minimum discharge, 2,500 second-feet on February 4 (stage-discharge relation affected by ice).

1903, 1914–1924: Maximum stage recorded, 10.60 feet at 7 a. m. April 16, 1922 (discharge, 72,100 second-feet); minimum discharge, estimated 1,600 second-feet December 20, 1921 (stage-discharge relation affected by ice).

According to records of United States Weather Bureau [9] (see note under "Gage"), on June 11, 1881, the river reached a stage of 11.1 feet and during August, 1868, zero on gage; discharge not computed owing to changes in channel and datum of gage.

REGULATION.—Nearest power plant above station is at Prairie du Sac, 40 miles distant; considerable diurnal fluctuation has been observed at gage. Owing to regulation by storage in the headwaters, the flow at this station is not natural.

ACCURACY.—Stage-discharge relation not permanent, also affected by ice. Rating curve fairly well defined above 4,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records poor.

[9] Daily river stages, pt. 10, p. 98, U. S. Dept. Agr.

Discharge measurements of Wisconsin River at Muscoda, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 8	0.90	4,040	Feb. 26	[a] 1.84	3,120	July 22	2.06	7,450
Jan. 22	[a] 2.01	3,110	May 13	5.39	22,600			

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Wisconsin River at Muscoda, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3,980	3,780	4,180	3,780	2,830	3,010	3,780	30,800	10,900	9,340	5,340	11,800
2	4,180	3,580	3,980	3,580	3,200	3,200	5,590	36,800	9,340	8,260	4,860	13,000
3	4,400	3,390	4,180	3,580	3,200	3,580	8,610	36,800	10,100	7,920	4,400	10,500
4	4,400	3,390	4,180	3,580	2,500	3,580	10,500	34,100	9,720	7,920	7,920	8,610
5	4,180	3,980	4,180	3,200	3,200	4,400	11,800	26,400	8,970	6,960	8,610	7,920
6	3,980	3,980	3,980	3,580	3,200	3,980	11,800	21,900	8,260	6,960	8,260	6,960
7	3,780	3,980	3,580	3,580	3,580	3,980	7,920	17,200	7,590	6,400	13,000	7,590
8	3,580	3,780	3,780	3,580	3,580	3,780	11,300	17,200	7,590	7,920	13,000	6,120
9	4,180	3,390	3,980	3,200	3,200	3,580	14,800	15,300	5,590	7,920	18,200	8,260
10	3,980	3,200	3,780	3,200	3,200	3,580	16,700	16,200	7,590	7,270	18,700	7,920
11	4,180	3,200	3,980	3,200	3,390	3,580	20,800	15,300	7,270	7,270	13,500	7,920
12	3,980	3,390	3,780	3,010	3,200	3,780	23,100	16,700	6,960	7,270	13,000	7,270
13	4,180	4,180	3,980	3,200	3,200	3,980	30,000	21,400	6,960	6,680	11,300	6,960
14	3,580	3,780	3,580	3,010	3,200	3,980	33,200	23,100	6,680	5,100	7,920	6,120
15	3,390	3,980	3,980	3,580	3,390	3,780	39,500	25,700	8,610	6,680	8,970	5,590
16	3,580	4,180	4,180	2,830	2,830	3,580	32,400	31,600	6,960	6,120	9,720	6,120
17	3,980	4,400	3,580	3,200	3,200	3,580	29,200	31,600	8,260	5,340	8,610	6,680
18	4,180	3,780	3,980	2,830	3,010	3,580	24,400	29,200	8,260	5,590	6,960	6,680
19	4,630	4,180	3,780	2,830	3,200	3,980	24,400	23,800	8,610	5,590	10,900	6,120
20	3,980	3,580	3,980	2,830	2,830	3,780	28,500	23,800	8,260	5,340	11,300	6,680
21	3,580	3,390	3,980	3,390	2,830	3,580	28,500	23,100	8,260	5,340	11,800	4,860
22	3,390	3,580	3,780	3,200	2,830	3,580	31,600	19,200	7,920	6,120	10,500	4,630
23	3,390	3,980	4,180	3,200	2,660	5,100	35,900	15,800	7,590	6,680	8,970	6,400
24	3,580	3,780	4,180	2,830	2,830	5,340	40,500	15,800	11,300	6,400	13,000	6,680
25	3,200	3,980	3,780	3,010	3,580	5,340	37,700	15,300	9,730	5,850	12,200	6,960
26	3,390	4,180	3,390	3,200	3,200	6,120	30,000	13,000	12,200	5,850	14,400	6,400
27	3,780	4,630	3,980	2,830	3,010	7,590	28,500	11,800	10,500	5,590	18,200	6,400
28	3,580	3,980	3,980	3,200	3,200	7,590	24,400	12,200	8,970	4,630	19,200	6,960
29	2,780	4,180	3,980	3,200	3,010	8,970	28,500	10,900	10,900	5,340	16,700	6,400
30	4,180	4,400	3,980	3,200	-------	4,400	30,000	10,100	10,500	5,850	16,700	8,970
31	3,780	-------	3,980	2,830	-------	3,580	--------	10,100	--------	5,590	13,900	-------

NOTE.—Stage-discharge relation affected by ice Dec. 28 to Mar. 24; daily discharge ascertained by applying to rating table gage height corrected for effect of ice by means of two discharge measurements, observer's notes, and weather records.

Monthly discharge of Wisconsin River at Muscoda, Wis., for the year ending September 30, 1924

[Drainage area, 10,300 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	4,630	3,200	3,870	0.376	0.43
November	4,630	3,200	3,840	.373	.42
December	4,180	3,390	3,930	.382	.44
January	3,780	2,830	3,210	.312	.36
February	3,580	2,500	3,110	.302	.33
March	8,970	3,010	4,370	.424	.49
April	40,500	3,780	23,500	2.28	2.54
May	36,800	10,100	21,000	2.04	2.35
June	12,200	5,590	8,680	.843	.94
July	9,340	4,630	6,490	.630	.73
August	19,200	4,400	11,300	1.10	1.27
September	13,000	4,630	7,320	.711	.79
The year	40,500	2,500	8,410	.817	11.09

TOMAHAWK RIVER NEAR BRADLEY, WIS.

LOCATION.—In sec. 16, T. 36 N., R. 6 E., 2 miles west of Cassion, 4 miles north of Bradley, Oneida County, 4 miles below mouth of Bearskin Creek, and 8 miles above mouth.

DRAINAGE AREA.—422 square miles.

RECORDS AVAILABLE.—September 18, 1914, to September 30, 1924.

GAGE.—Slope gage fastened to concrete posts on right bank; installed September 24, 1919; read by H. F. Hemmings.

DISCHARGE MEASUREMENTS.—Made from cable half a mile below gage.

CHANNEL AND CONTROL.—Bed at gage and a short distance below, sandy and likely to shift. Control is formed by rapids 2,000 feet below gage. Bed at cable section heavy gravel. When a head of 15 feet is maintained in Rice Lake storage dam, in secs. 4 and 9, T. 35 N., R. 6 E., backwater will extend halfway up the rapids and may affect stage-discharge relation slightly. Maximum head maintained during the year was considerably less than 15 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.8 feet April 20 and 21 (discharge, 1,120 second-feet); minimum discharge estimated, 205 second-feet January 17 (stage-discharge relation affected by ice).

1914–1924. Maximum stage recorded, 6.9 feet April 24, 1916 (discharge, 2,200 second-feet); minimum stage, 1.29 feet July 1 and August 9, 1921 (discharge, 132 second-feet).

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

REGULATION.—The following reservoirs are maintained above station for the purpose of regulating flow of Wisconsin River.

Reservoirs used to regulate flow of Wisconsin River

Name	Location of reservoir	Location of dam	Area of reservoir	Drainage area	Capacity (millions of cubic feet)	
					Summer	Winter
			Sq. mi.	*Sq. mi.*		
Squirrel	T. 39 N., R. 5 E.	Sec. 30, T. 39 N., R. 5 E.	3.00	17.07	152	152
Monocqua	Tps. 38–40 N., Rs. 6–7 E.	Sec. 10, T. 39 N., R. 6 E.	11.31	81.60	291	651
			14.31	98.67	443	803

ACCURACY.—Stage-discharge relation probably permanent, except as affected by ice. Rating curve poorly defined below 372 second-feet; fairly well defined above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating curve, except as indicated in footnote to table of daily discharge. Open-water records for medium and high stages fair; low-water and winter records poor.

Discharge measurements of Tomahawk River near Bradley, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 11	1.91	264	Feb. 22	[a] 2.67	254	May 23	2.84	446
Jan. 10	[a] 2.65	273	Mar. 15	[a] 2.56	240			

[a] Stage-discharge relation affected by ice.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	260	316	328	280	220	240	255	815	318	396	265	306
2	261	308	341	265	230	250	270	746	322	349	266	298
3	258	304	349	255	235	250	290	681	328	318	287	297
4	255	308	354	250	225	250	330	574	318	295	434	295
5	254	310	318	240	225	255	360	516	322	280	502	287
6	250	308	320	240	225	255	420	516	349	255	488	278
7	250	304	326	235	225	250	460	559	408	248	488	276
8	249	298	326	225	220	245	516	666	384	250	460	276
9	250	289	324	225	235	240	544	815	372	248	460	275
10	254	289	318	225	235	250	619	886	421	260	434	271
11	254	285	308	225	240	250	619	923	460	269	408	266
12	255	287	308	225	250	245	604	1,040	421	278	384	266
13	254	284	304	225	265	240	559	1,080	384	254	384	306
14	254	282	293	220	255	240	589	1,120	356	254	372	291
15	255	293	289	210	255	240	634	1,040	338	239	360	338
16	249	300	295	210	255	240	746	1,000	338	232	421	332
17	268	304	295	205	255	240	923	850	472	222	447	322
18	308	302	297	210	250	240	961	815	384	215	421	302
19	320	302	304	215	250	250	1,040	730	372	211	384	284
20	324	293	318	220	250	250	1,120	634	360	211	372	275
21	316	285	322	220	250	255	1,120	559	343	215	370	275
22	306	291	332	210	250	255	1,120	516	334	218	434	447
23	298	293	324	210	250	255	1,080	460	328	246	474	516
24	293	300	320	210	255	265	961	447	338	232	488	544
25	293	312	308	210	255	265	923	434	334	232	460	574
26	297	314	314	220	250	265	923	421	308	232	434	574
27	300	320	302	225	250	270	923	396	298	239	396	544
28	312	324	295	220	235	255	923	384	289	225	365	544
29	318	384	289	220	240	250	886	360	318	211	343	530
30	326	328	276	210	-------	240	850	338	408	232	326	516
31	322	-------	280	210	-------	240	-------	328	-------	249	316	-------

NOTE.—Stage-discharge relation affected by ice Jan. 1 to Apr. 6; discharge ascertained by applying to the rating table gage heights corrected for ice effect by means of three discharge measurements, observer's notes, and weather records.

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

[Drainage area, 422 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	326	249	279	0.661	0.76
November	384	282	304	.720	.80
December	354	276	312	.739	.85
January	280	205	225	.533	.61
February	265	220	243	.576	.62
March	270	240	250	.592	.68
April	1,120	255	719	1.70	1.90
May	1,120	328	666	1.58	1.82
June	460	289	354	.839	.94
July	396	211	252	.597	.69
August	502	265	401	.950	1.10
September	574	266	364	.863	.96
The year	1,120	205	364	.863	11.73

PRAIRIE RIVER NEAR MERRILL, WIS.

LOCATION.—On line between secs. 20 and 29, T. 32 N., R. 7 E., at highway bridge 4½ miles northeast of Merrill, Lincoln County, and 5½ miles above mouth of river. Haymeadow Creek enters 5 miles above station.

DRAINAGE AREA.—164 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—January 17, 1914, to September 30, 1924.

GAGE.—Chain gage attached to upstream side of bridge; read by Mrs. Meta Krause.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; clean and free from vegetation. Right bank high, not subject to overflow; left bank may be overflowed at extreme flood stages; banks wooded. Control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.30 feet April 17 and 18 (discharge, 1,630 second-feet); minimum discharge, estimated 60 second-feet February 23–25 and March 8–9 (stage-discharge relation affected by ice).

1914–1924: Maximum stage recorded, 6.1 feet April 22, 1916, and April 22, 1923 (discharge, 2,290 second-feet); minimum discharge occurred in 1924.

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice December 14, 15, and January 1 to March 22. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating curve, except for periods in which 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. Records excellent for periods of open water; for winter fair.

Discharge measurements of Prairie River near Merrill, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Jan. 9	[a] 1.85	85	Mar. 14	[a] 1.63	66
Feb. 21	[a] 1.74	63	May 21	2.42	239

[a] Stage-discharge relation affected by ice.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	102	94	99	90	75	65	137	496	159	133	137	99
2	99	94	94	85	75	70	212	421	159	118	137	96
3	99	94	94	80	75	70	184	348	159	115	159	91
4	96	101	91	80	70	70	159	313	148	112	184	99
5	94	94	91	80	75	65	172	261	212	112	172	94
6	94	96	91	80	75	65	128	458	244	108	159	88
7	91	94	88	80	70	65	105	614	244	105	148	91
8	91	94	88	80	70	60	212	825	244	102	137	94
9	91	96	88	80	70	60	184	1,160	212	115	137	91
10	91	96	88	80	70	70	184	1,220	184	126	133	86
11	91	94	88	80	70	75	184	870	172	118	129	94
12	88	94	91	80	70	70	159	655	159	115	126	99
13	88	94	91	80	70	70	458	696	148	108	115	102
14	88	94	90	80	70	70	574	738	148	102	112	102
15	88	96	90	80	70	65	614	696	137	99	112	99
16	88	96	91	80	70	65	1,110	696	129	96	137	96
17	102	99	91	80	65	65	1,630	696	148	91	198	94
18	115	96	94	80	65	65	1,630	496	137	88	184	94
19	115	96	96	80	65	65	1,350	384	133	88	159	91
20	112	96	99	80	65	70	963	348	129	88	137	88
21	108	96	99	80	65	75	870	278	122	88	133	91
22	102	96	96	75	65	80	614	261	118	86	278	129
23	99	96	96	75	60	86	614	244	122	86	366	137
24	99	98	96	75	60	87	696	290	122	91	348	133
25	96	96	94	75	60	88	825	290	115	99	278	126
26	94	96	91	70	65	91	963	278	105	96	198	115
27	94	98	89	70	65	92	825	244	102	94	137	261
28	94	99	88	75	70	96	781	212	99	88	133	118
29	96	99	88	75	70	99	655	198	122	86	118	118
30	96	99	86	75	-------	102	574	184	129	105	108	122
31	94	-------	86	75	-------	105	-------	172	-------	115	102	-------

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

[Drainage area, 164 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	115	88	96.6	0.589	0.68
November	101	94	96.0	.585	.65
December	99	86	91.7	.559	.64
January	90	70	78.5	.479	.55
February	75	60	68.4	.417	.45
March	105	60	75.5	.460	.53
April	1,630	105	592	3.61	4.03
May	1,220	172	485	2.96	3.41
June	244	99	152	.927	1.03
July	133	86	102	.622	.72
August	366	102	165	1.01	1.16
September	261	86	108	.659	.74
The year	1,630	60	176	1.07	14.59

EAU CLAIRE RIVER AT KELLY, WIS.

LOCATION.—In sec. 13, T. 28 N., R. 8 E., at highway bridge three-fourths mile northeast of Kelly, Marathon County, 1 mile above mouth of Big Sandy Creek, which enters from right, and 4½ miles above mouth of river.

DRAINAGE AREA.—326 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

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

GAGE.—Chain gage attached to downstream side of highway bridge; read by August Krueger.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of heavy gravel and rock. Gage is in rapids which form control. Banks medium high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.50 feet at 9 a. m. April 17 (discharge, 3,850 second-feet); minimum discharge, estimated 35 second-feet January 26 and March 13–15 (stage-discharge relation affected by ice).

1914–1924: Maximum stage recorded, 7.40 feet at 3 p. m. April 9, 1922 (discharge, 6,320 second-feet); minimum discharge, estimated 30 second-feet, December 6, 1917 (stage-discharge relation affected by ice).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined between 70 and 3,200 second-feet. Gage read to hundredths once daily. Daily discharge determined by applying daily gage height to rating table. Open-water records good; winter records fair.

The following discharge measurements were made:

February 20, 1924: Gage height, 2.18 feet;[10] discharge, 61.6 second-feet.

March 13, 1924: Gage height, 2.34 feet;[10] discharge, 39.4 second-feet.

May 21, 1924: Gage height, 1.70 feet; discharge, 363 second-feet.

[10] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Eau Claire River at Kelly, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	96	126	75	45	70	60	70	615	210	162	210	115
2	93	96	70	45	60	55	95	504	210	146	182	111
3	93	82	70	45	75	55	115	405	226	141	182	106
4	85	85	70	45	75	55	140	339	204	136	201	106
5	85	82	70	45	75	55	300	360	210	162	226	98
6	85	85	70	55	75	75	480	382	243	204	207	94
7	85	82	70	55	75	75	615	735	279	243	210	94
8	82	82	70	45	75	55	770	865	243	243	201	94
9	82	65	70	55	75	45	830	1,560	226	279	176	91
10	82	71	70	70	75	45	865	1,750	226	279	154	91
11	82	75	70	60	75	40	865	1,560	226	243	148	91
12	82	75	60	55	70	40	930	1,140	191	210	144	98
13	82	78	60	45	70	35	1,000	865	179	168	138	111
14	82	82	60	55	60	35	1,470	1,140	173	157	134	111
15	78	85	70	60	60	35	1,650	1,220	179	136	124	106
16	82	82	70	55	70	40	2,270	1,140	168	126	134	106
17	85	82	70	55	70	40	3,850	865	173	113	159	102
18	93	82	70	55	70	40	2,840	615	191	104	154	94
19	93	75	70	60	70	40	1,850	504	179	100	148	91
20	89	78	70	60	70	40	1,300	405	168	96	138	91
21	85	78	70	60	60	45	1,000	339	157	96	134	111
22	82	78	70	55	60	55	865	318	146	93	768	144
23	78	53	70	45	60	55	1,000	318	151	93	645	243
24	78	85	70	60	55	55	1,070	405	157	93	478	210
25	78	93	70	45	60	60	1,300	429	146	96	360	182
26	78	89	60	35	55	55	1,300	360	136	100	279	159
27	82	89	60	60	55	60	1,220	318	131	96	210	144
28	93	85	55	55	55	70	1,000	298	122	89	171	148
29	93	85	45	60	55	80	832	279	157	85	148	154
30	89	75	45	60	-------	105	735	243	168	96	138	154
31	108	-------	45	60	-------	55	-------	226	-------	122	124	-------

NOTE.—Stage-discharge relation affected by ice Nov. 28 to Apr. 11; discharge ascertained by means of gage heights, observer's notes, two discharge measurements, and weather records.

Monthly discharge of Eau Claire River at Kelly, Wis., for the year ending September 30, 1924

[Drainage area, 326 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	108	78	85.8	0.263	0.30
November	126	53	82.0	.252	.28
December	75	45	65.6	.201	.23
January	70	35	53.5	.164	.19
February	75	55	66.6	.204	.22
March	105	35	53.4	.164	.19
April	3,850	70	1,090	3.34	3.73
May	1,750	226	661	2.03	2.34
June	279	122	186	.571	.64
July	279	85	145	.445	.51
August	768	124	220	.675	.78
September	243	91	122	.374	.42
The year	3,850	35	235	.721	9.83

BIG EAU PLEINE RIVER NEAR STRATFORD, WIS.

LOCATION.—In sec. 13, T. 27 N., R. 3 E. at highway bridge at a place locally known as Weber farm, 2 miles north of Stratford, Marathon County, and 1 mile above Chicago & Northwestern Railway Bridge. Dill Creek enters from right 5 miles above station.

DRAINAGE AREA.—223 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch= 6 miles).

RECORDS AVAILABLE.—July 24, 1914 to September 30, 1924.

GAGE.—Vertical staff on right bank; read by Christian Weber and John Weber.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge half a mile below gage.

CHANNEL AND CONTROL.—Bed composed of heavy gravel and rock. Control at head of rapids 100 feet below gage. Banks high and will be overflowed only at stage of about 15 feet and above.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.2 feet at 7 a. m. August 22 (discharge, 7,510 second-feet); minimum stage, 1.34 feet December 15 and 16 (discharge, about 3 second-feet).

1914–1924: Maximum stage recorded, 10.9 feet Nov ember 10, 1919 (discharge, 8,630 second-feet); minimum stage, 1.23 feet August 17 and 18, 1923 (discharge, approximately 2.3 second-feet). The flood of June, 1914, reached a stage of 20.7 feet as determined by levels run to high-water marks.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice. Rating curve well defined between 5 and 4,000 second-feet. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good during medium and high stages; during low stages fair; for extreme low water may be poor.

The following discharge measurements were made:

May 18, 1924: Gage height, 2.60 feet; discharge, 184 second-feet.

July 26, 1924: Gage height, 1.53 feet; discharge, 6.6 second-feet.

Daily discharge, in second-feet, of Big Eau Pleine River near Stratford, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Apr.	May	June	July	Aug.	Sept.
1	10	6	6	--------	262	27	86	31	24
2	8	6	6	--------	200	23	57	16	20
3	7	6	6	--------	146	21	42	47	17
3	6	6	6	--------	115	19	36	66	15
5	6	6	6	--------	98	23	33	57	15
6	6	6	6	--------	96	27	28	61	13
7	6	6	5	--------	96	23	23	100	14
8	6	6	5	1,870	275	21	23	63	15
9	6	6	5	1,390	1,870	23	18	54	14
10	6	6	5	990	1,250	21	12	41	14
11	6	6	5	580	655	20	12	32	12
12	6	6	4	555	380	18	49	27	14
13	6	6	4	580	290	15	39	20	31
14	6	7	4	420	1,250	14	30	16	30
15	6	7	3	760	655	14	30	14	27
16	6	7	3	815	360	14	18	144	23
17	8	7	4	2,130	224	146	13	120	21
18	8	7	4	990	166	177	10	74	18
19	9	7	4	510	126	111	8	76	14
20	9	6	6	380	100	72	7	129	13
21	9	6	7	360	86	52	6	98	16
22	8	6	8	340	72	57	6	6,030	46
23	8	7	8	1,390	68	146	6	1,320	146
24	8	7	8	1,320	80	155	6	465	92
25	8	7	7	6,030	76	103	7	442	61
26	8	7	6	1,630	68	63	8	166	41
27	6	7	6	815	59	39	7	118	31
28	6	7	6	930	52	30	6	80	33
29	6	7	6	580	44	80	9	59	30
30	6	6	6	360	36	122	47	44	28
31	6	--------	6	--------	31	--------	50	36	--------

NOTE.—Stage-discharge relation affected by ice Jan. 1 to Apr. 7. No gage height records and no estimates made.

Monthly discharge of Big Eau Pleine River near Stratford, Wis., for the year ending September 30, 1924

[Drainage area, 223 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	10	6	6.97	0.031	0.04
November	7	6	6.43	.029	.03
December	8	3	5.52	.025	.03
April 8–30	6,030	----------	1,120	5.02	4.29
May	1,870	31	300	1.35	1.56
June	177	14	55.9	.251	.28
July	86	6	23.6	.106	.12
August	6,030	14	324	1.45	1.67
September	146	12	29.6	.133	.15

KICKAPOO RIVER AT GAYS MILLS, WIS.

LOCATION.—In sec. 28, T. 10 N., R. 4 W., at highway bridge immediately below Norwood Mill, in Gays Mills, Crawford County, 25 miles above mouth of river and 2 miles below mouth of Tainter Creek, which enters from right.

DRAINAGE AREA.—629 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch = 6 miles).

RECORDS AVAILABLE.—December 25, 1913, to September 30, 1924.

GAGE.—Chain gage fastened to downstream side of bridge; read by George Atwood.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel composed of rock covered by a deposit of sand and silt. Banks fairly high and not subject to overflow at ordinary high stages. No definite control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.7 feet at 8 a. m. August 4 (discharge about 3,370 second-feet); minimum discharge, 175 second-feet, estimated January 21 (stage-discharge relation affected by ice).

1914–1924: Maximum stage recorded, 15.05 feet March 24, 1917 (discharge, about 6,300 second-feet); minimum discharge about 100 second-feet during latter part of January, 1915 (stage-discharge relation affected by ice).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Mills at Gays Mills immediately above station, Soldiers Grove, 7 miles upstream and at several points above Soldiers Grove use comparatively little storage, so that recorded flow past station represents nearly the natural flow. During low stages a small diurnal fluctuation is observed at gage.

ACCURACY.—Stage-discharge relation not permanent, affected by ice during winter. Gage read to half-tenths twice daily. Rating curve fairly well defined below 2,000 second-feet. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to table of daily discharge. Records fair.

Discharge measurements of Kickapoo River at Gays Mills, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 7	1.67	235	Feb. 27	[a] 2.40	224	May 15	2.66	432
Jan. 23	[a] 2.61	209	May 14	3.07	477	July 23	2.11	306

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Kickapoo River at Gays Mills, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	241	226	256	210	240	240	417	438	256	870	321	397
2	226	226	256	210	240	225	377	397	256	502	271	438
3	226	226	241	195	255	225	695	357	321	438	502	417
4	226	226	256	195	255	225	1,450	339	287	397	3,100	397
5	226	226	226	195	255	240	1,900	339	271	357	3,100	377
6	226	241	211	195	255	240	1,980	339	256	357	2,520	377
7	226	241	226	195	240	225	2,020	321	271	438	1,520	377
8	226	241	241	210	255	240	2,140	339	357	357	1,560	438
9	226	256	241	225	255	240	2,060	339	620	339	2,420	438
10	226	241	226	225	240	240	1,700	377	1,240	357	2,570	397
11	226	211	211	225	240	255	960	357	480	339	1,020	397
12	241	226	241	195	255	255	645	321	339	397	595	438
13	226	256	176	210	285	255	595	357	321	397	480	480
14	226	256	211	210	255	255	547	459	287	321	438	438
15	226	241	226	195	240	256	502	397	502	287	840	377
16	256	241	226	195	225	241	480	377	480	287	1,110	377
17	256	241	241	195	255	256	1,170	339	357	271	595	339
18	256	241	226	195	225	256	810	321	1,200	271	459	357
19	256	226	226	195	240	256	502	304	1,560	256	2,140	339
20	241	241	256	195	255	256	459	304	1,080	256	2,700	339
21	226	241	256	175	225	271	438	287	480	256	2,340	357
22	226	226	256	195	195	271	480	287	397	321	2,620	645
23	226	241	226	210	225	304	480	287	620	287	1,340	480
24	226	256	241	210	210	357	417	357	1,340	271	1,020	377
25	226	256	241	195	225	397	524	339	720	271	670	357
26	241	256	226	195	225	480	459	304	459	256	570	357
27	256	256	241	195	225	620	459	304	397	256	502	339
28	241	241	226	195	210	930	900	287	1,200	241	459	357
29	241	226	197	195	210	695	870	287	1,700	256	438	357
30	256	271	176	195	-------	377	524	271	1,900	620	438	357
31	241	-------	195	210	-------	339	-------	256	-------	570	438	-------

NOTE.—Stage-discharge relation affected by ice Dec. 31 to Mar. 14. Daily discharge ascertained by means of gage heights, two discharge measurements, observer's notes, and weather records.

Monthly discharge of Kickapoo River at Gays Mills, Wis., for the year ending September 30, 1924

[Drainage area, 629 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	256	226	235	0.374	0.43
November	271	211	240	.382	.43
December	256	176	229	.364	.42
January	225	175	201	.320	.37
February	285	195	238	.378	.41
March	930	225	320	.509	.59
April	2,140	377	899	1.43	1.60
May	459	256	335	.533	.61
June	1,900	256	665	1.06	1.18
July	870	241	358	.569	.66
August	3,100	271	1,260	2.00	2.31
September	645	339	397	.631	.70
The year	3,100	175	448	.712	9.71

TURKEY RIVER AT GARBER, IOWA

LOCATION.—In sec. 36, T. 92 N., R. 4 W., at single-span highway bridge at Garber, Clayton County, 2,000 feet below mouth of Elk Creek.

DRAINAGE AREA.—1,530 square miles (measured on map by United States Geological Survey; scale, 1: 500,000).

RECORDS AVAILABLE.—August 29, 1913, to November 30, 1916; May 14, 1919, to September 30, 1924.

GAGE.—Chain gage attached to downstream handrail of bridge; read by E. J. Prolow.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed of sand and gravel; shifting. Right bank high and not subject to overflow; left bank is overflowed at stages above 13 feet, the road to left end of bridge being overflowed at gage height 22 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.45 feet at 10.30 p. m. August 21 (discharge, by extension of rating curve, 13,800 second-feet); minimum stage, 3.42 feet at 8 a. m. June 5 (discharge, 174 second-feet).

1913–1916; 1919–1924: Maximum stage recorded, 28.06 feet at 4.25 a. m. February 23, 1922 (discharge, about 26,600 second-feet); minimum stage, 3.55 feet September 5–7, 1922 (discharge, 88 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATIONS.—An electric light plant and gristmill at Elkader may cause slight diurnal fluctuation.

ACCURACY.—Stage-discharge relation for low water changed during high water in July or August. Rating curves fairly well defined between 200 and 11,000 second-feet. No record for January and February. Gage read to hundredths twice daily during remainder of year. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

The following discharge measurements were made:

May 12, 1924: Gage height, 3.90 feet; discharge, 327 second-feet.

August 22, 1924: Gage height, 10.34; discharge, 5,650 second-feet.

Daily discharge, in second-feet, of Turkey River at Garber, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	585	270	278	820	2,220	528	235	1,580	1,140	665
2	555	230	328	1,180	1,580	528	270	1,100	1,060	700
3	585	195	278	2,060	4,670	585	210	855	1,140	595
4	420	235	286	8,980	4,570	500	243	750	1,060	560
5	355	212	324	4,170	3,170	500	186	820	3,520	462
6	290	220	282	3,170	2,640	500	220	585	2,240	462
7	440	190	270	1,980	1,980	450	222	475	990	495
8	232	186	235	1,420	1,520	528	294	450	915	560
9	252	212	205	1,260	1,360	480	294	378	4,320	560
10	235	235	220	890	990	355	382	310	5,220	495
11	278	222	246	820	770	294	405	274	2,080	560
12	232	264	232	750	805	310	342	264	1,290	430
13	243	294	215	1,030	370	337	346	306	990	462
14	215	235	208	960	805	346	350	246	700	595
15	232	220	240	1,030	820	294	555	258	595	560
16	264	220	230	1,030	925	410	585	222	495	528
17	290	232	225	1,260	1,100	314	615	238	560	462
18	255	220	254	1,100	855	314	585	188	560	462
19	294	235	235	1,340	960	267	425	218	8,820	495
20	270	215	235	1,100	785	249	355	485	6,510	462
21	230	218	232	1,180	750	240	373	3,520	7,500	495
22	258	192	228	1,420	680	254	286	3,320	5,750	462
23	210	235	235	2,620	615	302	267	1,290	5,440	400
24	228	230	215	3,070	500	310	294	1,920	3,220	245
25	235	212	246	2,220	528	258	410	1,440	2,840	400
26	200	264	240	2,980	555	306	1,420	878	2,500	337
27	190	240	249	5,470	500	274	1,740	595	1,600	359
28	252	264	235	6,970	528	264	1,580	595	990	320
29	228	302	252	6,570	475	302	2,390	560	1,140	495
30	210	228	249	3,770	505	254	1,580	462	990	990
31	230	-------	314	2,220	-------	302	-------	495	735	-------

Monthly discharge of Turkey River at Garber, Iowa, for the year ending September 30, 1924

[Drainage area, 1,530 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	585	190	290	0.190	0.22
November	302	186	231	.151	.17
December	328	205	249	.163	.19
March	8,980	750	2,410	1.58	1.82
April	4,670	370	1,280	.837	.93
May	585	240	360	.235	.27
June	2,390	186	582	.380	.42
July	3,520	188	809	.529	.61
August	8,820	495	2,480	1.62	.19
September	990	245	502	.328	.37

AQUOKETAM RIVER BELOW NORTH FORK OF MAQUOKETA RIVER, NEAR MAQUOKETA, IOWA

LOCATION.—In SW. ¼ NE. ¼ sec. 17, T. 84 N., R. 3. E., at Bridgeport Bridge, 3 miles northeast of Maquoketa, Jackson County, 1,200 feet above mouth of Mill Creek and 2 miles below mouth of North Fork of Maquoketa River.

DRAINAGE AREA.—1,600 square miles (measured on map issued by United States Geological Survey; scale, 1:500,000).

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

GAGE.—A continuous water-stage recorder on midstream pier of downstream side of bridge; installed July 14, 1924. Chain gage on downstream handrail of bridge read previous to installation of recorder. Readings and inspection by John Strodthoff.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Bed composed of sand and mud. Above 13-foot stage overflow occurs under a pile-trestle approach on left side. Control not definite; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.8 feet at midnight, August 20 (discharge, 19,300 second-feet); minimum discharge probably occurred in January; not recorded.

1913–1924: Maximum stage recorded, 22.0 feet March 27, 1916 (discharge, 21,300 second-feet); minimum stage, 1.59 feet December 25, 1918 (discharge, estimated 245 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve fairly well defined below 8,000 second-feet and poorly defined below 16,000 second-feet. Gage read to hundredths once daily. On and after July 14, water-stage recorder obtained a continuous record of stage. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to daily-discharge table. Records fair.

Discharge measurements of Maquoketa River below North Fork of Maquoketa River, near Maquoketa, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 2	4.08	1,350	Aug. 20	18.01	16,800
May 11	2.30	569	Aug. 24	8.19	3,430
June 19	2.75	781			

Daily discharge, in second-feet, of Maquoketa River below North Fork of Maquoketa River, near Maquoketa, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,510	540	520		1,310	1,410	312	404	972	950	1,080
2	1,360	520	540		905	1,110	296	440	882	882	1,080
3	1,130	560	580		1,180	1,220	364	560	792	1,220	1,220
4	972	560	580		1,460	1,060	560	540	725	838	995
5	882	540	600		1,310	1,040	520	540	680	2,010	928
6	815	560	520		3,840	1,110	448	560	702	2,800	928
7	725	560	520		3,540	972	448	755	640	2,110	860
8	680	540	516		1,910	815	456	950	520	2,210	1,060
9	660	480	492		995	1,480	508	792	995	2,360	1,130
10	620	488	468		1,180	1,110	508	770	972	2,060	950
11	580	480	464		1,060	882	488	640	882	1,510	860
12	600	492	476		1,110	748	524	928	792	1,310	1,460
13	725	512	272		815	488	560	640	680	1,220	1,220
14	725	496	372		838	702	560	972	660	1,080	928
15	748	484	328		995	620	580	1,080	620	1,020	928
16	725	452	472		1,080	620	560	1,060	540	1,040	905
17	680	464	472		928	540	560	1,020	560	905	905
18	725	468	472		770	640	540	972	500	928	860
19	748	492	472		660	392	580	905	520	4,990	815
20	680	472	476		815	396	580	950	540	16,800	950
21	620	492	460		1,020	702	600	1,020	815	17,000	1,060
22	600	488	520		1,260	600	570	1,220	5,550	12,100	882
23	600	480	468		1,130	640	540	1,360	3,140	10,300	860
24	580	488	560		838	352	300	3,840	4,020	3,780	770
25	560	492	508		1,110	328	560	2,530	2,530	2,640	882
26	560	488	456		1,260	640	580	1,360	1,660	2,160	680
27	560	476	540	560	1,020	332	680	1,260	1,410	1,810	680
28	560	450	492	838	1,110	620	620	1,660	1,360	1,560	620
29	560	424	396	1,220	2,110	324	560	1,610	1,360	1,410	770
30	560	480	488	--------	2,970	320	560	1,130	1,310	1,310	680
31	560	--------	220	--------	3,080	--------	360	--------	1,080	1,220	--------

NOTE.—No gage-height record Oct. 30, Nov. 28, Dec. 17, 25, May 12, 22, 28, and June 7; discharge interpolated. No records Jan. 1 to Feb. 26.

Monthly discharge of Maquoketa River below North Fork of Maquoketa River, near Maquoketa, Iowa, for the year ending September 30, 1924

[Drainage area, 1,600 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,510	560	729	0.456	0.53
November	560	424	497	.311	.35
December	600	220	475	.297	.34
March	3,840	660	1,410	.881	1.02
April	1,480	320	740	.462	.52
May	680	296	512	.320	.37
June	3,840	404	1,080	.675	.75
July	5,550	500	1,240	.775	.89
August	17,000	838	334	.209	.24
September	1,460	620	932	.582	.65

ROCK RIVER AT AFTON, WIS.

LOCATION.—On line between secs. 22 and 27, T. 2. N., R. 12 E., at highway bridge in Afton, Rock County, 9 miles above Illinois State line. Bass Creek enters from right three-fourths mile below station.

DRAINAGE AREA.—3,190 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—February 5, 1914, to September 30, 1924.

GAGE.—Chain gage fastened to downstream side of bridge; read by George Robb.

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

CHANNEL AND CONTROL.—Banks medium high and will not be overflowed to any extent at flood stages. Channel gravel and clean silt, practically permanent. Control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.7 feet August 20 (discharge, 7,100 second-feet); minimum discharge, estimated, 530 second-feet January 13 and 20 (stage-discharge relation affected by ice).

1914–1924: Maximum stage recorded, 10.51 feet March 26, 1918 (discharge, 12,700 second-feet); minimum stage, 0.08 foot December 9, 1922 (discharge, about 370 second-feet).

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

REGULATION.—Operation of power plants at Janesville and above causes slight fluctuations at gage during low stages.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve fairly well defined between 600 and 1,060 second-feet; well defined between 1,060 and 6,100 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating curve except as indicated in footnote to table of daily discharge. Open-water records for medium and high stages good; others fair.

Discharge measurements of Rock River at Afton, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 14	1.14	615	Feb. 13	[a] 2.63	920	July 10	2.41	1,310
Jan. 17	[a] 2.08	660	May 9	3.49	2,100	Aug. 7	5.14	3,560

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Rock River at Afton, Wis., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	850	950	900	755	755	850	4,390	3,160	1,580	2,220	1,580	5,290
2	800	950	755	850	670	900	4,640	2,960	1,510	2,220	1,440	5,030
3	800	1,000	755	800	800	1,120	4,770	2,860	1,370	2,130	850	4,770
4	800	1,000	950	670	710	1,580	4,900	2,580	1,000	1,580	2,220	4,390
5	755	1,120	1,000	595	595	1,880	5,030	2,490	670	1,300	3,800	4,270
6	670	1,000	850	595	755	1,880	5,160	2,400	900	1,370	3,470	4,390
7	670	950	755	595	850	1,720	5,160	2,310	1,060	1,300	3,690	3,800
8	670	1,000	670	670	755	1,720	5,290	2,220	1,240	1,370	4,150	4,270
9	710	950	755	670	800	1,960	5,290	2,040	1,300	1,240	5,160	3,690
10	670	800	800	755	800	2,760	5,160	2,130	1,300	1,300	5,420	3,470
11	670	850	900	630	900	2,490	5,030	1,960	1,300	1,300	5,680	3,360
12	670	850	670	755	850	2,490	4,770	2,130	1,240	1,240	5,820	3,160
13	670	950	755	530	950	2,310	4,510	2,220	1,180	1,240	6,380	2,960
14	595	800	710	670	670	2,220	4,640	2,130	1,240	1,440	6,380	2,960
15	670	850	710	850	670	2,040	4,510	2,220	1,060	1,510	6,520	3,060
16	630	850	710	670	950	1,880	4,390	2,310	1,120	1,370	6,800	3,060
17	710	755	755	710	755	2,040	4,150	2,220	1,120	1,440	6,660	2,960
18	950	800	800	755	670	1,960	3,910	2,220	1,120	1,510	6,660	2,960
19	1,000	710	800	670	755	2,130	3,800	2,400	1,180	1,440	6,800	2,860
20	950	850	850	530	755	1,880	3,800	2,400	1,120	1,440	7,100	2,960
21	1,000	850	800	630	755	2,220	3,580	2,310	1,060	1,300	6,950	2,760
22	1,120	900	850	670	630	1,960	3,580	2,220	950	1,880	6,950	2,580
23	1,440	900	1,240	755	950	1,800	3,360	2,220	1,060	1,800	6,800	2,490
24	1,180	850	900	670	670	2,040	3,260	2,220	1,800	1,720	6,660	2,490
25	1,120	710	900	755	670	2,220	3,360	1,960	2,400	1,720	6,660	2,310
26	1,060	630	850	595	950	2,400	3,360	2,130	1,650	1,800	6,520	2,130
27	1,120	755	1,000	670	755	2,960	3,160	2,040	1,580	1,720	6,380	2,040
28	950	800	1,000	595	800	3,260	3,580	2,040	1,720	1,650	6,100	1,880
29	950	755	950	630	800	4,030	3,260	2,040	1,800	1,720	5,960	1,880
30	1,120	900	850	710	-------	4,390	3,260	1,800	1,720	1,650	5,680	1,800
31	1,000	-------	710	670	-------	4,270	-------	1,720	-------	1,650	5,420	-------

NOTE.—Stage-discharge relation affected by ice Dec. 25 to Feb. 26; discharge ascertained by means of gage heights, two discharge measurements, observer's notes, and weather records.

Monthly discharge of Rock River at Afton, Wis., for the year ending September 30, 1924

[Drainage area, 3,190 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,440	595	870	0.273	0.31
November	1,120	630	868	.272	.30
December	1,240	670	835	.262	.30
January	850	530	680	.213	.25
February	950	595	772	.242	.26
March	4,390	850	2,240	.702	.81
April	5,290	3,160	4,240	1.33	1.48
May	3,160	1,720	2,260	.708	.82
June	2,400	670	1,310	.411	.46
July	2,220	1,240	1,570	.492	.57
August	7,100	850	5,380	1.69	1.95
September	5,290	1,800	3,200	1.00	1.12
The year	7,100	530	2,020	.633	8.63

ROCK RIVER AT LYNDON, ILL.

LOCATION.—In sec. 21, T. 20 N., R. 5 E., at highway bridge known as Lyndon Bridge, in Lyndon, Whiteside County, 10 miles above Rock Creek, and 20 miles below dam at Sterling.

DRAINAGE AREA.—9,010 square miles.

RECORDS AVAILABLE.—November 24, 1914, to September 30, 1924.

GAGE.—Chain gage attached to bridge; read by George Cady.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Gravel and boulders; practically permanent. Banks wooded.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.7 feet at 7 a. m. August 23 (discharge, 29,800 second-feet); minimum stage, 4.93 feet at 5 p. m. October 17 (discharge, 1,700 second-feet).

1915–1924: Maximum stage recorded, 19.6 feet February 16, 1918 (discharge not determined because of backwater from ice). Maximum open-water stage recorded, 17.0 feet March 28, 1916 (discharge, 39,500 second-feet; minimum stage, 3.72 feet September 27, 1918 (discharge, 536 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Water diverted at Sterling Dam to feed Illinois & Mississippi Canal, probably averages about 100 second-feet.

REGULATION.—Flow past gage is regulated by power plants at Sterling and above, mean of two daily readings of gage during low stages is probably somewhat less than true mean daily gage height due to such regulation. Diurnal fluctuation at gage rather large during low stages.

ACCURACY.—Stage-discharge relation practically permanent; seriously affected by ice during winter. Rating curve well defined between 1,000 and 25,000 second-feet, fairly well defined beyond these limits. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except during ice periods. Records good for medium and high stages, fair for ordinary low stages during open-water periods, and poor for extremely low stages and for periods of ice effect.

The following discharge measurements were made:
October 18, 1923: Gage height, 5.15 feet; discharge, 1,990 second-feet.
July 10, 1924: Gage height, 6.32 feet; discharge, 4,160 second-feet.

Daily discharge, in second-feet, of Rock River at Lyndon, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,700	2,370	2,060	4,620			14,500	5,750	4,200	7,450	4,200	9,500
2	2,370	2,210	2,060			8,700	14,500	6,230	3,420	7,200	3,800	9,240
3	2,370	2,370	2,370				13,300	5,990	3,420	7,200	3,800	8,460
4	2,210	2,210	2,060			14,500	12,500	5,520	2,870	6,710	3,800	8,200
5	2,530	2,370	2,210			12,800	11,700	5,060	3,420	6,230	3,610	7,700
6	2,370	2,370	2,060			10,300	11,100	4,840	3,360	5,290	7,700	7,200
7	2,370	2,060	2,210			8,980	11,100	5,750	3,290	4,620	12,500	6,710
8	2,060	2,370	2,060			7,950	10,800	5,060	3,230	4,410	14,800	6,660
9	2,060	2,370	2,060			7,200	10,600	4,410	3,050	4,410	16,000	6,610
10	1,910	2,370	2,210			8,200	10,300	4,410	3,230	4,620	15,100	6,570
11	1,910	2,210	1,910	5,000		8,980	9,500	4,200	3,420	4,620	14,200	6,520
12	1,910	2,530	2,060			8,720	9,240	4,200	3,420	4,620	13,900	6,470
13	2,060	2,210	2,060			8,460	8,720	4,200	2,870	4,200	13,300	6,470
14	1,910	2,370	2,060			7,700	8,980	4,200	3,420	4,620	13,300	5,990
15	2,370	2,700	2,060		5,200	7,450	8,980	4,200	3,610	4,410	12,800	5,990
16	2,210	2,210	2,060			6,710	8,460	4,000	3,420	4,410	10,600	5,750
17	1,910	2,370	1,910			6,470	7,700	3,350	3,610	4,620	9,500	5,750
18	2,060	2,370	2,060			6,470	6,710	2,700	3,610	4,200	12,800	5,750
19	2,210	2,060	2,060			6,710	7,450	4,000	3,800	3,230	18,400	5,750
20	2,870	2,370	2,060			6,710	6,470	4,200	4,200	3,230	25,000	5,520
21	2,210	2,210	2,060			5,990	6,710	4,200	4,840	2,700	23,400	5,520
22	2,530	2,370	2,060			5,520	6,710	4,200	5,290	3,230	25,400	5,290
23	2,370	2,370	2,060			5,750	6,470	4,410	7,200	5,750	28,600	5,990
24	2,210	2,060	2,370			5,750	6,230	4,620	7,200	5,990	19,100	5,750
25	2,210	2,210	3,050			6,470	6,230	4,620	8,200	5,520	17,900	5,990
26	2,370	2,370	3,420	3,250		7,700	6,230	4,840	13,100	4,410	16,700	4,840
27	2,210	2,210	3,610			8,200	6,230	4,620	11,900	6,470	15,500	5,290
28	2,530	2,210	3,800			9,500	6,470	4,620	11,400	6,470	14,300	5,060
29	2,370	2,060	3,610			12,200	6,230	4,410	12,200	6,710	13,100	4,840
30	2,370	2,060	3,800		-------	13,300	7,700	4,620	11,400	5,990	11,900	4,620
31	2,210	-------	3,800		-------	14,800	--------	4,620	--------	3,800	10,300	-------

NOTE.—Discharge May 17, June 6, 7, Aug. 25–29, Sept. 8–11 interpolated, for lack of gage-height record; estimated Jan. 2 to Mar. 3, because of ice, from gage heights, observer's notes, and weather records. Braced figures show mean discharge for periods indicated.

Monthly discharge of Rock River at Lyndon, Ill., for the year ending September 30, 1924

[Drainage area, 9,010 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,870	1,910	2,260	0.251	0.29
November	2,700	2,060	2,290	.254	.28
December	3,800	1,910	2,430	.270	.31
January	----------	----------	4,370	.485	.56
February	----------	----------	[a] 5,200	.577	.62
March	14,800	5,520	8,570	.951	1.10
April	14,500	6,230	8,930	.991	1.10
May	6,230	2,700	4,580	.508	.58
June	13,100	2,870	5,390	.598	.67
July	7,450	2,700	5,080	.564	.65
August	28,600	3,610	13,700	1.52	1.75
September	9,500	4,620	6,330	.703	.78
The year	28,600	1,910	5,760	.639	8.69

[a] Estimated.

PECATONICA RIVER AT FREEPORT, ILL.

LOCATION.—In sec. 32, T. 27 N., R. 8 E., at highway bridge at Hancock Avenue, half a mile east of Illinois Central Railroad station at Freeport, Stephenson County, and 2 miles above mouth of Yellow Creek.

DRAINAGE AREA.—1,330 square miles.

RECORDS AVAILABLE.—September 11, 1914, to September 30, 1924.

GAGE.—Chain gage attached to upstream side of bridge; read by W. C. Krueger.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of sand and silt; likely to shift. Left bank of only medium height and is overflowed during high water; at stages above about 17.0 feet part of flow passes over left bank and through East Freeport.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.85 feet at 5 p. m. August 23 (discharge 4,720 second-feet; minimum stage, 3.24 feet 8 a. m. December 14 (discharge, 246 second-feet.)

1914–1924: Maximum stage recorded, 19.4 feet March 28, 1916 (discharge, 17,000 second-feet; minimum discharge, 200 second-feet December 14, 1917.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—A dam and power plant three-fourths mile upstream regulates flow past gage. Only slight diurnal fluctuation is noticeable.

ACCURACY.—Stage-discharge relation probably changed during high water in June; affected by ice during winter. Rating curve used October 1 to June 25, well defined between 300 and 7,000 second-feet and fairly well defined above; rating curve used June 26 to September 30, fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period of ice effect. Records good for open-water periods; fair for period of ice effect.

The following discharge measurements were made:

October 17, 1923: Gage height, 4.59 feet; discharge, 456 second-feet.

July 11, 1924: Gage height, 8.20 feet; discharge, 1,550 second-feet.

Daily discharge, in second-feet, of Pecatonica River at Freeport, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	410	393	345		480	746	3,290	768	410	1,509	792	1,030
2	410	377	361		500	975	1,960	660	427	1,210	748	1,000
3	393	377	393		520	1,600	1,280	600	427	1,080	725	955
4	377	393	410		812	2,110	1,260	560	444	980	748	930
5	361	361	427		1,020	2,750	1,310	540	462	930	955	905
6	345	361	410		900	2,700	1,180	540	462	882	2,490	930
7	330	377	410		856	2,910	1,120	560	427	1,100	3,120	905
8	345	393	361		925	2,850	1,080	520	660	1,030	2,460	955
9	377	377	300		878	2,700	1,000	540	640	1,030	1,560	955
10	410	361	393		660	2,150	1,000	540	768	1,180	1,810	905
11	393	361	345		600	1,450	975	520	660	1,620	1,620	905
12	377	345	361		540	1,260	878	462	500	1,290	1,260	905
13	410	300	361	370	410	1,180	856	520	480	1,060	1,350	1,060
14	427	377	255		393	1,020	790	500	444	1,240	1,680	1,210
15	393	377	270		462	975	746	520	444	1,060	1,350	1,080
16	393	361	361		520	1,080	724	520	500	860	1,240	860
17	410	377	361		600	975	724	520	540	815	1,130	792
18	427	377	361		540	950	746	462	600	725	1,160	815
19	500	361	361		540	878	746	427	600	705	1,960	792
20	520	377	377		500	1,020	724	427	620	705	3,540	1,130
21	500	410	393		500	1,080	660	444	620	770	3,930	1,350
22	427	410	393		480	1,120	702	462	600	1,740	4,330	1,240
23	427	393	410		462	1,260	1,150	462	746	2,380	4,720	1,100
24	410	377	520		480	1,510	1,340	500	1,750	2,810	4,620	930
25	345	361	580		462	1,870	1,200	500	3,580	2,940	4,000	838

Daily discharge, in second-feet, of Pecatonica River at Freeport, Ill., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
26	377	315	462	370	427	1,930	1,020	500	3,860	2,000	2,690	815
27	462	315	500		480	2,030	878	500	3,600	1,160	2,040	815
28	444	361	480		540	2,310	900	462	3,370	980	1,470	815
29	410	377	393		640	2,970	975	444	2,900	838	1,320	792
30	393	361	361		-------	3,660	925	427	2,100	815	1,240	815
31	361	-------	345		-------	3,500	-------	410	-------	838	1,060	-------

NOTE.—Stage-discharge relation affected by ice Dec. 30 to January 31; discharge estimated from gage-height record, observer's notes, and climatic record. Braced figure gives mean discharge for period indicated.

Monthly discharge of Pecatonica River at Freeport, Ill., for the year ending September 30, 1924

[Drainage area, 1,330 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	520	330	405	0.305	0.35
November	410	300	369	.277	.31
December	580	255	389	.292	.34
January	-------	-------	[a]370	.278	.32
February	1,020	393	591	.444	.48
March	3,660	746	1,790	1.35	1.55
April	3,290	660	1,070	.805	.90
May	768	410	510	.383	.44
June	3,860	410	1,120	.842	.94
July	2,940	705	1,230	.925	1.07
August	4,720	725	2,040	1.53	1.76
September	1,350	792	951	.715	.80
The year	4,720	255	905	.680	9.26

[a] Estimated.

SUGAR RIVER NEAR BRODHEAD, WIS.

LOCATION.—In sec. 26, T. 2 N., R. 9 E., at highway bridge 2 miles southwest of Brodhead, Green County, 12 miles above Illinois State line. Jordan Creek enters from right 2 miles below and Little Jordan Creek from right 4 miles above.

DRAINAGE AREA.—529 square miles (measured on map issued by Wisconsin Geological and Natural History Survey, edition of 1911; scale, 1 inch=6 miles).

RECORDS AVAILABLE.—February 7, 1914, to September 30, 1924.

GAGE.—Chain gage attached to upstream side of bridge; read by Arthur Christensen.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; not permanent. Control not well defined. Right bank of medium height; seldom overflowed; left bank at gage overflowed at stage of about 6.8 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.68 feet at 5 p. m. June 26 (discharge, 2,380 second-feet); minimum discharge, estimated, 70 second-feet, January 20 (stage-discharge relation affected by ice).

1914–1924: Maximum stage recorded, 11.4 feet September 13, 1915 (discharge, about 13,000 second-feet); minimum stage, 0.78 foot at 5 p. m. August 26, 1923 (discharge, about 47 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—A power plant at Brodhead 2 miles above station causes slight fluctuation of stage during low water, but pondage is small and it is believed that monthly discharge represents natural flow quite accurately. The difference between morning and evening gage readings is seldom more than 0.2 foot. There are two power plants farther upstream but they probably have no effect on discharge at gage.

ACCURACY.—Stage-discharge relation changed during winter. Standard rating curve fairly well defined. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as indicated in footnote to table of daily discharge. Records fair.

Discharge measurements of Sugar River near Brodhead, Wis., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 14	1.54	208	Feb. 12	[a] 2.42	193	July 10	2.35	530
Jan. 16	[a] 2.09	150	May 9	1.63	270			

[a] Stage-discharge relation affected by ice.

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

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	243	216	190	180	215	120	750	246	190	475	315	315
2	188	216	164	130	270	205	562	330	203	379	285	315
3	203	243	180	100	165	676	454	257	300	330	230	330
4	190	190	171	90	245	1,150	540	271	315	300	496	300
5	188	243	216	90	270	1,320	584	257	285	230	1,000	271
6	157	257	152	75	205	1,480	454	243	257	285	1,420	271
7	104	216	166	155	245	1,260	475	257	190	346	1,720	257
8	216	216	185	165	230	1,000	454	285	285	362	1,200	271
9	188	203	139	155	205	725	518	271	415	434	850	379
10	180	141	190	130	110	518	454	257	415	415	607	271
11	190	123	171	130	205	379	415	203	330	496	700	315
12	190	190	178	145	205	330	379	257	285	396	562	257
13	216	190	190	120	180	315	330	285	257	346	415	346
14	104	203	230	165	130	330	330	271	257	346	434	330
15	243	190	190	165	205	415	300	257	230	285	434	379
16	230	216	141	130	190	362	315	285	243	230	454	315
17	230	180	185	145	120	379	330	257	285	285	396	315
18	230	117	166	155	165	379	379	230	346	230	496	315
19	315	203	168	155	120	362	379	285	379	243	584	330
20	362	190	166	70	155	475	257	257	346	203	1,100	346
21	257	216	161	155	110	475	271	257	315	415	1,420	330
22	271	143	188	155	165	434	285	243	257	900	1,720	315
23	243	171	203	180	110	630	285	285	346	1,200	1,050	230
24	203	157	205	155	100	1,100	285	257	1,200	1,420	700	285
25	203	134	190	145	165	1,150	346	257	1,720	1,000	540	285
26	216	180	190	145	145	1,150	285	257	2,360	518	454	300
27	243	176	190	110	130	1,100	230	271	1,540	330	415	271
28	157	188	180	155	110	1,200	475	216	1,050	315	379	166
29	230	180	180	215	110	1,780	653	230	630	362	415	271
30	243	203	180	245	-------	1,720	518	190	630	315	415	257
31	230	-------	180	230	-------	1,200	-------	257	-------	300	300	-------

NOTE.—Stage-discharge relation affected by ice Dec. 24 to Mar. 2; discharge estimated.

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

[Drainage area, 529 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	362	104	215	0.406	0.47
November	257	117	190	.359	.40
December	230	139	180	.340	.39
January	245	70	146	.276	.32
February	270	100	172	.325	.35
March	1,780	120	778	1.47	1.70
April	750	230	410	.775	.86
May	330	190	257	.486	.56
June	2,360	190	529	1.00	1.12
July	1,420	203	442	.836	.96
August	1,720	230	694	1.31	1.51
September	379	166	298	.563	.63
The year	2,360	70	360	.681	9.27

IOWA RIVER AT MARSHALLTOWN, IOWA

LOCATION.—In sec. 23, T. 84 N., R. 18 W., at Third Avenue Bridge, 1 mile north of Marshalltown, Marshall County. Asher Creek enters 1 mile above and Burnett Creek 1 mile below station.

DRAINAGE AREA.—1,380 square miles (measured on map issued by United States Geological Survey; scale 1: 500,000).

RECORDS AVAILABLE.—May 21, 1915, to September 30, 1924. February 23, 1903, to August 8, 1903, 1 mile above present site.

GAGE.—Chain gage attached to downstream handrail of bridge, 60 feet from right pier; read by B. S. Beehrle.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of mud and sand; subject to change. Banks are subject to overflow. Gravel bar forms control at extreme low water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.95 feet at 7.10 p. m. June 28 (discharge, 7,520 second-feet); minimum discharge, probably occurred during winter.

1915–1924: Maximum stage recorded, 17.74 feet June 4, 1918 (discharge, 42,000 second-feet); minimum discharge, estimated 2 second-feet November 24, 1917.

ICE.—Stage-discharge relation affected by ice.

REGULATIONS.—Operation of a power plant at Eldora causes slight diurnal fluctuation during periods of low-water flow.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except as explained in footnote to table of daily discharge. Open-water records good; winter records fair.

The following discharge measurements were made:
March 5, 1924: Gage height, 8.71 feet; discharge, 2,760 second-feet;
August 26, 1924: Gage height, 7.12 feet; discharge, 2,410 second-feet.

Daily discharge, in second-feet, of Iowa River at Marshalltown, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	655	120	110		210	2,280	2,380	775	265	1,890	1,710	990
2	635	120	110		500	1,980	1,940	735	250	1,710	1,350	815
3	575	160	98		735	1,440	1,760	735	235	1,660	1,170	775
4	535	150	85		695	3,050	1,760	735	222	1,400	1,190	775
5	430	130	85		615	3,200	1,580	695	210	1,080	1,400	735
6	535	130	100		500	2,900	1,480	655	198	990	1,350	615
7	500	120	110		395	2,540	1,260	655	130	990	945	430
8	395	120	120		310	1,350	1,220	615	1,480	775	1,580	695
9	412	110	130		295	1,170	1,120	615	1,440	775	3,250	655
10	395	120	110		280	695	1,040	430	1,440	735	3,250	555
11	325	110	98		265	615	900	412	1,400	695	3,150	448
12	295	120	100		265	615	1,040	412	1,170	615	2,800	655
13	265	130	98		310	615	1,040	378	735	518	2,480	990
14	235	130	70		3,100	655	990	360	378	500	1,800	1,120
15	235	140	85		3,250	815	945	325	378	412	1,620	1,080
16	250	140	100	65	2,900	795	945	310	412	378	1,040	615
17	235	130	98		1,940	775	900	295	518	310	990	518
18	222	130	98		1,580	775	815	280	635	295	1,120	465
19	210	120	98		1,320	855	735	265	395	295	2,440	448
20	198	110	100		1,000	945	695	250	412	295	3,900	430
21	185	120	110		745	990	655	235	430	280	3,420	395
22	172	130	130		665	1,300	615	325	855	265	3,300	378
23	130	130	120		535	1,480	575	360	990	235	4,900	360
24	120	130	110		382	1,710	482	395	1,350	3,100	4,570	325
25	120	130	110		365	2,040	482	378	1,660	2,080	3,360	310
26	130	120	100		348	2,740	535	360	1,940	2,040	3,050	295
27	140	110	98		488	2,740	1,300	342	2,440	1,980	2,440	448
28	150	98	85		705	2,740	1,440	310	5,350	1,980	1,940	535
29	140	100	78		2,040	3,150	1,040	295	7,440	2,040	1,710	575
30	140	110	75		-------	3,970	815	265	6,100	2,240	1,530	575
31	130	-------	75		-------	3,050	-------	250	-------	1,980	1,400	-------

NOTE.—Stage-discharge relation affected by ice Dec. 30 to Feb. 12 and Feb 23; discharge estimated from study of temperature and gage-height records. Braced figure shows estimated mean daily discharge for period indicated.

Monthly discharge of Iowa River at Marshalltown, Iowa, for the year ending September 30, 1924

[Drainage area, 1,380 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	655	120	293	0.212	0.24
November	160	98	124	.090	.10
December	130	70	99.8	.072	.08
January	----------	----------	65	.047	.05
February	3,250	210	922	.668	.72
March	3,970	615	1,740	1.26	1.45
April	2,380	482	1,080	.783	.87
May	775	250	434	.314	.36
June	7,440	130	1,360	.986	1.10
July	3,100	235	1,110	.804	.93
August	4,900	945	2,260	1.64	1.89
September	1,120	295	600	.435	.49
The year	7,440	----------	842	.610	8.28

NOTE.—Mean discharge for January estimated.

IOWA RIVER AT IOWA CITY, IOWA

LOCATION.—In sec. 15, T. 79 N., R. 6 W., 200 feet below highway bridge in Iowa City, Johnson County, 100 feet below university hydraulic laboratory.

DRAINAGE AREA.—3,140 square miles (measured on map issued by United States Geological Survey; scale, 1: 500,000).

RECORDS AVAILABLE.—November 19, 1921, to September 30, 1924, at present site; from October 30, 1913, to November 18, 1921, at highway bridge 500 feet below Chicago, Rock Island & Pacific Railway; June 1, 1903, to July 21, 1906, at highway bridge, 200 feet above present location.

GAGE.—Gurley water-stage recorder installed November 19, 1921; inspected by Floyd A. Nagler.

DISCHARGE MEASUREMENTS.—Made from cable near gage.

CHANNEL AND CONTROL.—Bed composed of sand. Control fairly well defined. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.34 feet at 7 a. m. July 1 (discharge, 19,900 second-feet); minimum discharge, 61 second-feet January 26 (stage-discharge relation affected by ice).

1903–1906; 1913–1924: Maximum stage recorded, 19.45 feet June 7, 1918 (discharge, 36,200 second-feet); minimum discharge about 10 second-feet December 26, 1916.

REGULATION.—Considerable diurnal fluctuation occurs at low stages due to operation of power plant above.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspection of gage-height graph or as explained in footnote to table of daily discharge. Records good.

Discharge measurements of Iowa River at Iowa City, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft*
Mar. 27	5.07	2,850	June 13	4.96	2,690	July 1	15.21	19,700
May 22	2.08	831	June 23	7.66	5,690	July 2	13.27	14,200
June 10	7.18	5,030	June 28	9.54	8,230	July 3	11.14	10,800
June 11	7.82	6,100	June 30	14.38	17,500	July 7	6.16	3,690

NOTE.—All measurements except of May 22 made by students of hydraulics department of University of Iowa under supervision of Prof. F. A. Nagler.

Daily discharge, in second-feet, of Iowa River at Iowa City, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,330	620	715	178	481	1,580	5,020	1,680	498	19,100	4,570	2,260
2	1,820	620	544	126	588	2,100	4,900	1,640	642	14,500	4,240	2,030
3	1,750	606	598	219	690	2,410	4,790	1,580	530	11,000	2,960	1,890
4	1,420	588	548	152	919	2,490	4,790	1,480	575	10,200	2,580	1,820
5	1,270	580	530	152	1,200	3,470	4,020	1,390	530	9,550	3,910	1,680
6	1,160	544	518	182	1,160	3,260	3,470	1,270	552	7,120	4,390	1,540
7	1,080	548	715	152	1,110	4,240	3,160	1,190	1,220	3,910	2,860	1,450
8	970	544	458	133	1,060	5,500	2,860	1,140	7,860	3,060	3,580	1,360
9	915	530	470	133	485	7,030	2,580	1,140	5,780	2,760	4,570	1,300
10	915	530	482	283	525	7,310	2,410	1,080	5,260	2,490	4,570	1,270

Daily discharge, in second-feet, of Iowa River at Iowa City, Iowa, for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
11	915	490	482	346	481	6,360	2,260	970	5,860	2,580	4,460	1,360
12	970	450	490	188	443	4,130	2,180	915	5,740	2,260	4,460	1,190
13	1,680	518	458	261	749	2,760	2,030	915	3,020	1,960	4,240	1,300
14	1,240	530	338	188	1,170	2,330	1,890	890	2,410	1,960	3,910	1,220
15	1,020	539	402	152	1,030	2,100	1,820	840	2,860	1,820	3,360	1,190
16	1,020	530	410	149	1,070	2,030	1,720	865	2,670	1,680	2,960	1,270
17	1,020	506	470	165	1,330	1,890	1,720	890	2,670	1,540	2,580	1,240
18	1,080	482	398	175	1,590	1,820	1,640	865	2,100	1,420	2,410	1,190
19	970	486	410	67	1,360	1,820	1,580	840	1,890	1,480	3,360	1,140
20	915	482	442	208	1,080	1,890	1,540	790	1,960	1,420	3,260	1,190
21	790	474	482	89	883	2,260	1,480	790	1,890	1,360	4,130	1,110
22	840	458	506	98	729	2,030	1,390	665	2,340	2,890	5,380	1,000
23	1,020	522	474	100	667	1,960	1,330	765	5,240	1,420	5,500	970
24	642	494	450	98	638	2,030	1,240	665	5,620	4,080	5,020	970
25	665	494	474	98	570	2,260	1,220	665	4,790	6,750	4,460	942
26	665	458	462	61	597	2,580	1,140	715	4,680	6,360	4,240	890
27	642	498	462	126	676	2,860	1,140	665	5,260	9,060	4,240	815
28	642	482	450	100	873	3,160	1,090	665	7,880	7,970	4,240	790
29	598	470	450	158	991	4,350	1,190	690	8,900	4,460	4,240	815
30	598	526	442	271	-------	5,140	1,540	665	15,000	4,130	3,470	890
31	598	-------	310	434	-------	4,900	-------	665	-------	4,460	2,580	-------

NOTE.—Stage-discharge relation affected by ice Dec. 31 to Feb. 29 discharge estimated by comparison with records of power plant a short distance above. Discharge June 7–9, 13, 22, 23, 28, 30, July 2, 6, 22, 24, 27, Aug. 6 determined by averaging bihourly mean.

Monthly discharge of Iowa River at Iowa City, Iowa, for the year ending September 30, 1924

[Drainage area, 3,140 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,330	598	1,040	0.331	0.38
November	620	450	520	.166	.18
December	715	310	479	.153	.18
January	434	61	169	.054	.06
February	1,590	443	867	.276	.30
March	7,300	1,580	3,240	1.03	1.19
April	5,020	1,090	2,300	.732	.82
May	1,680	665	967	.308	.36
June	15,000	498	3,870	1.23	1.37
July	19,100	1,360	4,990	1.59	1.83
August	5,500	2,410	3,890	1.24	1.43
September	2,260	790	1,270	.405	.45
The year	19,100	61	2,000	.637	8.55

IOWA RIVER AT WAPELLO, IOWA

LOCATION.—In sec. 27, T. 74 N., R. 3 W., at highway bridge half a mile from railroad station at Wapello, Louisa County, and 20 miles from mouth of river. No important tributaries enter near station.

DRAINAGE AREA.—12,480 square miles (measured on map issued by United States Geological Survey; scale, 1: 500,000).

RECORDS AVAILABLE.—February 26, 1915, to September 30, 1924.

GAGE.—Chain gage attached to bridge near center of first span from right abutment; read by C. W. Warren.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; subject to shift. Right bank high and will not be overflowed; levee along left bank, which broke during flood of June, 1918.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.23 feet at 6 p. m. June 28 (discharge, 40,300 second-feet); minimum discharge, estimated 1,000 second-feet January 1–4 (stage-discharge relation affected by ice).

1915–1924: Maximum stage recorded, 14.94 feet at 6 p. m. June 8, 1918 (discharge, 63,100 second-feet). The flood of June, 1892, was probably much higher than flood of 1918.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation subject to shifts during July; affected by ice December 14, December 31 to March 8. Rating curve fairly well defined. Gage read to hundredths once or more daily. Daily discharge ascertained by applying mean daily gage height to rating table, except during July, when shifting-channel methods were used, and during winter when discharge was estimated from gage heights, observer's notes, and climatological records. Records fair.

COOPERATION.—A large part of the base data and record of daily discharge furnished by Mississippi River Power Co., Keokuk, Iowa.

Discharge measurements of Iowa River at Wapello, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 2	4.07	9,690	July 15	3.28	5,840
Dec. 5	.98	2,680	Aug. 13	5.72	15,000

Daily discharge, in second-feet, of Iowa River at Wapello, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9,980	3,000	2,080	1,000	2,500	6,000	18,000	4,780	2,680	32,700	11,200	10,900
2	8,820	3,000	2,380	1,000	2,500	7,000	18,000	5,180	2,680	31,200	10,900	9,680
3	7,740	3,000	2,530	1,000	2,500	8,000	18,000	5,390	2,680	27,800	10,300	9,100
4	6,500	3,000	2,380	1,000	2,500	10,000	16,900	5,180	2,530	22,800	8,540	8,540
5	6,040	2,840	2,380	1,200	2,500	12,000	14,200	5,180	2,530	18,900	8,820	8,000
6	6,740	2,840	2,680	1,200	2,500	12,500	12,200	4,780	2,380	16,500	13,600	7,480
7	6,740	2,680	2,380	1,200	2,500	13,000	11,500	4,590	2,380	13,900	15,300	6,980
8	5,820	2,680	2,230	1,200	2,500	14,000	11,500	4,400	4,040	9,980	14,600	6,980
9	5,180	2,680	2,230	1,200	2,500	15,300	11,200	4,040	15,000	9,390	17,200	6,500
10	4,780	2,680	2,230	1,200	2,500	17,600	10,900	3,860	14,600	8,270	17,200	6,040
11	4,400	2,530	2,080	1,400	2,500	16,100	10,900	3,860	11,500	7,480	16,500	6,040
12	4,040	2,530	2,080	1,500	2,500	13,600	9,980	3,680	10,900	7,480	15,300	4,400
13	4,780	2,680	2,080	1,600	2,500	10,300	9,100	3,680	12,500	6,500	13,900	7,480
14	5,600	2,530	1,900	1,700	2,500	8,540	8,540	3,680	11,500	6,040	13,600	6,270
15	4,980	2,380	2,080	1,800	3,500	7,480	8,000	3,510	9,980	5,820	12,200	5,820
16	4,400	2,380	1,800	1,800	5,000	7,230	7,740	3,340	10,900	5,390	11,200	5,600
17	4,040	2,380	1,800	1,800	4,900	6,980	7,230	3,340	8,540	5,180	9,680	5,600
18	4,040	2,380	1,800	1,800	4,800	6,980	6,980	3,340	7,740	4,780	8,540	5,600
19	4,590	2,080	1,800	1,800	4,700	6,500	6,740	3,510	7,480	4,400	10,900	5,600
20	4,590	2,080	1,800	1,800	4,600	7,480	6,500	3,340	6,500	4,220	16,500	5,600
21	4,040	2,080	1,940	1,800	4,400	8,000	6,500	3,170	6,740	4,220	26,000	5,600
22	3,680	1,940	2,080	1,700	4,100	8,000	6,270	3,000	6,500	4,400	34,700	5,180
23	3,680	1,940	2,080	1,600	3,800	7,230	5,820	3,000	10,900	9,980	34,700	5,180
24	3,680	1,940	2,080	1,500	3,500	6,980	5,390	3,000	19,700	18,000	32,700	4,780
25	3,510	1,940	2,230	1,500	3,200	6,980	5,180	3,000	22,400	24,600	32,700	4,780
26	3,340	1,940	2,230	1,400	3,000	8,000	5,180	3,000	21,000	23,200	30,200	4,590
27	3,340	1,940	2,230	1,400	2,800	9,100	4,780	3,000	17,600	25,500	26,000	4,780
28	3,340	1,940	2,230	1,400	3,500	10,300	4,780	3,000	34,200	22,800	24,600	4,780
29	3,170	1,940	2,230	1,400	4,000	15,300	4,590	2,840	33,700	18,900	24,200	4,590
30	3,170	2,080	2,080	1,400	-------	16,500	4,590	2,840	32,200	13,600	18,900	4,590
31	3,000	-------	1,700	2,000	-------	18,000	---------	2,840	---------	12,200	12,900	-------

Monthly discharge of Iowa River at Wapello, Iowa, for the year ending September 30, 1924

[Drainage area, 12,480 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	9,980	3,000	4,900	0.392	0.45
November	3,000	1,940	2,400	.192	.21
December	2,680	1,700	2,120	.170	.20
January	2,000	1,000	1,460	.117	1.35
February	5,000	2,500	3,270	.262	.28
March	18,000	6,000	10,400	.832	.96
April	18,000	4,590	9,240	.739	.82
May	5,390	2,840	3,720	.298	.34
June	34,200	2,380	11,800	.944	1.05
July	32,700	4,220	13,700	1.10	1.27
August	34,700	8,540	17,900	1.43	1.65
September	10,900	4,400	6,240	.499	.56
The year	34,700	1,000	7,260	.581	9.14

CEDAR RIVER AT JANESVILLE, IOWA

LOCATION.—In sec. 35, T. 91 N., R. 14 W., at highway bridge in Janesville, Bremer County, 3 miles above junction with Shellrock River.

DRAINAGE AREA.—1,660 square miles (measured on map issued by United States Geological Survey; scale 1: 500,000).

RECORDS AVAILABLE.—April 27, 1905, to September 30, 1906; May 26, 1915, to September 30, 1924.

GAGE.—Chain gage attached to downstream handrail of middle span of highway bridge; read by Mrs. Emma Cameron.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. The remains of an old milldam forms control; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.0 feet at 5 p. m. August 22 (discharge, 5,230 second-feet); minimum open-water stage, 1.50 feet at 6.30 p. m. June 10 (discharge, 100 second-feet).

1905–1906; 1915–1924: Maximum discharge, estimated 27,000 second-feet May 29, 1921; minimum discharge, 28 second-feet, October 21, 1922.

ICE.—Stage-discharge relation seriously affected by ice. Observations discontinued during winter.

REGULATION.—There is slight diurnal fluctuation during low-water periods due to operation of power plant at Waverly, 9 miles above station.

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

The following discharge measurement was made:

May 20, 1924: Gage height, 1.92 feet; discharge, 314 second-feet.

Daily discharge, in second-feet, of Cedar River at Janesville, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	835	264	200	-------	1,020	525	360	3,060	525	710
2	1,160	252	264	-------	925	490	215	1,590	595	490
3	1,110	240	264	-------	925	390	235	1,160	525	360
4	925	230	145	-------	1,420	560	235	1,020	420	483
5	710	230	215	-------	1,980	390	168	880	595	750
6	490	200	252	-------	2,790	414	300	630	1,920	360
7	525	181	225	-------	2,920	420	354	483	1,110	390
8	420	200	200	-------	1,810	300	270	483	880	414
9	372	154	300	-------	1,590	300	145	420	710	525
10	630	230	282	-------	1,020	294	102	455	1,110	360
11	372	252	210	-------	970	270	300	390	880	483
12	348	200	225	-------	970	240	270	483	710	455
13	384	215	264	-------	880	354	145	390	790	525
14	476	200	300	490	710	560	168	215	750	490
15	360	154	210	525	790	360	390	483	560	483
16	300	200	225	525	710	354	300	360	560	525
17	372	200	215	490	790	294	880	354	595	560
18	384	230	190	420	750	455	880	330	710	483
19	390	190	200	360	710	330	835	330	970	455
20	408	163	200	455	490	390	595	240	1,480	490
21	402	190	200	670	390	420	525	595	3,630	560
22	300	190	225	790	330	190	560	483	5,230	630
23	240	200	252	1,110	420	420	525	390	4,240	710
24	240	181	210	1,540	420	455	630	1,020	2,530	790
25	408	200	190	1,860	490	360	483	835	2,280	880
26	408	215	230	1,810	483	330	710	750	1,210	880
27	384	215	225	1,920	560	354	630	710	1,060	970
28	342	181	312	2,280	240	360	880	790	880	925
29	372	230	252	*2,790	560	190	880	1,370	750	1,160
30	360	190	210	1,810	630	330	3,340	1,480	790	1,210
31	288	-------	-------	1,160	-------	190	-------	525	750	-------

Monthly discharge of Cedar River at Janesville, Iowa, for the year ending September 30, 1924

[Drainage area, 1,660 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,160	240	475	0.286	0.33
November	264	154	206	.124	.14
December 1-30	312	145	230	.139	.16
March 14-31	2,790	360	1,170	.705	.47
April	2,920	240	957	.577	.64
May	560	190	364	.219	.25
June	3,340	102	544	.328	.37
July	3,060	215	732	.441	.51
August	5,230	420	1,280	.771	.89
September	1,210	360	617	.372	.42

CEDAR RIVER AT CEDAR RAPIDS, IOWA

LOCATION.—In sec. 28, T. 83 N., R. 7 W., in central part of Cedar Rapids, Linn County, half a mile below dam and 1,000 feet above Eighth Avenue Bridge.

DRAINAGE AREA.—6,640 square miles (measured on map issued by United States Geological Survey; scale 1: 500,000).

RECORDS AVAILABLE.—February 14, 1903, to September 30, 1924.

GAGE.—Gurley water-stage recorder on right bank; installed August 20, 1920; inspected by R. S. Toogood.

DISCHARGE MEASUREMENTS.—Made from Eighth Avenue Bridge.

CHANNEL AND CONTROL.—Bed composed of rock and gravel, free from vegetation and practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.54 feet at 4 p. m. August 22 (discharge, 26,300 second-feet); minimum discharge probably occurred during January.

1903–1924.—Maximum stage recorded, 17.2 feet April 1, 1912, and March 26, 1917 (discharge, 54,100 second-feet); minimum stage, 2.23 feet September 9, 1921 (discharge, 190 second-feet).

Greatest known flood probably occurred in June, 1851, when maximum stage was about 20 feet (discharge, estimated 65,000 second-feet).

ICE.—Stage-discharge relation affected by ice during extreme cold weather. The swift current and proximity to power plant keep river open at other times.

REGULATIONS.—Power plant half a mile above gage causes marked diurnal fluctuations during all periods of low water.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height as obtained by inspection of recorder graph, except as explained in footnote to table of daily discharge. Records good, except for periods when stage-discharge relation was affected by ice for which they are fair.

The following discharge measurements were made:

May 21, 1924: Gage height, 3.59 feet; discharge. 2,130 second-feet.

August 19, 1924: Gage height, 8.90 feet; discharge, 19,100 second-feet.

Daily discharge, in second-feet, of Cedar River at Cedar Rapids, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3,710	1,510	1,290	780	1,610	3,430	10,100	2,510	1,680	4,350	4,290	1,710
2	3,230	1,440	1,150	710	1,790	4,440	8,710	2,590	1,620	5,660	4,000	1,550
3	3,570	1,440	1,510	620	1,730	4,530	6,920	2,470	1,540	6,120	3,430	1,380
4	4,890	1,410	1,260	620	1,950	5,620	6,120	2,330	1,540	5,340	3,290	1,290
5	5,190	1,410	1,020	620	2,050	7,240	5,810	2,280	1,540	4,440	3,570	1,300
6	4,290	1,340	970		2,110	8,540	6,120	2,240	1,240	3,710	4,000	3,070
7	3,860	1,410	1,070		2,030	10,200	6,440	2,300	1,490	3,570	4,890	2,950
8	3,290	1,190	1,060	660	1,910	11,400	6,760	1,950	4,440	3,290	6,760	2,900
9	2,740	1,250	1,110		1,710	6,440	6,760	1,990	3,370	2,950	7,720	2,770
10	2,610	1,260	1,090		1,850	5,810	6,120	1,950	2,610	3,120	7,400	2,660
11	2,390	1,150	1,070		1,490	4,590	5,660	1,910	2,110	2,640	6,600	2,640
12	2,150	1,150	1,130		1,490	3,710	4,740	1,890	2,330	2,420	6,760	2,660
13	2,330	1,220	1,090	680	1,510	4,000	4,590	1,930	2,870	2,350	6,120	2,640
14	2,260	1,250	800		2,370	3,710	4,290	1,910	2,610	2,240	5,810	2,540
15	1,830	1,120	600		2,330	4,290	4,140	1,910	3,010	2,090	4,890	2,640
16	1,710	1,300	990		2,870	4,290	4,000	2,030	3,090	1,930	4,140	2,740
17	2,190	1,220	1,120		2,610	3,710	3,860	1,950	2,670	1,790	3,710	2,610
18	2,150	1,150	1,120		2,490	4,140	4,000	1,910	2,610	1,750	6,760	2,470
19	1,950	1,120	1,110		2,470	3,860	3,860	1,930	2,900	1,750	19,500	2,420
20	2,070	1,180	1,090		2,470	3,860	3,570	1,930	2,900	1,730	21,700	2,390
21	1,810	1,230	1,090	630	3,090	4,000	3,430	1,950	2,610	2,170	19,800	2,330
22	1,830	1,070	1,190		2,820	4,000	3,150	1,830	2,710	4,740	24,500	2,260
23	1,730	1,090	1,110		2,300	4,440	2,740	1,830	4,440	5,500	19,100	2,220
24	1,730	1,080	1,120		2,150	4,740	2,420	1,910	5,810	7,080	16,100	2,240
25	1,570	1,070	1,080		1,950	5,190	2,280	1,950	6,600	6,120	16,100	2,420
26	1,620	1,040	1,120		1,750	5,960	2,110	1,950	4,440	5,960	16,500	2,490
27	1,540	1,020	1,120	680	2,610	6,600	2,260	1,950	3,860	5,340	12,500	2,390
28	1,660	1,190	1,060		3,710	7,080	2,220	1,910	5,040	5,040	8,050	2,370
29	1,610	1,150	820	1,120	4,000	8,050	2,240	1,710	4,590	4,440	6,120	2,280
30	1,540	1,220	990	1,120	-------	9,040	2,370	1,590	4,000	3,860	5,190	2,870
31	1,490	-------	760	1,340	-------	9,720	-------	1,610	-------	4,290	4,590	-------

NOTE.—Stage-discharge relation affected by ice Jan. 2–28; discharge based on temperature and gage-height records. Braced figures show mean discharge for periods indicated.

Monthly discharge of Cedar River at Cedar Rapids, Iowa, for the year ending September 30, 1924

[Drainage area, 6,640 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	5,190	1,490	2,470	0.372	0.43
November	1,510	1,020	1,220	.184	.21
December	1,510	600	1,070	.161	.19
January	1,340	----------	709	.107	.12
February	4,000	1,490	2,250	.339	.37
March	11,400	3,710	5,700	.858	.99
April	10,100	2,110	4,590	.691	.77
May	2,590	1,590	2,000	.301	.35
June	6,600	1,240	3,080	.464	.52
July	7,080	1,730	3,800	.572	.66
August	24,500	3,290	9,160	1.38	1.59
September	3,070	1,290	2,370	.357	.40
The year	24,500	----------	3,210	.483	6.60

SHELLROCK RIVER NEAR CLARKSVILLE, IOWA

LOCATION.—In T. 92 W., R. 16 W., at highway bridge, 1¼ miles northwest of Clarksville, Butler County, and 25 miles above junction of Cedar River.

DRAINAGE AREA.—1,660 square miles (measured on map issued by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—May 28, 1915, to September 30, 1924.

GAGE.—Chain gage attached to handrail on upstream side of bridge, 75 feet from right abutment; read by Mrs. H. H. Sherburne.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of rock and sand; fairly permanent. Right bank high; left bank will probably be overflowed at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.4 feet at 7.30 a. m. October 2 (discharge, 4,200 second-feet); minimum stage occurred during winter.

1915–1924: Maximum discharge recorded, 12,200 second-feet June 2, 1916; minimum stage, 0.48 foot August 29 and September 17, 1923 (discharge, 50 second-feet).

In April, 1907, a stage of about 16.5 feet was reached (discharge, estimated 19,000 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Slight diurnal fluctuation of stage may occur during low water, due to operation of power plant at Greene, 10 miles upstream.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined. Gage read to hundredths once daily. Discharge ascertained by applying daily gage height to rating table. Records fair.

The following discharge measurement was made:
May 20, 1924: Gage height, 1.43 feet; discharge, 288 second-feet.

Daily discharge, in second-feet, of Shellrock River near Clarksville, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,960	112	--------	805	516	315	1,340	200	294
2	4,200	90	--------	865	469	294	985	154	255
3	2,210	95	--------	865	401	294	750	218	255
4	1,420	184	--------	2,050	379	274	640	236	274
5	1,120	165	--------	1,970	379	315	565	2,050	236
6	750	140	--------	1,730	315	274	516	925	218
7	695	128	--------	1,490	315	255	446	590	274
8	565	110	--------	1,190	315	315	379	615	218
9	516	154	--------	985	294	274	357	835	218
10	401	160	--------	865	294	274	315	805	218
11	379	148	--------	750	379	255	469	615	255
12	315	116	--------	695	379	294	401	446	274
13	294	106	--------	640	357	446	315	446	218
14	274	93	--------	590	379	492	294	401	274
15	255	86	--------	565	357	424	236	401	255
16	236	77	--------	540	401	1,420	218	446	236
17	218	71	--------	540	379	750	236	516	236
18	200	--------	--------	540	357	424	187	401	218
19	184	--------	--------	492	336	255	200	424	218
20	157	--------	--------	469	302	255	218	565	236
21	140	--------	--------	446	315	255	168	640	255
22	126	--------	--------	424	315	255	218	1,650	236
23	116	--------	--------	401	294	236	200	540	469
24	110	--------	--------	379	294	200	446	492	357
25	110	--------	--------	379	294	401	236	446	294
26	135	--------	--------	336	274	492	193	424	255
27	187	--------	--------	492	274	336	193	424	236
28	174	--------	2,300	695	274	379	178	379	805
29	140	--------	1,850	695	274	3,660	168	315	640
30	128	--------	1,160	590	274	2,390	184	294	540
31	118	--------	695	--------	274	--------	236	315	--------

Monthly discharge of Shellrock River near Clarksville, Iowa, for the year ending September 30, 1924

[Drainage area, 1,660 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	4,200	110	608	0.366	0.42
November 1–17	184	71	120	.072	.05
April	2,050	336	782	.471	.53
May	516	274	337	.203	.23
June	3,660	200	550	.331	.37
July	1,340	168	371	.223	.26
August	2,050	154	555	.334	.39
September	805	218	299	.180	.20

SKUNK RIVER NEAR AMES, IOWA

LOCATION.—In sec. 23, T. 84 N., R. 24 W., at site of old county bridge, 2½ miles north of Ames, Story County, 5 miles above mouth of Squaw Creek, and 3½ miles below Keigley Branch.

DRAINAGE AREA.—320 square miles (measured on topographic map and on United States post route map).

RECORDS AVAILABLE.—July 28, 1920, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder installed August 25, 1921; inspected by R. J. Coon.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Banks are high, but overflow will occur around right bank during extremely high water. Rock ledge forms permanent control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.21 feet at 9 a. m. June 28 (discharge, 3,010 second-feet). Minimum discharge occurred during January.

1920–1924: Maximum stage recorded, 9.0 feet at 6.30 p. m. February 23, 1922 (discharge, 3, 370 second-feet); minimum stage, 1.60 feet July 31, 1921 (discharge, 1.5 second-feet).

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

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table, except as explained in footnote to table of daily discharge. Records good.

Discharge measurements of Skunk River near Ames, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 8	2.53	54.7	May 1	3.03	158	Aug. 18	3.23	220
Mar. 4	4.26	558	June 28	8.03	2,870			

Daily discharge, in second-feet, of Skunk River near Ames, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	820	67	44		225	668	625	159	54	1,200	216	100
2	640	67	38		215	181	585	144	53	850	178	107
3	463	66	50		150	121	625	133	50	600	150	100
4	358	63	42		90	548	565	123	43	475	127	88
5	290	59	33		47	645	478	109	42	400	442	76
6	243	58	35		60	668	446	100	41	325	512	70
7	208	58	46		96	432	400	87	82	275	376	65
8	179	55	42		109	370	453	83	306	250	850	60
9	162	54	38		101	276	309	80	273	225	1,260	56
10	148	53	34		96	289	257	78	210	200	795	53
11	153	53	24		115	260	239	76	171	175	495	70
12	127	53	39		199	270	245	71	144	165	390	164
13	120	56	26		309	356	267	70	125	311	339	150
14	110	56	27		453	359	270	71	111	189	279	119
15	106	54	33		589	342	233	80	135	144	242	105
16	108	53	32	10	460	332	210	76	119	109	248	92
17	116	50	29		292	336	194	78	107	100	224	82
18	116	50	31		219	279	171	82	109	85	213	76
19	106	48	36		166	245	150	76	105	83	194	71
20	97	45	36		140	254	135	73	101	83	171	68
21	90	44	36		107	263	127	70	92	83	155	63
22	88	40	36		107	495	117	68	157	236	199	56
23	84	42	37		106	605	109	78	239	292	233	50
24	83	44	32		105	565	111	105	366	267	309	46
25	80	48	35		105	668	115	105	597	439	309	43
26	76	48	29		105	1,020	171	96	394	325	263	41
27	74	44	37		115	850	254	94	319	219	202	125
28	73	38	24		150	668	239	85	2,440	186	159	400
29	70	41	25		390	1,440	210	76	2,100	242	135	242
30	70	46	16		-------	1,350	186	68	1,800	380	117	181
31	69	-------	12		-------	715	-------	62	-------	279	101	-------

NOTE.—No gage-height record June 28 to July 12; discharge estimated by comparison with Squaw Creek record. Stage-discharge relation affected by ice Jan. 1 to Feb. 4, Feb. 22-29; discharge based on temperature and gage-height records and estimates obtained by field inspection.

Monthly discharge of Skunk River near Ames, Iowa, for the year ending September 30, 1924

[Drainage area, 320 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	820	69	178	0.556	0.64
November	67	38	51.8	.162	.18
December	50	12	33.4	.104	.12
January	----------	----------	[a] 10	.031	.04
February	589	47	187	.584	.63
March	1,440	121	512	1.60	1.84
April	625	109	283	.884	.99
May	159	62	88.9	.278	.32
June	2,440	41	363	1.13	1.26
July	1,200	83	297	.928	1.07
August	1,260	101	319	.997	1.15
September	400	41	101	.316	.35
The year	2,440	----------	202	.631	8.59

[a] Estimate.

SKUNK RIVER AT COPPOCK, IOWA

LOCATION.—In sec. 1, T. 73 N., R. 8 W., at highway bridge one-eighth mile above Chicago, Burlington & Quincy Railroad bridge at Coppock, Henry County, and one-fourth mile above junction with Crooked Creek.

DRAINAGE AREA.—2,890 square miles (measured on map issued by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—October 21, 1913, to September 30, 1924.

GAGE.—Chain gage attached to downstream side of bridge; read by J. W. Ricks.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.85 feet at 6 a. m. June 29 (discharge, estimated 18,000 second-feet); minimum discharge, estimated at 200 second-feet January 1–9 (stage-discharge relation affected by ice).

1913–1924: Maximum stage recorded, 19.7 feet June 9, 1918 (discharge, estimated 19,600 second-feet); minimum stage, 2.10 feet August 15, 18, 25–27, 1914 (discharge, 33 second-feet).

A stage of about 22 feet occurred on or about May 31, 1903 (discharge, estimated 25,000 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table, except October 1–25 and July 26 to September 19, when shifting-channel corrections were applied and during winter period when discharge was estimated from gage heights, observer's notes, climatological records, and by comparison with records at Augusta. Records fair.

COOPERATION.—Most of the base data and the record of daily discharge furnished by Mississippi River Power Co., Keokuk, Iowa.

Discharge measurements of Skunk River at Coppock, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 4	7.91	2,850	May 10	4.53	874	Aug. 28	5.90	1,780
Dec. 6	4.00	565	July 15	5.80	1,510			

NOTE.—Excepting May 10 all measurements made by engineers of Mississippi River Power Co.

Daily discharge, in second-feet, of Skunk River at Coppock, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5,580	719	584	200	740	3,000	4,440	1,510	503	7,230	2,420	924
2	4,540	719	584	200	700	4,500	4,240	1,390	503	6,260	2,050	924
3	3,360	719	584	200	680	4,000	4,150	1,330	465	6,740	1,770	924
4	2,960	719	627	200	700	5,500	4,150	1,210	465	7,100	1,450	979
5	2,720	672	627	200	740	6,500	4,060	1,150	503	6,980	1,270	924
6	2,560	672	584	200	760	7,000	3,530	1,040	503	5,040	4,150	818
7	1,980	672	543	200	780	7,230	3,440	979	465	4,150	6,260	672
8	1,580	627	503	200	700	6,980	2,880	924	1,270	2,640	3,440	1,090
9	1,450	584	543	200	650	7,000	2,560	924	2,340	2,260	4,940	924
10	1,270	584	543	280	560	7,500	2,260	870	3,780	1,980	3,960	627
11	1,210	584	543	460	500	7,610	2,120	870	3,960	1,840	3,620	627
12	1,090	584	543	500	500	5,360	1,980	818	4,150	2,050	3,280	1,150
13	1,330	543	543	600	520	3,040	1,840	768	4,340	1,700	2,960	1,330
14	1,450	584	500	600	900	2,420	1,770	768	3,040	1,580	2,340	870
15	1,330	627	500	580	1,600	2,190	1,700	719	2,340	1,580	1,910	719
16	1,210	627	465	550	2,600	2,050	1,770	719	2,120	1,580	1,770	768
17	1,210	627	447	480	2,500	2,050	1,700	719	1,980	1,390	1,640	768
18	1,580	584	447	440	2,200	1,840	1,640	719	2,050	1,210	1,510	719
19	1,390	584	465	420	1,800	1,770	1,640	672	1,640	1,090	1,390	672
20	1,270	543	503	380	1,600	1,980	1,510	672	1,510	1,040	1,330	870
21	1,210	543	543	320	1,400	2,260	1,450	627	1,450	979	1,210	818
22	1,090	503	543	320	1,200	2,260	1,330	627	1,580	924	1,390	672
23	979	543	543	320	1,000	1,980	1,210	627	1,700	870	1,210	584
24	870	503	543	320	900	1,910	1,150	627	3,620	6,740	1,450	543
25	870	584	543	320	850	2,050	1,090	584	6,370	8,810	1,770	503
26	818	584	503	320	800	2,560	1,040	584	5,360	6,740	1,910	584
27	768	543	503	320	750	2,560	1,210	584	5,040	3,780	1,910	447
28	768	543	503	320	700	2,490	1,270	584	12,200	2,560	1,770	503
29	768	543	465	400	1,200	5,580	1,640	584	18,000	1,910	1,390	503
30	768	543	429	500	-------	6,140	1,640	543	12,400	2,340	1,150	627
31	719	-------	429	700	-------	4,840	-------	584	-------	1,980	1,040	-------

NOTE.—Stage-discharge relation affected by ice Dec. 14, 15, Jan. 1 to Mar. 6, Mar. 9, and 10. Gage not read September 22, 23. Discharge estimated.

Monthly discharge of Skunk River at Coppock, Iowa, for the year ending September 30, 1924

[Drainage area, 2,890 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	5,580	719	1,640	0.567	0.65
November	719	503	600	.208	.23
December	627	429	523	.181	.21
January	700	200	363	.126	.15
February	2,600	500	1,050	.363	.39
March	7,610	1,770	4,000	1.38	1.59
April	4,440	1,040	2,210	.765	.85
May	1,510	543	816	.282	.33
June	18,000	465	3,520	1.22	1.36
July	8,810	870	3,320	1.15	1.33
August	6,260	1,040	2,250	.779	.90
September	1,330	447	769	.266	.30
The year	18,000	200	1,760	.609	8.29

SKUNK RIVER AT AUGUSTA, IOWA

LOCATION.—In sec. 26, T. 69 N., R. 4 W., at highway bridge one-third mile from Augusta post office, Des Moines County, and 12.2 miles above mouth.

DRAINAGE AREA.—4,290 square miles (measured on map issued by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—October 1 to November 15, 1913; May 27, 1915, to September 30, 1924.

GAGE.—Chain gage attached to downstream handrail of bridge 95 feet from left abutment; read by J. A. Schroder.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed of stream sandy; subject to change. Right bank high and will not be overflowed; left bank overflowed only at extremely high stages. Remains of old milldam 600 feet below gage forms control. Riffle at dam causes a drop of about 3 feet at medium low stages. Backwater from Mississippi probably will not occur more than once in 50 years.

REGULATION.—Natural discharge at extreme low stages occasionally affected by operation of power plant at Oakland Mills, 26 miles upstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.25 feet at 9 a. m. June 29 (discharge, 26,000 second-feet); minimum discharge, estimated 250 second-feet, January 1–9 (stage-discharge relation affected by ice).

1913; 1915–1924: Maximum discharge recorded, 30,800 second-feet, March 28, 1916; minimum discharge, 26 second-feet (by current-meter measurement) September 8, 1919.

A stage of about 21 feet (discharge, 45,000 second-feet) was reached on or about June 1, 1903.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined for all but high stages. Gage read to half-tenths once daily. Daily discharge determined by applying daily gage height to rating table, except for stages above 10.0 feet when shifting-channel methods were used, and during winter when it was obtained from daily gage heights, observer's notes, and climatological records. Records fair.

COOPERATION.—A large part of the base data and records of daily discharge furnished by Mississippi River Power Co., Keokuk, Iowa.

Discharge measurements of Skunk River at Augusta, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 7	[a] 2.62	666	May 10	2.97	1,060	June 28	17.71	24,300
Jan. 24	[b] 2.35	403	June 25	[a] 14.20	17,000			

[a] Engineers of Mississippi River Power Co. [b] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Skunk River at Augusta, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	6,200	811	542	250	1,500	3,700	7,040	1,760	582	23,900	3,120	1,250
2	7,340	811	582	250	1,450	7,000	6,200	1,620	542	14,200	3,120	1,140
3	5,500	811	623	250	1,300	8,000	5,500	1,560	542	9,140	2,700	1,020
4	3,960	811	668	250	1,250	7,600	5,220	1,430	542	8,840	2,300	1,020
5	3,400	811	668	250	1,150	9,000	5,080	1,310	506	8,840	1,900	1,020
6	3,120	762	668	250	1,100	10,300	4,660	1,190	970	8,240	2,570	1,020
7	2,570	762	623	250	1,050	9,890	4,100	1,140	970	6,200	9,140	915
8	2,300	713	582	250	980	9,290	3,540	1,080	3,120	4,800	9,740	863
9	1,900	713	582	250	900	8,540	3,400	970	3,400	4,240	12,900	915
10	1,760	668	582	300	820	8,090	2,980	970	3,960	3,540	8,540	915
11	1,500	668	623	650	720	8,840	2,700	970	4,940	2,840	6,200	970
12	1,370	623	623	640	600	8,240	2,440	915	4,800	2,570	4,660	1,020
13	1,370	668	668	700	550	5,640	2,300	915	4,800	3,680	3,960	1,370
14	1,560	668	700	780	800	3,260	2,300	863	5,080	3,680	3,400	1,760
15	1,760	623	623	800	1,600	2,840	2,030	811	4,660	2,700	2,840	1,310
16	1,620	623	623	780	3,000	2,570	2,030	811	3,680	2,160	2,300	970
17	1,430	623	623	700	3,600	2,300	2,030	811	2,840	2,030	2,160	863
18	1,560	623	542	660	3,800	2,160	2,030	811	2,570	1,760	2,030	863
19	1,760	623	506	600	3,500	2,030	1,900	762	2,570	1,760	1,760	811
20	1,760	582	542	580	2,800	2,030	1,760	762	2,570	1,430	1,760	811
21	1,370	542	582	500	2,300	2,300	1,760	713	2,300	1,310	1,760	915
22	1,430	582	582	560	2,000	2,300	1,620	668	1,760	1,760	1,560	970
23	1,250	542	582	420	1,700	2,300	1,500	668	2,570	1,250	1,560	811
24	1,190	542	582	400	1,500	2,300	1,430	668	3,680	15,000	1,500	668
25	1,250	542	623	440	1,300	2,300	1,310	713	18,000	19,700	2,030	623
26	1,020	582	623	480	1,150	2,570	1,310	623	16,300	14,800	3,120	582
27	970	542	582	470	1,100	3,120	1,250	668	15,300	9,740	2,570	582
28	915	542	582	460	1,050	3,400	1,250	623	22,800	5,780	2,160	542
29	915	582	582	750	1,200	6,760	1,310	623	26,000	3,540	2,030	506
30	863	542	623	1,100	-------	11,100	1,760	623	24,600	3,540	1,760	470
31	863	-------	713	1,400	-------	9,440	-------	582	-------	3,960	1,430	-------

NOTE.—Discharge estimated Dec. 14 and Jan. 1 to March 5; Stage-discharge relation affected by ice.

Monthly discharge of Skunk River at Augusta, Iowa, for the year ending September 30, 1924

[Drainage area, 4,290 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	7,340	863	2,120	0.494	0.57
November	811	542	651	.152	.18
December	713	506	608	.142	.16
January	1,400	250	526	.123	.14
February	3,800	550	1,580	.368	.40
March	11,100	2,030	5,460	.127	.15
April	7,040	1,250	2,790	.650	.72
May	1,760	582	924	.215	.25
June	26,000	506	6,230	.145	.16
July	23,900	1,250	6,350	.148	.17
August	12,900	1,430	3,500	.816	.94
September	1,760	470	916	.214	.24
The year	26,000	250	2,640	.615	4.08

SQUAW CREEK AT AMES, IOWA

LOCATION.—In sec. 3, T. 83 N., R. 24 W., at footbridge, 1,700 feet above Chicago & Northwestern Railway bridge, in Ames, Story County, 2 miles above junction with Skunk River.

DRAINAGE AREA.—210 square miles (measured from topographic map and on United States post route map).

RECORDS AVAILABLE.—May 24, 1919, to September 30, 1924.

GAGE.—Vertical staff gage attached to middle pile of left bent of bridge; read by Stanley Collins.

DISCHARGE MEASUREMENTS.—Made from footbridge, by wading, or from Chicago & Northwestern Railway bridge.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifting. Left bank high; right bank subject to overflow at a stage above 11 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.5 feet at 9 p. m. June 28 (discharge, about 2,950 second-feet). Minimum discharge occurred during winter.

Maximum stage in recent years, approximately 14.5 feet June 4, 1918 (discharge, estimated 6,900 second-feet). Occasionally the creek is dry for a short period during summer.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation not permanent. Rating curve poorly defined. Gage read to hundredths twice daily and more often during periods of high water. Daily discharge ascertained by applying mean daily gage height to rating table, except as explained in footnote to table of daily discharge. Records poor.

Discharge measurements of Squaw Creek at Ames, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 8	1.14	46.1	May 1	1.59	115	Aug. 18	1.68	120
Mar. 26	4.00	765	June 29	6.78	1,910			

Daily discharge, in second-feet, of Squaw Creek at Ames, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	360	68	43		150	350	502	103	43	552	184	96
2	330	67	43		120	175	480	96	43	400	141	96
3	290	62	43		100	120	502	85	43	310	118	96
4	240	62	43		90	175	370	82	38	260	99	82
5	202	62	43		80	350	330	82	38	220	370	75
6	184	62	43			300	320	75	32	193	211	68
7	158	62	42			290	300	82	53	141	150	68
8	150	62	41		80	250	260	82	410	110	450	62
9	141	58	41			211	211	82	290	118	960	55
10	125	45	43			310	240	75	202	96	540	55
11	125	43	42		95	250	250	68	158	89	280	125
12	103	53	41		160	175	202	68	133	82	240	125
13	89	43	41		270	175	175	68	110	79	220	103
14	103	43	43		350	193	158	68	96	75	184	82
15	107	43	43		310	166	158	68	110	68	158	71
16	107	43	43	7	195	193	184	65	96	62	150	55
17	103	43	43		140	158	125	65	85	62	141	55
18	100	43	43		115	141	110	68	82	55	125	55
19	89	43	43		100	133	110	68	82	63	107	55
20	88	43	43		80	133	103	62	75	58	93	55
21	79	43	43			141	110	55	68	60	82	55
22	71	43	43			290	110	55	184	110	158	43
23	68	43	33			370	107	68	370	89	310	43
24	68	43	32			400	85	68	350	89	640	43
25	68	43	29		70	515	79	68	590	79	330	43
26	68	43	32			655	184	68	330	68	202	38
27	68	43	29			552	193	68	220	55	175	184
28	68	43	23			460	161	62	2,180	62	141	250
29	65	43	21			1,010	141	55	1,870	82	110	150
30	68	43	18		-------	1,050	125	49	838	515	96	125
31	68	-------	16		-------	552	-------	45	-------	290	96	-------

NOTE.—Stage-discharge relation affected by ice Dec. 30 to Mar. 6; discharge estimated from temperature and gage-height records. Braced figures show average daily discharge for periods indicated. Shifting-control method used Mar. 23 to Apr. 12 and June 28 to July 6.

Monthly discharge of Squaw Creek at Ames, Iowa, for the year ending September 30, 1924

[Drainage area, 210 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	360	68	128	0.610	0.70
November	68	43	49.3	.235	.26
December	43	16	37.7	.179	.21
January	----------	----------	[a] 7.0	.033	.04
February	350	----------	117	.557	.60
March	1,050	120	330	1.57	.18
April	502	79	213	1.01	1.13
May	103	45	70.1	.334	.39
June	2,180	32	307	1.46	1.63
July	552	55	148	.705	.81
August	960	82	234	1.11	1.28
September	250	38	83.6	.398	.44
The year	2,180	----------	144	.686	7.67

[a] Estimated.

DES MOINES RIVER AT KALO, IOWA

LOCATION.—In sec. 17, T. 88 N., R. 28 W., at Kalo, Webster County, 1½ miles east of Otho, on Minneapolis & St. Louis Railroad, and 1½ miles above mouth of Holiday Creek, which enters from left.

DRAINAGE AREA.—4,170 square miles (measured on map issued by United States Geological Survey; scale, 1:500,000.

RECORDS AVAILABLE.—October 18, 1913, to September 30, 1924.

GAGE.—Water-stage recorder on right bank, 300 feet below highway bridge; read by S. C. Fuller.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel of gravel; fairly permanent. No well-defined control. Point of zero flow estimated to be at gage height −0.40 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.52 feet at 4 p. m. April 5 (discharge, 3,320 second-feet). Minimum discharge probably occurred during January.

1913–1924: Maximum stage recorded, 14.0 feet May 30, 1915 (discharge, 18,500 second-feet). Minimum discharge, 14 second-feet, October 15, 1922.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Operation of city power plant at Fort Dodge, 7 miles upstream causes diurnal fluctuation during periods of low water.

ACCURACY.—Stage-discharge relation probably changed during high water in June. Rating curves fairly well defined. Operation of water-stage recorder satisfactory except as explained in footnote to table of daily discharge. Mean daily gage height ascertained by inspection of gage-height graph. Daily discharge obtained by applying to rating table mean daily gage height. Records fair.

The following discharge measurement was made:

April 2, 1924: Gage height, 3.33 feet; discharge, 2,170 second-feet.

Daily discharge, in second-feet, of Des Moines River at Kalo, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,320	385	310	-------	75	1,510	2,050	1,150	465	2,480	574	854
2	3,000	390	324	-------	60	1,640	2,230	1,000	460	2,200	440	826
3	3,100	360	267	-------	150	1,960	2,700	825	455	1,930	476	693
4	2,800	542	247	-------	270	2,050	3,100	725	450	1,570	452	630
5	2,500	434	263	-------	220	1,870	3,300	650	450	1,230	452	518
6	2,100	434	344	-------	160	1,780	3,200	657	500	1,150	524	482
7	1,740	400	299	-------	160	1,460	3,100	699	530	990	500	458
8	1,640	446	303	-------	180	1,300	3,000	706	566	950	1,030	446
9	1,180	405	235	-------	203	1,220	2,600	720	650	819	1,750	410
10	1,100	356	239	-------	259	1,510	2,230	846	578	798	1,440	435
11	1,060	390	130	-------	231	1,220	2,050	720	536	714	1,110	458
12	825	390	243	-------	271	1,140	1,920	720	602	658	950	500
13	790	360	109	-------	400	1,340	1,870	748	590	430	756	430
14	790	365	184	-------	560	1,180	1,870	748	614	542	700	370
15	644	370	127	-------	560	1,100	1,740	729	530	560	675	420
16	804	338	219	-------	614	1,420	1,560	713	548	395	840	458
17	614	307	164	-------	620	2,050	1,460	734	536	385	903	375
18	706	370	164	-------	566	2,700	1,340	650	620	370	1,030	390
19	620	370	227	-------	494	1,600	1,300	706	554	482	1,070	395
20	614	375	243	-------	464	1,140	1,260	602	416	488	1,230	365
21	554	351	255	-------	482	1,260	1,100	536	482	512	1,520	350
22	554	307	227	-------	464	1,960	1,180	554	632	464	1,620	350
23	500	307	115	30	390	2,800	932	602	956	488	1,700	380
24	482	324	26	-------	395	2,800	860	458	790	644	1,800	777
25	434	320	136	-------	458	2,800	924	548	1,420	700	1,930	926
26	416	320	84	-------	283	2,800	988	572	1,380	644	1,750	990
27	488	315	130	-------	434	2,600	876	434	1,260	542	1,660	1,110
28	494	315	130	-------	600	2,600	1,000	500	1,920	644	1,480	1,030
29	405	310	100	50	900	3,200	1,100	554	2,900	777	1,270	1,390
30	400	310	80	75	-------	2,800	1,150	476	3,000	707	1,070	1,310
31	405	-------	60	75	-------	2,140	-------	470	-------	651	990	-------

NOTE.—Stage-discharge relation affected by ice Dec. 30 to Mar. 17; discharge estimated from temperature records and gage heights corrected for ice. No gage heights Nov. 25–30, Apr. 30, May 1, 2, 4, June 1–6, Aug. 14, 15; discharge estimated by comparison with flow at Boone.

Monthly discharge of Des Moines River at Kalo, Iowa, for the year ending September 30, 1924

[Drainage area, 4,170 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,100	400	1,100	0.264	0.30
November	542	307	366	.088	.10
December	344	26	193	.463	.53
January			[a] 50	.012	.01
February	900	60	377	.090	.10
March	3,200	1,000	1,900	.455	.52
April	3,300	860	1,800	.431	.48
May	1,150	434	670	.161	.19
June	3,000	416	846	.203	.23
July	2,480	370	836	.200	.23
August	1,930	440	1,090	.261	.30
September	1,390	350	618	.148	.17
The year	3,300		822	.197	3.16

[a] Estimated.

DES MOINES RIVER NEAR BOONE, IOWA

LOCATION.—In sec. 12, T. 84 N., R. 27 W., at highway bridge in Centerville, 2½ miles northwest of Boone, Boone County, 1 mile above Boone waterworks, and 3 miles above Bluff Creek.

DRAINAGE AREA.—5,480 square miles (measured on map issued by United States Geological Survey, scale, 1: 500,000).

RECORDS AVAILABLE.—April 1, 1920, to September 30, 1924. At site of old gage 3½ miles downstream at Chicago & Northwestern Railway crossing, scattered records of stage have been maintained by United States Weather Bureau from 1905 to 1917.

GAGE.—Chain gage attached to downstream side of bridge 20 feet from left end of right span; read by S. A. Elliott.

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

CHANNEL AND CONTROL.—Well-defined control is formed by the remains of an old dam, 300 feet below bridge. Channel consists of gravel and sand; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 7.0 feet at 8 a. m. March 30 (discharge, 7,350 second-feet). Minimum discharge occurred during January.

1920–1924: Maximum stage recorded, 13.39 feet at 6.30 a. m. July 11, 1920 (discharge, 16,900 second-feet); minimum stage, 1.18 feet at 7 a. m. July 28, 1923 (discharge, 68 second-feet). Highest stage since 1907, 20.54 feet probably on June 6, 1918 (discharge, approximate, 32,000 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—The city power plant at Fort Dodge causes some diurnal fluctuation during periods of extreme low water.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined between 800 and 18,000 second-feet. Gage read to hundredths once daily, and more frequently during days of rapidly changing stage. Daily discharge ascertained by applying daily gage height to rating table except as explained in footnote to table of daily discharge. Records good.

The following discharge measurements were made:
April 3, 1924: Gage height, 5.01 feet; discharge, 4,050 second-feet.
August 29, 1924: Gage height, 3.62 feet; discharge, 2,180 second-feet.

Daily discharge, in second-feet, of Des Moines River near Boone, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,930	580	391	2,630	3,620	1,670	665	5,480	1,000	1,540
2	3,770	580	391	3,050	3,470	1,540	710	4,520	1,000	1,300
3	4,670	622	384	3,190	4,070	1,420	665	4,070	900	1,060
4	4,370	622	378	3,770	4,670	1,240	622	3,050	850	710
5	4,070	580	378	3,190	5,310	1,240	622	2,630	1,120	622
6	3,470	580	360	2,630	5,650	1,180	580	2,070	1,360	580
7	3,470	580	343	2,910	5,310	1,000	580	1,800	1,060	755
8	2,490	580	354	2,350	4,830	950	950	1,540	1,860	850
9	2,070	540	326	2,210	4,370	900	1,060	1,420	3,190	802
10	1,800	540	288	1,800	3,620	900	950	1,180	4,000	755
11	1,540	500	261	1,540	3,190	850	900	1,180	3,050	755
12	1,540	540	229	1,480	2,910	850	900	1,000	2,140	665
13	1,300	540	208	1,540	2,630	950	850	950	1,800	755
14	1,300	540	190	1,800	2,630	950	950	850	1,800	730
15	1,180	540	183	1,800	2,490	900	950	755	1,300	705
16	1,060	540	183	1,480	2,210	802	900	710	1,060	680
17	1,180	500	194	1,420	2,070	802	900	622	1,420	655
18	1,060	500	200	1,360	1,930	900	802	622	1,540	630
19	1,060	472	211	1,800	1,800	950	850	540	1,540	605
20	850	465	214	1,300	1,800	850	850	665	3,190	580
21	850	451	222	1,670	1,670	755	710	710	3,620	560
22	850	444	225	2,070	1,420	755	950	900	4,070	540
23	850	424	225	4,990	1,540	755	1,120	755	3,330	520
24	850	417	218	5,480	1,180	710	2,350	710	3,190	500
25	755	417	208	5,650	1,120	710	1,930	850	2,910	800
26	710	410	200	7,010	1,120	755	2,630	1,180	2,770	1,000
27	665	410	194	6,500	1,420	755	2,910	1,000	2,530	1,500
28	665	404	183	5,310	1,420	710	3,620	1,060	2,300	1,800
29	622	398	169	5,990	1,540	710	4,220	1,360	2,070	2,000
30	580	398	100	7,350	1,670	755	5,650	1,420	1,930	1,900
31	580	-------	75	5,310	-------	710	-------	1,180	1,800	-------

NOTE.—No gage-height record Dec. 30, 31, Aug. 27, 28, Sept. 14–30. Discharge based on a comparison with stations at Kalo and Des Moines.

Monthly discharge of Des Moines River near Boone, Iowa, for the year ending September 30, 1924

[Drainage area, 5,480 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	4,670	580	1,680	0.307	0.35
November	622	398	504	.092	.10
December	391	75	248	.045	.05
March	7,350	1,300	3,240	.591	.68
April	5,600	1,120	2,760	.504	.56
May	1,670	710	933	.170	.20
June	5,650	622	1,410	.257	.29
July	5,480	540	1,510	.276	.32
August	4,070	850	2,120	.387	.45
September	2,000	500	895	.163	.18

DES MOINES RIVER AT DES MOINES, IOWA

LOCATION.—In sec. 2, T. 78 N., R. 24 W., at Walnut Street Bridge in Des Moines, Polk County, one-fourth mile below dam of Des Moines Electric Co. and one-third mile above mouth of Raccoon River.

DRAINAGE AREA.—6,180 square miles (measured on map issued by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—October 1, 1902, to August 3, 1903; October 1, 1914, to September 30, 1924, at Walnut Street Bridge. May 27, 1905, to July 20, 1906, at Interurban Bridge near Highland Park 5 miles upstream. United States Weather Bureau have maintained a station at or near present site since July 1, 1897.

GAGE.—Friez water-stage recorder at second pier from east abutment of Walnut Street Bridge; installed January, 1912.

DISCHARGE MEASUREMENTS.—Made from one of several bridges near gage.

CHANNEL AND CONTROL.—A low timber dam constructed September, 1913, one-fourth mile below gage, was partly destroyed in 1915, but still forms control at medium stages. Back fill around piers of Court Street Bridge, one block downstream, forms control at extremely low stages. Both may be drowned out depending on stage in Raccoon River. A new mouth to this river, dredged farther downstream in 1914, has somewhat relieved backwater conditions at gage.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 7,570 second-feet, March 31 (stage-discharge relation affected by backwater). Minimum stage, 0.50 foot at 10 p. m. December 31 (discharge, about 25 second-feet).

1915–1924: Maximum discharge, about 41,500 second-feet, June 7, 1918; brief periods of zero flow have occurred since construction of dam above gage.

ICE.—Stage-discharge relation not affected by ice since construction of dam above gage. Numerous bridges below gage occasionally cause ice jams for short periods.

REGULATION.—Considerable diurnal fluctuation during low water is caused by operation of power plant above. Dam is practically drowned out at stage of 22 feet.

ACCURACY.—Stage-discharge relation probably permanent during year. Rating curve well defined above 150 second-feet. Operation of water-stage recorder satisfactory except as explained in footnote to table of daily discharge. Mean daily gage height obtained by inspection of recorder graph. Daily discharge ascertained by applying to rating table mean daily gage height. Records fair.

COOPERATION.—Gage-height records furnished by United States Weather Bureau.

Discharge measurements of Des Moines River at Des Moines, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 5	*6.62	4,690	June 27	*6.10	3,300
Oct. 25	3.20	1,590	June 30	5.70	4,700

* Stage-discharge relation affected by backwater from Raccoon River.

Daily discharge, in second-feet, of Des Moines River at Des Moines, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,360	875	475	35	260	1,640	5,580	1,940	785	5,510	1,520	2,000
2	2,850	875	545	82	415	2,370	4,790	1,940	785	5,330	1,410	1,820
3	4,330	875	415	100	475	3,180	4,640	1,820	785	4,630	1,180	1,580
4	5,050	830	415	110	582	4,970	4,950	1,700	785	4,020	1,080	1,470
5	4,730	785	385	130	305	5,510	5,330	1,520	742	3,460	875	1,290
6	4,240	785	355	130	305	5,510	5,700	1,410	660	2,900	1,080	1,130
7	3,800	785	385	130	305	4,320	5,700	1,300	1,760	2,500	1,410	1,020
8	3,230	742	415	130	355	3,600	5,150	1,180	2,200	2,120	1,470	875
9	3,180	700	545	160	475	3,110	4,630	1,130	2,170	1,880	2,000	975
10	2,760	700	475	205	475	2,630	4,020	1,130	2,100	1,760	3,180	875
11	2,370	700	415	175	475	2,240	3,740	1,080	1,930	1,580	3,460	830
12	2,240	700	415		545	2,120	3,460	1,080	1,730	1,470	3,040	925
13	2,000	620	280		742	2,000	3,180	1,080	1,640	1,300	2,560	875
14	1,820	620	152		1,080	1,820	3,040	1,080	1,520	1,300	2,240	830
15	1,760	620	210		1,180	1,820	3,040	1,080	1,520	1,080	2,120	785
16	1,760	583	330		1,300	1,880	2,900	1,130	1,450	975	1,880	742
17	1,640	583	355		1,640	1,820	2,760	1,080	1,380	975	1,600	785
18	1,520	583	385		1,640	1,760	2,500	975	1,360	875	1,450	742
19	1,410	545	415		1,640	2,000	2,300	975	1,340	785	1,940	660
20	1,350	545	415	130	1,530	1,880	2,120	1,020	1,340	785	1,880	660
21	1,300	545	415		1,400	1,760	2,060	975	1,470	785	2,300	660
22	1,180	545	415		1,300	1,880	2,000	925	1,180	875	3,180	620
23	1,180	545	475		1,200	2,240	1,760	875	1,180	1,080	3,460	545
24	1,080	510	415		1,100	4,320	1,760	875	2,410	1,130	3,740	510
25	1,020	475	415		1,000	5,700	1,640	875	3,230	975	4,020	475
26	975	510	385		900	7,000	1,520	875	2,780	1,130	3,740	875
27	875	545	355		800	7,120	1,640	785	3,280	1,410	3,460	1,180
28	875	510	355		700	6,500	1,760	830	3,420	1,300	3,180	2,000
29	830	545	305	90	875	6,420	1,880	785	4,630	1,240	2,900	1,880
30	975	475	175	90	-------	7,000	1,940	742	5,150	1,410	2,500	1,820
31	925	-------	35	110	-------	7,570	-------	742	-------	1,640	2,120	-------

NOTE.—Stage-discharge relation affected by backwater from Raccoon River Oct. 1–8, Mar. 27 to Apr. 4, June 8–12, 16–20, 24–28, Aug. 17, 18; discharge obtained from auxiliary gage upstream. Gage height missing Jan. 12–28, Feb. 21–27; discharge interpolated. Braced figure shows estimated mean discharge for period indicated.

Monthly discharge of Des Moines at Des Moines, Iowa, for the year ending September 30, 1924

[Drainage area, 6,180 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	5,050	830	2,120	0.343	0.40
November	875	475	642	.104	.12
December	545	35	372	.602	.69
January	205	35	125	.020	.02
February	1,640	260	862	.139	.15
March	7,570	1,640	3,670	.594	.68
April	5,700	1,520	3,250	.526	.59
May	1,940	742	1,130	.183	.21
June	5,150	660	1,890	.306	.34
July	5,510	785	1,880	.304	.35
August	4,020	875	2,320	.375	.43
September	2,000	475	1,050	.170	.19
The year	7,570	35	1,610	.261	4.17

DES MOINES RIVER NEAR TRACY, IOWA

LOCATION.—In sec. 19, T. 75 N., R. 17 W., at highway bridge in Bellefontaine, Mahaska County, near Tracy, Marion County, 3 miles above mouth of Cedar Creek and 6 miles below mouth of English Creek.

DRAINAGE AREA.—12,400 square miles (measured on map issued by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—March 1, 1920, to September 30, 1924. From about April 22 to December 31, 1910, the United States Engineer Corps maintained daily readings at same site.

GAGE.—Chain gage attached to downstream side of bridge near right end of second span from right end of bridge; read by D. M. Coleman. Sea-level elevation of the zero of gage is 671.78 feet.

DRAINAGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Solid rock bottom overlain in places with sand and gravel. Right bank high; left bank subject to overflow at high stages. Low-water control well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.5 feet, 7 p. m. June 27 (discharge, 38,200 second-feet). Minimum discharge probably occurred during January.

Maximum stage since 1851 approximately 25 feet, May 31, 1903 (discharge, estimated 100,000 second-feet).

ICE.—Stage-discharge relation affected by ice during periods of extreme cold weather.

ACCURACY.—Stage-discharge relation fairly permanent. Rating curve well defined between 800 and 40,000 second-feet. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

The following discharge measurements were made:

April 23, 1924: Gage height, 5.22 feet; discharge, 3,720 second-feet.

June 27, 1924: Gage height, 16.28 feet; discharge, 37,500 second-feet.

Daily discharge, in second-feet, of Des Moines River near Tracy, Iowa., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8,600	2,510	1,470	13,700	18,700	3,450	1,640	12,900	2,540	3,790
2	8,600	2,380	1,470	18,400	15,500	3,450	1,640	11,800	2,540	4,330
3	9,560	2,380	1,470	12,600	13,100	3,450	1,640	11,000	2,400	4,520
4	12,000	2,250	1,470	19,400	11,500	3,290	1,530	10,300	2,260	3,290
5	14,000	2,130	1,470	22,700	11,200	3,130	1,530	8,840	2,260	3,130
6	13,400	2,130	1,370	15,200	11,500	2,980	1,640	7,420	2,540	2,830
7	12,300	2,130	1,370	13,100	11,800	2,830	1,640	6,520	2,830	2,540
8	10,800	2,130	1,370	10,300	11,800	2,680	6,100	5,680	3,130	2,540
9	8,600	2,130	1,370	8,600	10,800	2,540	19,400	5,280	4,520	2,260
10	7,190	2,010	1,370	7,190	9,560	2,400	15,200	4,900	4,710	2,000
11	6,100	2,010	1,470	5,890	8,600	2,400	11,200	4,710	5,680	1,880
12	5,690	2,010	1,470	5,280	7,650	2,400	7,880	4,150	6,100	2,000
13	5,300	2,010	1,370	5,190	6,960	2,400	5,890	3,790	5,680	1,880
14	4,920	2,010	1,280	4,710	6,520	2,260	5,280	3,450	5,190	2,130
15	4,560	2,010	1,190	4,330	6,310	2,260	4,710	3,130	4,710	2,000
16	4,210	2,010	1,100	4,150	6,310	2,260	5,680	2,980	4,900	1,880
17	4,210	1,890	1,100	4,150	6,100	2,260	7,190	2,830	4,900	1,760
18	3,870	1,890	1,100	4,330	5,680	2,260	8,840	2,680	5,190	1,760
19	3,710	1,890	1,100	3,970	5,190	2,130	12,300	2,540	4,900	1,640
20	3,710	1,780	1,100	4,330	4,710	2,130	8,120	2,540	4,710	1,640
21	3,550	1,780	1,100	4,150	4,330	2,000	6,740	2,400	4,520	1,640
22	3,390	1,670	1,100	4,150	3,970	1,880	5,680	2,260	4,710	1,530
23	3,080	1,670	1,280	4,150	3,790	1,880	4,710	2,260	5,190	1,420
24	3,080	1,670	1,280	4,710	3,620	1,880	5,680	2,540	5,890	1,420
25	2,930	1,670	1,280	8,120	3,450	1,760	26,600	2,830	11,200	1,320
26	2,790	1,670	1,240	10,800	3,450	1,760	32,500	2,830	9,560	1,320
27	2,650	1,570	1,190	12,600	3,450	1,760	27,500	2,540	7,650	1,320
28	2,650	1,570	1,240	14,600	3,290	1,760	35,500	2,830	6,520	2,260
29	2,650	1,570	1,190	17,400	3,450	1,880	23,100	2,830	5,480	2,540
30	2,510	1,570	1,190	20,400	3,450	1,640	16,800	2,540	4,710	3,290
31	2,510	-------	1,100	21,000	-------	1,640	-------	2,540	4,150	-------

Monthly discharge of Des Moines River near Tracy, Iowa, for the year ending September 30, 1924

[Drainage area, 12,400 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	14,000	2,510	5,910	0.477	0.55
November	2,510	1,570	1,940	.156	.17
December	1,470	1,100	1,280	.103	.12
January	----------	----------	550	.044	.05
February	----------	----------	2,800	.226	.24
March	22,700	3,970	9,990	.806	.93
April	18,700	3,290	7,520	.606	.68
May	3,450	1,640	2,350	.190	.22
June	37,500	1,530	10,800	.871	.97
July	12,900	2,260	4,700	.379	.44
August	11,200	2,260	4,880	.394	.45
September	3,790	1,320	2,260	.182	.20
The year	37,500	----------	4,580	.369	5.02

NOTE.—Mean discharge for January and February estimated by comparison with records of flow at Des Moines and Ottumwa.

DES MOINES RIVER AT OTTUMWA, IOWA

LOCATION.—At Market Street Bridge, Ottumwa, Wapello County. No large tributary enters within several miles.

DRAINAGE AREA.—13,200 square miles (measured on map issued by United States Geological Survey; scale, 1: 500,000).

RECORDS AVAILABLE.—March 28, 1917, to September 30, 1924. Fragmentary high-water observations 1902-1916.

GAGE.—Chain gage attached to downstream handrail of bridge; read by Henry Eilers.

DISCHARGE MEASUREMENTS.—Made from Vine Street Bridge, 1,500 feet below gage.

CHANNEL AND CONTROL.—Channel fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.8 feet at 7 a. m. June 28 (discharge, 37,600 second-feet). Minimum discharge probably occurred in January.

1917-1924: Maximum stage recorded, 16.5 feet June 11, 1917 (discharge, 58,700 second-feet); minimum discharge estimated at less than 350 second-feet during several days in December, 1917 (stage-discharge relation affected by ice).

Maximum discharge since 1850, probably in the last century, occurred May 31, 1903 (discharge, estimated 100,000 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Power plant located a short distance above gage probably produces some diurnal fluctuation at low stages.

ACCURACY.—Stage-discharge relation probably permanent during year; affected by ice January 6 to Feburary 2. Rating curve well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

The following discharge measurements were made:
May 6, 1924: Gage height, 3.06 feet; discharge, 3,550 second-feet.
June 26, 1924: Gage height, 10.77 feet; discharge, 28,800 second-feet.

Daily discharge, in second-feet, of Des Moines River at Ottumwa, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8,840	2,560	1,520	860	800	8,260	20,300	3,440	1,590	15,600	2,560	4,660
2	9,130	2,560	1,520	650	850	7,970	17,400	3,440	1,750	12,800	2,770	4,400
3	9,430	2,560	1,520	650	975	24,500	14,600	3,670	1,750	12,200	2,560	5,440
4	9,730	2,370	1,520	560	975	18,800	12,500	3,440	1,750	11,200	2,560	5,180
5	11,600	2,180	1,370	560	1,100	24,900	11,200	3,440	1,750	10,300	2,370	3,670
6	13,900	2,180	1,370		2,000	22,200	11,200	3,210	2,090	9,130	3,670	3,440
7	13,200	2,180	1,370		1,830	15,200	11,600	3,210	2,280	7,970	3,210	2,980
8	11,900	2,180	1,370		1,670	12,800	11,900	2,770	2,670	6,810	3,210	2,560
9	10,300	2,180	1,370		1,520	10,000	11,200	2,770	14,900	5,980	4,660	2,560
10	8,260	2,180	1,370		1,670	8,550	10,300	2,770	17,700	5,980	5,980	2,560
11	7,100	2,000	1,370		1,670	7,390	9,430	2,770	14,200	5,440	5,440	2,180
12	6,530	2,000	1,520		1,670	6,250	8,550	2,770	10,300	4,920	6,530	2,560
13	5,980	2,180	1,520		1,670	5,710	7,680	2,370	7,390	4,400	6,530	2,560
14	5,710	2,180	1,370		2,980	5,440	7,100	2,370	6,250	3,910	6,530	2,560
15	5,180	2,180	1,370		7,970	4,920	6,530	2,370	6,250	3,670	5,980	2,370
16	5,180	2,000	1,370		7,680	4,660	6,530	2,370	5,710	3,440	5,440	2,180
17	4,920	2,000	1,230		5,980	4,400	6,810	2,370	6,810	3,210	5,710	2,180
18	4,660	2,000	1,100		5,440	4,400	6,530	2,370	8,550	2,980	5,440	2,000
19	4,150	2,000	1,100	650	4,660	4,400	5,710	2,370	11,600	2,980	5,440	1,830
20	3,910	1,830	1,100		4,400	4,400	5,180	2,280	11,600	2,560	5,440	1,830
21	3,670	1,830	1,370		5,440	4,660	4,920	2,280	8,550	2,560	5,180	1,830
22	3,670	1,830	1,370		4,400	4,150	4,400	2,090	7,390	2,560	4,920	1,830
23	3,440	1,830	1,370		2,560	4,150	4,150	2,090	6,810	2,370	5,180	1,670
24	3,210	1,830	1,370		2,560	4,150	3,910	1,920	6,810	2,770	6,530	1,670
25	3,210	1,830	1,370		3,210	5,180	3,670	1,920	19,900	2,770	7,970	1,670
26	3,210	1,670	1,370		2,980	9,430	3,670	1,920	28,000	3,670	10,900	1,520
27	2,980	1,670	1,370		2,770	11,600	3,440	1,920	35,300	2,980	10,900	1,520
28	2,770	1,670	1,230		2,370	13,500	3,440	1,920	37,600	2,980	7,970	1,520
29	2,770	1,670	1,230		2,560	19,600	3,440	1,920	36,700	2,980	6,810	2,770
30	2,560	1,670	1,230		-------	19,600	3,440	1,920	21,100	2,770	5,980	3,440
31	2,560	-------	1,230		-------	21,100	--------	1,920	--------	2,560	5,180	-------

Monthly discharge of Des Moines River at Ottumwa, Iowa, for the year ending September 30, 1924

[Drainage area, 13,200 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	13,900	2,560	6,250	0.473	0.55
November	2,560	1,670	2,030	.154	.17
December	1,520	1,230	1,350	.102	.12
January	860	----------	651	.049	.06
February	7,970	800	2,980	.226	.24
March	24,900	4,150	10,400	.788	.91
April	20,300	3,440	8,020	.608	.68
May	3,670	1,920	2,530	.192	.22
June	37,600	1,590	11,500	.871	.97
July	15,600	2,560	5,370	.407	.47
August	10,900	2,370	5,470	.414	.48
September	5,440	1,520	2,640	.200	.22
The year	37,600	----------	4,930	.374	5.09

DES MOINES RIVER AT KEOSAUQUA, IOWA

LOCATION.—In sec. 36, T. 69 N., R. 10 W., at county bridge in Keosauqua, Van Buren County, one-fourth mile above old dam site and Government locks. No important tributary enters for several miles.

DRAINAGE AREA.—13,900 square miles (measured on map issued by United States Geological Survey; scale, 1: 500,000).

RECORDS AVAILABLE.—May 29, 1903, to July 21, 1906; April 5 to December 31, 1910 (United States Engineer Corps); August 3, 1911, to September 30, 1924.

GAGE.—Chain gage attached to upstream handrail of bridge; read by Frank Schreckengast.

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

CHANNEL AND CONTROL.—Channel shifts considerably at flood stages. Control is a gravel riffle one-fourth mile below gage.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 41,800 second-feet June 28 (by current-meter measurement); minimum discharge, estimated, 400 second-feet January 3 (stage-discharge relation affected by ice).

1903–1906; 1910–1924: Maximum stage recorded, 27.85 feet, June 1, 1903 (discharge, about 97,000 second-feet); minimum stage, 0.0 foot August 28 to September 6, 1911 (discharge, 160 second-feet).

Flood of June 1, 1851, reached a stage of about 24 feet (discharge, estimated 80,000 second-feet).

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

ACCURACY.—Stage-discharge relation for low water probably changed during flood latter part of June. Rating curves fairly well defined. Gage read to half-tenths once daily except Sundays and during winter. Daily discharge obtained by applying daily gage height to rating table except during periods December 14–17, January 1 to February 15, March 2 and 3, when stage-discharge relation was affected by ice. Discharge for these periods estimated by comparison with flow at Ottumwa, observer's notes, one discharge measurement, and climatological records. Records fair.

COOPERATION.—A large part of base data and records of daily discharge furnished by Mississippi River Power Co., Keokuk, Iowa.

Discharge measurements of Des Moines River at Keosauqua, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 5	4.85	11,400	Jan. 23	[a] 0.96	727	June 28	12.64	41,800
Dec. 1	1.01	1,620	May 16	1.80	3,390	July 14	2.01	4,140

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Des Moines River at Keosauqua, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7,210	2,680	1,800	650	900	5,540	21,800	3,730	1,700	16,900	2,720	4,620
2	9,520	2,680	1,700	450	900	12,000	19,500	3,970	1,400	14,000	2,950	4,130
3	8,940	2,560	1,600	400	900	16,500	16,900	3,970	1,910	12,800	2,780	4,380
4	9,520	2,510	1,600	450	900	19,100	14,400	3,730	1,600	11,900	2,610	5,140
5	11,600	2,460	1,500	400	900	24,800	12,500	3,490	1,700	11,000	2,610	4,380
6	13,700	2,460	1,400	450	900	24,800	12,500	3,490	4,480	9,560	7,860	2,950
7	13,700	2,340	1,500	450	950	18,200	12,500	3,490	2,680	8,420	4,620	3,300
8	13,100	2,340	1,500	500	950	15,000	12,500	3,020	7,210	7,300	3,420	3,650
9	11,300	2,240	1,450	600	1,000	12,400	12,500	3,020	6,650	6,480	8,140	3,650
10	9,540	2,240	1,400	600	1,000	9,810	11,300	2,900	19,500	5,930	7,200	3,080
11	7,780	2,130	1,310	700	1,200	8,360	10,700	2,790	15,600	5,140	5,660	2,500
12	6,930	2,020	1,400	800	1,500	7,210	9,520	2,560	12,500	4,620	6,200	3,060
13	6,650	2,020	1,700	950	2,000	6,650	8,800	2,680	9,520	4,380	6,750	3,650
14	6,100	2,120	1,350	1,100	3,000	6,090	8,070	2,680	6,650	4,130	6,750	3,180
15	5,540	2,120	1,650	1,000	4,500	5,540	7,210	2,460	6,370	3,890	5,660	2,720
16	5,000	2,120	1,400	850	8,650	5,270	7,210	2,560	6,090	3,650	5,140	2,500
17	5,000	2,020	1,020	800	8,000	5,000	7,210	2,460	5,540	3,180	5,400	2,280
18	4,480	2,020	1,040	800	7,210	5,000	6,930	2,460	10,400	3,060	5,400	2,280
19	4,480	2,020	805	800	6,380	5,000	6,650	2,340	8,650	4,620	5,140	1,960
20	3,490	1,910	960	700	5,540	4,740	6,100	2,340	13,700	3,420	5,660	2,280
21	3,730	1,910	1,040	700	6,000	4,480	5,540	2,240	9,810	2,610	5,140	2,170
22	3,970	1,800	1,310	700	5,810	5,000	4,480	2,240	8,510	2,840	4,620	2,060
23	3,730	1,910	1,310	700	3,730	4,870	4,740	2,240	7,210	2,500	4,620	1,850
24	3,490	1,910	1,310	700	3,850	4,740	4,480	2,120	6,090	2,390	9,500	1,960
25	3,490	1,910	1,310	700	3,970	5,000	4,220	2,070	22,800	4,620	7,860	1,850
26	3,250	1,910	1,220	700	3,970	7,780	3,970	2,020	28,300	2,950	10,700	1,640
27	3,020	1,910	1,130	700	3,490	8,940	3,970	1,960	32,200	3,060	10,100	1,350
28	2,900	1,800	1,310	750	3,490	13,100	3,970	1,910	40,000	2,840	8,420	1,550
29	2,790	1,800	1,220	800	4,480	20,100	3,730	1,910	37,000	2,720	7,300	1,750
30	2,790	1,800	1,180	850	-------	22,800	3,730	1,800	28,300	5,660	5,660	2,720
31	2,680	-------	1,130	900	-------	21,400	-------	1,700	-------	3,060	5,140	-------

Monthly discharge of Des Moines River at Keosauqua, Iowa, for the year ending September 30, 1924

[Drainage area, 13,900 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	13,700	2,680	6,430	0.463	0.53
November	2,680	1,800	2,120	.153	.17
December	1,800	805	1,340	.096	.11
January	1,100	400	698	.050	.06
February	8,650	900	3,310	.238	.26
March	24,800	4,480	10,800	.777	.90
April	21,800	3,730	8,920	.642	.72
May	3,970	1,700	2,660	.191	.22
June	40,000	1,400	12,100	.871	.97
July	16,900	2,390	5,800	.417	.48
August	10,700	2,610	5,860	.422	.49
September	5,140	1,350	2,820	.203	.23
The year	40,000	400	5,240	.377	5.14

RACCOON RIVER AT VAN METER, IOWA

LOCATION.—In SW. ¼ sec. 22, T. 78 N., R. 27 W., at highway bridge one-third mile from railroad station, Van Meter, Dallas County, 1 mile below junction of North and South Raccoon Rivers, and 30 miles above junction of Raccoon and Des Moines Rivers.

DRAINAGE AREA.—3,410 square miles (measured on map issued by United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—April 25, 1915, to September 30, 1924.

GAGE.—Gurley 7-day water-stage recorder; installed May 31, 1923; read by Cal Smith.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; subject to change. River divided into two channels at low and medium stages by an island. Right bank high; left bank subject to overflow at a stage of 13 feet. At extremely high stage this overflow will extend for several hundred feet beyond left end of bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.23 feet at 1 a. m. June 25 (discharge, 20,100 second-feet); minimum discharge probably occurred during winter.

1915–1924: Maximum stage recorded, 17.5 feet June 7, 1917 (discharge, 31,800 second-feet); minimum stage, 1.56 feet, October 22, 1918 (discharge, estimated 28 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined below 15,000 second-feet. Operation of water-stage recorder satisfactory. Mean daily gage height obtained by inspection of recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table except as explained in footnote to table of daily discharge. Records good.

Discharge measurements of Raccoon River at Van Meter, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 6	10.23	8,200	Apr. 25	4.28	1,370	Sept. 9	3.68	822
Apr. 12	5.77	2,460	Sept. 5	4.14	1,200			

Daily discharge, in second-feet, of Raccoon River at Van Meter, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	6,390	1,340	755	6,000	7,340	1,420	755	4,430	890	1,180
2	7,540	1,340	755	8,880	6,200	1,340	755	4,550	820	1,180
3	7,930	1,340	755	6,020	5,090	1,340	755	4,070	1,180	1,140
4	9,470	1,260	755	4,790	4,850	1,260	755	3,380	1,500	1,140
5	9,020	1,180	755	5,390	4,850	1,180	755	2,850	1,030	1,260
6	7,930	1,260	755	5,270	4,730	1,180	755	2,450	1,030	1,030
7	6,140	1,180	755	4,790	4,350	1,100	2,650	2,250	1,500	970
8	4,790	1,180	755	3,830	3,980	1,100	9,320	1,960	2,350	910
9	4,190	1,100	755	3,050	3,610	1,030	5,640	1,780	2,450	855
10	3,710	1,100	755	2,750	3,240	1,030	4,550	1,680	2,750	788
11	3,380	1,100	690	2,450	2,870	1,030	3,490	1,500	2,750	755
12	3,050	1,030	690	2,250	2,500	1,030	3,270	1,420	2,650	855
13	2,850	1,030	630	2,060	2,350	960	2,650	1,340	2,650	788
14	2,650	1,030	630	2,060	2,600	960	2,250	1,260	3,600	722
15	2,450	1,030	630	2,060	2,650	925	4,070	1,100	3,600	722
16	2,350	1,030	570	2,060	2,400	890	3,490	995	4,190	690
17	2,350	995	570	2,060	2,350	890	5,520	890	4,070	755
18	2,350	995	570	2,060	2,110	855	4,670	820	3,710	630
19	2,250	960	570	1,870	2,060	820	3,270	820	3,380	630
20	2,160	960	630	1,870	1,960	755	2,750	820	3,050	630
21	2,060	960	630	1,870	1,870	712	2,550	820	2,550	600
22	1,870	925	630	2,350	1,680	690	2,250	855	2,250	570
23	1,780	890	570	3,830	1,680	660	1,960	1,500	2,060	540
24	1,680	890	570	5,390	1,590	690	13,500	2,060	3,050	540
25	1,680	890	570	5,390	1,420	690	16,300	1,500	3,050	485

Daily discharge, in second-feet, of Raccoon River at Van Meter, Iowa, for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
26	1,590	890	510	6,390	1,420	750	9,320	1,680	2,950	485
27	1,260	855	510	7,150	1,500	712	7,540	1,500	2,450	485
28	1,500	820	510	7,670	1,420	712	6,020	1,260	1,960	3,000
29	1,420	788	510	9,100	1,420	712	5,030	1,100	1,680	1,550
30	1,420	755	300	8,670	1,420	755	4,430	1,030	1,500	1,140
31	1,340	-------	200	7,860	-------	755	-------	960	1,340	-------

NOTE.—Discharge Mar. 26 to Apr. 18 and Sept. 3–30 determined by shifting-control method; for June 24 by averaging bihourly discharges. Discharge Mar. 1 estimated.

Monthly discharge of Raccoon River at Van Meter, Iowa, for the year ending September 30, 1924

[Drainage area, 3,410 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	9,470	1,260	3,570	1.05	1.21
November	1,340	755	1,040	.305	.34
December	755	200	621	.182	.21
March	9,100	1,870	4,430	1.30	1.50
April	7,340	1,420	2,920	.856	.96
May	1,420	712	933	.274	.32
June	16,300	755	4,370	1.28	1.43
July	4,550	820	1,760	.516	.59
August	4,190	820	2,380	.698	.80
September	3,000	485	901	.264	.29

SUGAR CREEK NEAR KEOKUK, IOWA

LOCATION.—In sec. 7, T. 65 N., R. 5 W., at single-span highway bridge 6 miles northwest of Keokuk, Lee County, on road to Argyle, and 3½ miles above mouth.

DRAINAGE AREA.—113 square miles (measured on county topographic map; scale, 1 inch=2 miles).

RECORDS AVAILABLE.—March 29, 1922, to September 30, 1924.

GAGE.—Gurley 7-day water-stage recorder attached to right abutment of bridge; installed June 25, 1923; read by Mrs. J. B. Williams.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand; shifting. Left bank is overflowed at high stages. A heavy timber and riprap construction 100 feet below gage acts as low-water control; permanent. Elevation of lowest part of control 1.01 feet referred to gage datum. There is slight leakage through control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.81 feet at 11 a. m. August 7 (discharge, 2,400 second-feet). Creek dry during parts of October, November, and December.

Maximum known stage, about 20.6 feet June 9, 1905 (discharge, about 15,000 second-feet). This flood was caused by the same historic storm which passed over the adjoining drainage area of Devil's Creek and caused the destructive flood in that stream.

ACCURACY.—Stage-discharge relation permanent. Affected by ice during winter. Rating curve well defined below 300 second-feet and fairly well defined above. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Sugar Creek near Keokuk, Iowa, during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 9	0.84	0.2	May 27	1.11	0.48	June 26	2.94	236
Mar. 22	1.62	12.6	June 6	2.52	168	Aug. 7	9.44	2,230
Apr. 4	1.68	15.9	Do	2.37	129	Sept. 24	1.18	1.04
Apr. 24	1.28	1.95	June 25	6.21	981			

Daily discharge, in second-feet, of Sugar Creek near Keokuk, Iowa, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5.8	0.0	1.6	182	33	5.3	0.8	33	34	34
2	1.0	.0	2.0	84	21	2.0	.5	20	18	26
3	2.6	.0	.8	142	20	2.2	.4	14	11	8.7
4	2.6	.0	.7	152	17	1.3	.6	11	7.5	10
5	1.7	.0	.5	37	12	1.3	318	9.2	39	5.3
6	1.4	.0	.2	32	14	.8	233	7.9	1,360	3.7
7	1.0	.0	.3	18	9.2	.8	72	8.3	1,880	3.0
8	.5	.0	.4	11	9.2	.9	114	6.6	569	4.0
9	.4	.0	.2	11	10	.9	114	8.3	569	2.4
10	.0	.0	.0	4.0	12	.8	56	20	152	2.2
11	.0	.0	.0	6.6	9.2	.8	20	20	62	2.0
12	.0	.0	.2	7.5	6.2	.7	14	12	33	2.9
13	.0	.0	6.2	8.3	5.1	.7	9.6	7.9	25	2.9
14	.0	.0	.6	5.3	4.2	.7	5.8	5.3	19	1.7
15	.0	.0	.5	5.3	3.4	.7	11	3.4	15	1.7
16	.0	.0	.4	4.6	3.4	.6	133	4.2	23	2.0
17	.0	.0	.3	4.6	4.2	.8	16	26	14	1.7
18	.2	.0	.3	5.6	3.0	3.0	20	12	15	1.7
19	.2	.0	.7	4.4	2.6	1.0	11	99	11	1.9
20	.0	.0	.9	5.6	2.0	.7	6.2	233	11	2.6
21	.0	.0	.4	7.9	3.4	.7	4.2	40	8.3	1.8
22	.0	.0	1.6	12	2.0	.5	2.9	84	7.9	1.4
23	.0	.5	5.1	11	2.0	1.1	5.8	33	5.6	1.2
24	.0	.4	1.3	10	1.8	1.1	56	593	11	1.0
25	.0	.2	1.0	26	2.3	.8	820	692	11	1.0
26	.0	.1	1.0	47	5.8	.7	318	87	6.6	.7
27	.0	.0	1.2	37	3.2	.6	47	33	4.6	.8
28	.0	.0	.8	19	2.4	.5	820	17	4.2	1.2
29	.0	.0	1.2	406	1.7	3.2	768	12	3.5	.9
30	.0	.9	1.2	318	2.6	2.4	76	12	3.4	.8
31	.0	-------	.4	152	-------	1.3	-------	108	2.8	-------

NOTE.—Stage-discharge relation affected by ice during parts of December and also on Mar. 10. Record discontinued during January and February, when discharge relation was seriously affected by ice.

Monthly discharge of Sugar Creek near Keokuk, Iowa, for the year ending September 30, 1924

[Drainage area, 113 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	5.8	0	0.56	----------	----------
November	.9	0	.07	----------	----------
December	6.2	0	1.03	0.009	0.01
March	406	4.0	57.3	.507	.58
April	33	1.7	7.60	.067	.07
May	5.3	.5	1.25	.011	.01
June	820	.4	136	1.20	1.34
July	692	3.4	73.3	.649	.75
August	1,880	2.8	159	1.41	1.63
September	34	.7	4.37	.039	.04

FOX RIVER NEAR WAYLAND, MO.

LOCATION.—In NE. ¼ sec. 25, T. 65 N., R. 7 W., at highway bridge 1 mile above Chicago, Burlington & Quincy Railroad bridge, 2½ miles northwest of Wayland, Clark County, and 3 miles below Brush Creek.

DRAINAGE AREA.—392 square miles (measured on map of Iowa, scale, 1:500,000, and on topographic maps.)

RECORDS AVAILABLE.—February 22, 1922, to September 30, 1924.

GAGE.—Chain gage bolted to handrail on upstream side of bridge; read by Loren Smith.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of clean sand; shifting. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.32 feet August 6, 7, and 9 (discharge, 3,250 second-feet); minimum stage, 1.98 feet at 7 a. m. November 7 (discharge, 0.6 second-foot).

1922–1924: Maximum and minimum stages and discharges same as given above.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; seriously affected by ice during winter. Rating curve well defined between 80 and 2,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by indirect method for shifting control except as noted in footnote to table of daily discharge. Open-water records good for medium and high stages and fair for low stages. Records poor for periods of ice effect.

Discharge measurements of Fox River near Wayland, Mo., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 9	2.48	18	Mar. 31	8.37	1,460	Aug. 12	4.19	25
Feb. 20	[a] 4.65	140	May 12	2.23	11			

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Fox River near Wayland, Mo., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	230	4.1	8	16	442	810	358	20	10	128	158	27
2	100	2.9	10	16	330	1,140	230	19	10	100	121	45
3	67	2.9	14	16	284	780	181	21	7	93	55	38
4	46	3.8	19	9	247	810	150	15	32	65	18	36
5	27	3.8	21	9	213	810	121	16	498	59	22	20
6	16	3.5	20	9	197	414	121	12	1,940	43	2,260	17
7	10	1.1	22	9	181	213	114	12	840	37	3,030	35
8	8	1.9	24	16	165	150	100	10	722	34	1,230	25
9	6	1.9	16	25	150	121	93	10	2,330	31	2,990	30
10	4.4	1.8	15	205	150	76	73	9	1,230	142	2,020	20
11	4.7	1.7	15	165	150	86	56	9	264	100	1,110	20
12	3.5	1.7	28	121	165	78	48	10	158	58	230	20
13	4.4	1.6	78	107	165	70	46	12	181	11	128	70
14	3.2	1.5	37	93	181	76	46	10	100	20	107	100
15	2.9	1.9	50	80	181	76	49	9	100	18	86	56
16	5	1.8	74	68	165	66	52	8	158	24	93	42
17	8	1.7	68	57	150	65	52	8	158	27	86	28
18	10	2.6	49	46	150	62	45	12	358	25	70	21
19	6	2.3	35	46	135	61	45	11	386	870	58	20
20	12	3.2	38	46	135	68	43	8	181	900	57	15
21	11	2.9	28	35	135	93	40	7	80	386	46	36
22	7	2.6	26	35	135	100	33	9	63	247	43	34
23	4.7	8	135	35	135	93	29	10	43	213	33	24
24	5	9	107	46	135	86	31	12	35	442	40	24
25	4.1	8	86	181	135	121	26	10	1,080	694	45	19
26	3.8	5	74	150	135	414	28	8	2,580	442	78	14
27	3.5	4.7	56	165	150	284	30	9	1,460	150	107	13
28	2.9	4.1	44	213	181	189	35	7	1,200	78	146	16
29	3.2	4.4	30	358	230	2,120	27	13	1,460	16	32	7
30	3.5	7	26	414	-------	2,700	22	16	306	16	52	11
31	3.8	-------	25	470	-------	1,350	-------	13	-------	17	86	-------

NOTE.—Stage-discharge relation affected by ice Jan. 1–8, 14–31, and Feb. 1–29; daily discharge 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. Discharge interpolated July 30; gage reading probably in error.

Monthly discharge of Fox River near Wayland, Mo., for the year ending September 30, 1924

[Drainage area, 392 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	230	2.9	20.2	0.052	0.06
November	9	1.1	3.45	.009	.01
December	135	8	41.2	.105	.12
January	470	9	105	.268	.31
February	442	135	183	.467	.50
March	2,700	61	438	1.12	1.29
April	358	22	77.5	.198	.22
May	21	7	11.5	.029	.03
June	2,580	7	599	1.53	1.71
July	900	11	177	.452	.52
August	3,030	18	469	1.20	1.38
September	100	7	29.4	.075	.08
The year	3,030	1.1	180	.459	6.23

WYACONDA RIVER NEAR CANTON, MO.

LOCATION.—In SE. ¼ SW. ¼ sec. 33, T. 62 N., R. 6 W., at highway bridge on south road from Canton to Monticello, three-fourths mile below Sugar Creek, 2 miles below north road highway bridge, 3 miles southwest of Canton, Lewis County, and 15 miles above mouth.

DRAINAGE AREA.—447 square miles (measured on map of Iowa, scale, 1:500,000 and on topographic maps).

RECORDS AVAILABLE.—February 20, 1922, to September 30, 1924.

GAGE.—Chain gage bolted to wooden beam between vertical members on upstream side of bridge; read by Fred Schroeder.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and mud; free from vegetation; shifting. No well-defined control. Banks wooded near edge and cultivated beyond; left bank subject to overflow at extreme high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.26 feet at 6 a. m. June 27 (discharge, 3,520 second-feet); minimum discharge, 0.5 second-foot January 8–9 and 19–23 (stage-discharge relation affected by ice).

1922–1924: Maximum and minimum stages and discharges same as given above.

ACCURACY.—Stage-discharge relation for low water changed during high water in March; seriously affected by ice during winter. Rating curve used until March 31 fairly well defined above 20 second-feet; curve used after that date fairly well defined. Gage read to hundredths once or twice daily Daily discharge ascertained by applying mean daily gage height to rating table except as described in footnote to table of daily discharge. Records good for medium and high stages; poor for very low stages and for periods of ice effect.

Discharge measurements of Wyaconda River near Canton, Mo., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 8	1.69	52	Mar. 31	9.25	2,180	June 27	12.01	3,440
Feb. 22	a 2.50	85	Apr. 1	3.96	525	Aug. 12	3.12	327
Mar. 30	9.78	2,570	May 12	1.14	11			

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Wyaconda River near Canton, Mo., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,430	7	44	13	241	1,270	390	38	29	138	740	27
2	2,270	7	68	12	199	1,620	390	33	23	96	680	25
3	415	7	106	5	164	620	365	35	17	90	166	17
4	390	8	156	2	147	1,130	152	33	12	82	166	17
5	265	6	103	2	114	830	152	33	53	53	138	17
6	82	7	88	1	98	590	124	21	1,070	35	515	15
7	22	6	66	1	82	290	117	21	710	33	1,720	15
8	16	5	49	.5	82	164	117	19	800	29	2,110	15
9	11	2.9	41	.5	82	147	166	17	1,620	25	1,800	19
10	9	2.9	31	1	82	147	131	15	1,620	27	2,550	90

Daily discharge, in second-feet, of Wyaconda River near Canton, Mo., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
11	10	2.6	32	5	98	98	124	15	340	35	3,070	38
12	10	3.2	28	5	98	138	70	12	31	60	327	35
13	13	2.6	465	2	114	130	67	12	117	65	218	315
14	37	1.9	710	2	164	138	71	11	110	62	110	209
15	45	2.3	315	2	800	98	60	11	96	60	72	17
16	56	2.6	130	1	830	92	60	8	124	38	58	15
17	55	2.3	78	1	800	88	58	8	131	33	38	14
18	44	2.9	74	1	710	85	58	9	490	740	29	11
19	49	3.5	80	.5	680	82	55	11	315	1,040	27	11
20	70	2.9	84	.5	98	101	48	9	174	1,830	25	14
21	42	2.9	87	.5	98	122	47	8	103	515	23	12
22	41	2.9	109	.5	98	130	38	8	65	340	19	15
23	11	11	770	.5	98	98	33	8	48	182	19	17
24	10	30	650	1	114	164	31	8	47	182	96	14
25	7	28	340	2	114	147	27	14	3,150	182	40	11
26	6	20	199	12	114	620	29	14	3,270	138	138	9
27	5	11	147	64	114	620	35	11	3,390	110	15	11
28	4	22	96	241	114	650	42	9	1,580	77	12	8
29	6	27	82	302	114	1,970	40	48	710	72	12	8
30	7	27	60	340	-------	2,550	40	96	219	70	11	5
31	6	-------	46	490	-------	2,510	-------	68	-------	265	38	-------

NOTE.—Stage-discharge relation affected by ice Jan. 2–26 and Feb. 3–29; daily discharge ascertained by applying to rating table mean daily gage height corrected for ice effect by means of one discharge measurement, observer's notes, and weather records. Discharge interpolated Aug. 13.

Monthly discharge of Wyaconda River near Canton, Mo., for the year ending September 30, 1924

[Drainage area, 447 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,430	4	208	0.465	0.54
November	30	1.9	8.91	.020	.02
December	770	28	172	.385	.44
January	490	.5	48.8	.109	.13
February	830	98	230	.515	.56
March	2,550	82	563	1.26	1.45
April	390	27	105	.235	.26
May	96	8	21.4	.048	.06
June	3,390	12	682	1.53	1.71
July	1,830	25	216	.483	.56
August	3,070	11	483	1.08	1.24
September	315	5	34.9	.078	.09
The year	3,390	.5	231	.517	7.06

NORTH FABIUS RIVER AT MONTICELLO, MO.

LOCATION.—In SE. ¼ sec. 6, T. 61 N., R. 7 W., at highway bridge 1 mile south of Monticello, Lewis County, and 22 miles above confluence with Middle Fabius River.

DRAINAGE AREA.—452 square miles (measured on State base maps, scale, 1: 500,000, and on topographic maps).

RECORDS AVAILABLE.—February 18, 1922, to September 30, 1924.

GAGE.—Chain gage fastened to upstream side of bridge; read by Floyd Nelson.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of rock, sand, and silt; shifts occasionally. Control is a coarse gravel bar 1½ miles below gage; clean and fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, determined from floodmarks, 22.9 feet June 26 (discharge by extension of rating curve, 6,370 second-feet; minimum stage, 0.68 foot at 3.45 p. m. November 17 (discharge, 4 second-feet).

1922–1924: Maximum stage recorded that as given above; minimum stage, 0.52 foot July 9, 1922 (discharge, 1 second-foot).

ACCURACY.—Stage-discharge relation for low water probably changed during high water in March; affected by ice during winter. Rating curves fairly well defined below 4,000 second-feet. Gage read to hundredths once or twice daily; readings unreliable before May 20. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to table of daily discharge. Records poor until May 20 and fair afterwards.

Discharge measurements of North Fabius River at Monticello, Mo., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 8	1.83	99	Mar. 31	5.51	750	June 27	15.95	[c] 3,450
Feb. 21	[a] 2.73	96	Do	5.20	666	Aug. 12	2.52	194
Mar. 30	15.15	[b] 3,160	May 12	1.14	18			

[a] Stage-discharge relation affected by ice.
[b] Made during rapidly falling stage; computed discharge, 3,410 second-feet.
[c] Made during rapidly falling stage; computed discharge, 3,730 second-feet.

Daily discharge, in second-feet, of North Fabius River at Monticello, Mo., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	76	26	182	92	253	1,240	343	16	30	133	110	37
2	65	23	136	76	238	719	283	12	20	110	75	40
3	55	18	122	72	224	656	238	9	14	96	37	32
4	48	16	110	57	224	635	193	23	14	78	27	19
5	57	17	116	47	210	595	178	34	41	59	19	14
6	55	14	155	37	182	396	156	28	806	43	1,040	12
7	49	17	126	27	155	298	126	22	268	37	896	9
8	44	28	98	27	142	253	156	17	942	36	1,560	73
9	42	22	79	27	129	253	133	14	2,640	36	3,030	223
10	40	17	59	37	116	253	110	19	515	96	3,960	56
11	48	16	40	27	104	268	88	25	313	238	806	27
12	48	13	210	27	92	253	79	22	140	65	170	896
13	44	12	1,240	18	92	210	74	20	435	41	126	328
14	39	8	677	12	92	136	62	17	170	30	70	96
15	34	6	415	12	80	104	59	14	96	22	56	50
16	48	5	396	7	80	78	73	22	223	20	54	34
17	148	4	378	7	80	66	61	15	96	20	73	22
18	142	6	360	7	80	78	41	16	475	298	50	20
19	129	7	343	7	92	98	31	29	283	1,140	39	50
20	116	5	313	7	92	104	22	19	148	1,340	34	25
21	110	5	298	7	92	155	17	14	110	455	26	27
22	104	23	253	7	104	189	19	11	63	328	23	25
23	92	86	238	12	116	116	43	12	43	223	20	22
24	86	72	224	18	129	110	41	20	45	359	268	20
25	80	68	210	52	129	784	31	23	4,370	495	740	16
26	73	59	210	136	189	1,140	22	22	6,370	253	148	15
27	59	52	189	268	475	360	25	15	1,450	96	96	9
28	44	64	168	268	1,110	475	48	13	656	52	45	9
29	40	168	136	283	2,230	3,340	30	43	435	35	30	8
30	36	268	116	298	-------	3,870	22	74	178	118	23	9
31	32	-------	104	283	-------	615	-------	39	-------	283	19	-------

NOTE.—Daily discharge Dec. 7–11 estimated from one discharge measurement. Stage-discharge relation affected by ice Jan. 4–24 and Feb. 6–25; daily discharge ascertained by applying to rating table daily gage height corrected for ice effect by means of one discharge measurement, observer's notes, and weather records.

Monthly discharge of North Fabius River at Monticello, Mo., for the year ending September 30, 1924

[Drainage area, 452 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	148	32	67.2	0.149	0.17
November	268	4	38.2	.085	.09
December	1,240	40	248	.549	.63
January	298	7	73	.162	.19
February	2,230	80	253	.560	.60
March	3,870	66	576	1.27	1.46
April	343	17	93.5	2.07	.23
May	74	9	21.9	.048	.06
June	6,370	14	713	1.58	1.76
July	1,340	20	214	.473	.55
August	3,960	19	441	.976	1.13
September	896	8	74.1	.164	.18
The year	6,370	4	234	.518	7.05

SALT RIVER NEAR NEW LONDON, MO.

LOCATION.—In NE. ¼ NW. ¼ sec. 36, T. 56 N., R. 5 W., at bridge on State highway No. 8, 1¼ miles below Turkey Creek and 2 miles north of New London, Ralls County.

DRAINAGE AREA.—2,480 square miles (measured on topographic and United States soil survey maps).

RECORDS AVAILABLE.—February 16, 1922, to September 30, 1924.

GAGE.—Chain gage bolted to handrail on upstream side of bridge; read by Wilson Mosley.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and silt; clean and fairly permanent. Control is a gravel bar 200 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.21 feet at 6 p. m. June 13 (discharge, 13,700 second-feet); minimum discharge, 28 second-feet September 26–27.

1922–1924: Maximum stage recorded, 24.15 feet at 5 p. m. March 16, 1922 (discharge, 39,800 second-feet); minimum discharge estimated at 12 second-feet August 20, 1922.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice for short periods. Rating curves fairly well defined above 30 second-feet. Gage read to hundredths twice daily; readings rather unreliable for 1922 and part of 1923. Daily discharge ascertained by applying mean daily gage height to rating table except as described in footnote to table of daily discharge. Records of discharge above 30 second-feet are fair for 1922 and 1923 and good for 1924; those below 30 second-feet are poor for 1922 and 1923 and fair for 1924.

Discharge measurements of Salt River near New London, Mo., during the years ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 7	3.12	578	Mar. 31	10.79	8,590	Aug. 13	3.10	577
Feb. 16	4.40	1,540	May 11	2.53	227			

Daily discharge, in second-feet, of Salt River near New London, Mo., for the years ending September 30, 1922–1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922												
1						665	16,700	595	443	29	57	34
2						630	7,330	560	400	39	54	32
3						595	3,090	560	358	54	56	208
4						406	3,890	476	286	40	196	476
5						394	8,170	400	232	37	68	488
6						358	13,400	840	185	34	50	226
7						340	11,400	2,900	145	35	68	125
8						770	18,200	1,530	121	36	51	99
9						1,450	21,400	910	112	39	39	84
10						1,290	16,700	528	102	46	38	2,040
11						2,990	10,800	700	88	68	37	6,790
12						4,090	5,900	560	70	476	31	5,070
13						3,290	3,790	370	54	2,290	24	2,290
14						17,400	8,450	346	36	4,090	22	1,140
15						30,400	16,000	132	33	3,990	21	630
16					121	38,800	8,450	145	31	3,790	18	430
17					99	21,600	13,400	180	28	3,090	16	328
18					86	6,790	22,200	140	26	1,780	16	238
19					89	3,690	13,700	125	25	665	14	140
20					86	2,380	4,410	113	24	1,450	12	175
21					84	2,540	2,460	102	24	1,530	22	370
22					125	2,200	1,530	94	26	1,140	59	436
23					770	1,700	1,210	97	27	595	298	488
24					2,200	1,860	985	113	28	358	560	364
25					2,380	3,690	985	106	20	268	436	226
26					1,780	14,000	1,610	346	14	190	262	129
27					1,370	13,700	1,860	1,060	17	150	113	86
28					985	7,610	1,140	1,370	32	125	94	63
29						7,190	985	1,210	33	99	63	54
30						10,300	805	948	29	66	42	44
31						17,400		770		63	35	
1922–23												
1	38	24	46	31	38	27	188	188	250	700	22	76
2	37	48	41	29	39	29	168	211	1,450	430	17	86
3	36	41	38	28	41	29	138	184	840	400	17	86
4	34	32	33	28	42	38	100	157	700	340	18	70
5	33	30	31	26	32	37	6,140	118	560	3,790	18	78
6	132	36	30	26	32	57	2,900	95	495	2,900	250	65
7	1,370	56	28	26	32	70	1,950	92	424	2,460	57	207
8	1,060	121	26	30	32	316	1,140	88	328	2,040	216	115
9	770	190	25	33	32	394	700	84	207	1,610	364	188
10	418	102	25	35	42	316	400	81	180	1,210	665	358
11	102	280	25	35	41	250	322	76	145	840	3,590	191
12	94	1,950	25	33	41	12,600	262	78	168	495	2,990	95
13	76	1,530	19	31	46	13,200	237	195	138	370	1,780	103
14	57	2,200	19	31	50	6,530	191	153	157	207	948	78
15	44	2,630	19	34	56	5,180	172	233	176	370	495	78
16	35	2,380	19	37	61	10,600	149	370	168	199	8,310	63
17	37	1,780	19	38	57	8,590	115	246	700	88	9,570	42
18	35	1,210	25	40	56	4,740	81	211	1,210	191	6,020	121
19	33	495	25	39	52	3,490	121	195	1,060	188	3,990	93
20	31	376	25	37	42	2,900	127	176	700	124	2,460	153

Daily discharge, in second-feet, of Salt River near New London, Mo., for the years ending September 30, 1922–1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922–23												
21	28	262	28	38	38	2,200	121	145	528	90	1,530	145
22	27	214	29	41	25	910	98	124	241	74	805	118
23	24	175	30	46	31	770	153	86	88	57	400	88
24	24	145	28	46	29	735	840	153	45	46	250	56
25	23	129	29	44	31	665	560	304	31	42	195	54
26	22	102	30	45	33	665	352	482	100	38	172	54
27	20	81	31	48	33	595	412	250	7,470	33	157	66
28	20	70	31	41	31	462	450	168	2,900	16	127	121
29	18	65	30	37	-------	412	340	310	1,210	19	95	83
30	18	57	30	35	-------	286	134	495	910	23	76	149
31	17	-------	30	35	-------	237	--------	370	--------	25	76	-------
1923–24												
1	250	86	130	199	1,060	560	3,990	109	1,060	1,450	84	495
2	406	191	109	191	840	910	3,090	124	665	630	74	840
3	469	149	93	168	805	1,140	2,290	157	436	418	57	595
4	412	106	199	168	735	1,210	985	145	292	244	42	412
5	250	83	528	130	700	1,140	630	149	560	202	34	280
6	216	72	630	130	630	1,950	528	141	630	155	46	214
7	160	59	630	130	560	1,780	450	840	207	86	46	165
8	127	56	528	100	495	1,210	376	476	495	92	44	102
9	90	54	334	118	482	770	322	322	188	74	65	86
10	76	54	220	115	412	560	280	274	3,290	54	136	72
11	72	48	246	112	495	382	228	241	8,450	41	418	59
12	57	42	376	109	700	237	211	176	9,010	72	595	61
13	76	44	1,530	106	985	191	180	141	12,100	70	495	46
14	72	41	1,860	100	1,450	246	172	124	7,470	56	370	40
15	56	46	1,290	95	1,780	328	145	103	5,300	42	262	37
16	56	41	1,140	86	2,290	334	124	98	7,050	38	175	41
17	48	39	805	76	3,090	394	127	93	5,780	35	84	72
18	41	38	560	74	3,190	280	121	100	11,400	2,040	74	310
19	44	34	496	72	2,990	430	118	76	9,010	1,060	65	202
20	41	31	262	72	2,040	630	106	310	4,520	5,540	36	155
21	42	30	224	72	2,720	700	103	63	1,700	4,300	51	125
22	40	31	188	86	2,040	1,610	95	63	1,060	1,700	50	129
23	42	32	184	100	1,210	2,200	109	70	595	2,630	42	76
24	70	33	203	205	1,610	2,120	98	98	495	1,700	630	46
25	78	34	228	310	910	1,530	109	90	5,540	770	4,190	35
26	74	40	250	470	495	1,060	103	93	5,540	418	2,380	28
27	48	48	292	630	250	910	124	98	4,850	274	1,530	28
28	52	61	316	1,420	430	1,210	95	233	3,690	155	1,060	35
29	57	88	352	2,200	495	5,180	98	2,720	3,390	150	250	44
30	57	134	304	1,780	-------	8,450	121	2,460	3,190	140	364	31
31	54	-------	262	1,290	-------	5,900	--------	2,120	--------	106	262	-------

NOTE.—Daily discharge estimated from records of precipitation and discharge at near-by stations for June 9, 12, 13, and Aug. 18–21, 1922, on account of unreliable gage readings; and for Apr. 4–6, May 7–9, 27–31, June 1–6, 25–30, July 1, 6–13, 1923, and each alternate day Jan. 10–28, 1924, on account of no gage readings. Stage-discharge relation affected by ice Dec. 10–20, 1922, Feb. 4–10, 1923, and Jan. 3–8, 1924; daily discharge estimated from gage heights, observer's notes, and weather records.

Monthly discharge of Salt River near New London, Mo., for the years ending September 30, 1922–1924

[Drainage area, 2,480 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1922					
February 16–28	2,380	84	783	0.316	0.15
March	38,800	340	7,110	2.87	3.31
April	22,200	805	8,030	3.24	3.62
May	2,900	94	591	.238	.27
June	443	14	102	.041	.05
July	4,090	29	860	.347	.40
August	560	12	92.6	.037	.04
September	6,790	32	777	.313	.35
1922–23					
October	1,370	17	152	.061	.07
November	2,630	24	560	.226	.25
December	46	19	28.0	.011	.01
January	48	26	35.6	.014	.02
February	61	29	40.2	.016	.02
March	13,200	27	2,490	1.00	1.15
April	6,140	81	635	.256	.29
May	495	76	197	.079	.09
June	7,470	31	786	.317	.35
July	3,790	16	626	.252	.29
August	9,570	17	1,470	.593	.68
September	358	42	109	.044	.05
The year	13,200	16	600	.242	3.27
1923–24					
October	469	40	117	.047	.05
November	191	30	61.5	.025	.03
December	1,860	93	474	.191	.22
January	2,200	72	352	.142	.16
February	3,190	250	1,240	.500	.54
March	8,450	191	1,470	.593	.68
April	3,990	95	518	.209	.23
May	2,720	63	397	.160	.18
June	12,100	188	3,930	1.58	1.76
July	5,540	35	798	.322	.37
August	4,190	34	452	.182	.21
September	840	28	162	.065	.07
The year	12,100	28	825	.333	4.50

CUIVRE RIVER NEAR TROY, MO.

LOCATION.—In SW. ¼ sec. 18, T. 49 N., R. 1 E., at Frenchman Bluff highway bridge, 1½ miles above Sugar Creek, 3 miles northeast of Troy, Lincoln County, and 38 miles above mouth.

DRAINAGE AREA.—908 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 15, 1922, to September 30, 1924.

GAGE.—Chain gage bolted to handrail on upstream side of bridge; read by Hester Kolb.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed of silt, sand, and gravel; clean except for drift. Left bank high and rocky; right bank wooded; subject to overflow at extreme high stages. Control is coarse gravel bar 300 feet below gage; clean except for brush growing on exposed part; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.42 feet at 5 p. m. December 13 (discharge, 19,000 second-feet); minimum stage, 1.64 feet at 5 p. m. September 30 (discharge, 14 second-feet).

1922–1924: Maximum stage recorded, 23.90 feet March 14, 1922 (discharge, 24,900 second-feet); minimum stage, 1.20 feet December 6, 1922 (discharge, 5 second-feet).

ACCURACY.—Stage-discharge relation changed during high water in December; not affected by ice. Rating curves well defined between 1,340 and 18,000 second-feet and fairly well defined beyond these limits. Gage read to hundredths once daily except as described in footnote to table of daily discharge. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Cuivre River near Troy, Mo., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 6	5.95	1,310	May 11	2.76	152
Feb. 17	8.16	2,890	Aug. 14	2.13	51

Daily discharge, in second-feet, of Cuivre River near Troy, Mo., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	139	318	535	178	880	200	580	580	1,140	189	61	50
2	117	177	348	148	545	168	475	422	960	168	800	650
3	62	121	236	138	685	178	405	237	615	138	158	338
4	46	107	2,740	129	800	168	370	189	405	129	120	138
5	33	94	2,140	120	840	158	308	138	268	74	61	84
6	37	80	1,240	116	510	168	278	111	370	102	48	59
7	35	72	945	111	422	138	237	440	224	96	46	50
8	32	64	693	106	308	138	224	685	720	84	48	39
9	26	60	463	102	224	138	200	475	2,940	84	46	34
10	22	52	303	354	148	138	158	212	4,910	79	84	27
11	18	46	223	650	87	120	158	148	2,780	77	138	440
12	16	46	275	338	200	120	138	120	7,840	77	90	87
13	21	42	19,000	224	338	120	138	102	11,800	74	64	50
14	23	211	2,620	168	440	168	129	90	2,060	77	48	35
15	26	535	960	129	545	237	129	79	7,720	111	39	24
16	38	275	685	111	440	268	138	74	1,800	87	30	22
17	199	177	510	102	4,710	250	129	66	1,340	2,620	27	21
18	157	139	440	94	1,990	800	120	64	14,600	580	24	18
19	148	58	440	86	960	800	111	120	2,340	388	20	24
20	94	91	1,140	77	650	580	99	278	960	800	15	28
21	74	110	800	74	388	440	90	129	880	1,740	16	30
22	56	69	650	71	308	2,340	84	102	580	510	17	21
23	48	74	1,240	69	278	1,340	79	102	6,520	405	15	22
24	44	103	720	69	250	880	77	1,560	1,240	120	1,990	27
25	38	74	545	1,340	224	720	74	580	1,920	129	1,040	21
26	33	103	422	960	224	650	79	268	1,090	138	323	16
27	35	62	354	880	200	440	99	189	960	102	200	15
28	37	58	308	800	178	440	93	615	510	79	120	14
29	38	62	278	1,120	189	14,900	87	6,760	308	71	74	15
30	1,290	1,190	224	1,440	-------	1,920	120	1,800	224	71	46	14
31	613	-------	212	1,040	-------	880	-------	760	-------	66	35	-------

NOTE.—Gage not read Jan. 6-8, 17-19, 27, and 29; discharge interpolated.

Monthly discharge of Cuivre River near Troy, Mo., for the year ending September 30, 1924

[Drainage area, 908 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,290	16	116	0.128	0.15
November	1,190	42	156	.172	.19
December	19,000	212	1,340	1.48	1.71
January	1,440	69	366	.403	.46
February	4,710	87	619	.682	.74
March	14,900	120	968	1.07	1.23
April	580	74	180	.198	.22
May	6,760	64	564	.621	.72
June	14,600	224	2,670	2.94	3.28
July	2,620	66	305	.336	.39
August	1,990	15	188	.207	.24
September	650	14	80.4	.089	.10
The year	19,000	14	628	.692	9.43

ILLINOIS RIVER AT MORRIS, ILL.

LOCATION.—In sec. 9, T. 33 N., R. 7 E. third principal meridian, at highway bridge in Morris, Grundy County, 7 miles below station formerly maintained near Minooka and 10 miles below mouth of Kankakee River.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—October 1, 1919, to September 30, 1924; January 1, 1903, to December 13, 1904, records were obtained at station near Minooka. Daily readings were obtained at present site by United States Engineer Corps December 10, 1899, to November 30, 1900, and April 20, 1903, to December 11, 1904.

GAGE.—Chain gage attached to bridge; installed March 1, 1916; read by employee of United States Weather Bureau.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed of sand and gravel. Right bank high; left bank is overflowed at extremely high stages. Control probably a few miles below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.2 feet August 10 (discharge, 50,100 second-feet); minimum stage, 6.1 feet October 12, 13, and 16 (discharge, 9,420 second-feet).

1919–1924; Maximum stage recorded, 20.1 feet April 12, 1922 (discharge, 60,600 second-feet); minimum stage, 5.2 feet August 9, 1920 (discharge, 7,600 second-feet).

A discharge of 67,800 second-feet occurred at 8 a. m. March 26, 1904. at station near Minooka.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Flow at this station includes the flow from Chicago drainage canal. Operation of power plants at Lockport and Joliet above gage cause considerable diurnal at low and medium stages.

ACCURACY.—Stage-discharge relation probably permanent during year. Rating curve well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

No discharge measurements made at this station during year.

Daily discharge, in second-feet, of Illinois River at Morris, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	10,300	13,100	11,900	18,200	15,600	20,100	37,000	15,800	12,600	29,000	11,900	13,100
2	10,800	12,900	12,200	16,100	17,200	19,300	35,100	15,600	12,600	27,200	11,900	13,800
3	10,800	12,900	11,900	15,800	18,200	18,000	32,600	15,100	12,400	25,800	11,400	14,100
4	10,300	13,800	12,200	14,800	18,700	18,000	30,000	14,800	12,900	22,800	11,400	13,800
5	10,800	13,600	13,100	14,600	20,100	20,600	27,200	14,600	12,900	21,200	11,900	13,600
6	10,300	14,800	16,900		23,900	20,600	25,200	14,100	13,400	19,300	12,400	13,600
7	9,420	15,100	19,800		24,900	20,400	23,300	14,100	13,400	18,200	16,100	13,400
8	9,640	15,800	20,100		24,100	18,700	22,200	13,800	13,800	18,000	16,700	11,900
9	9,860	15,100	21,400	14,200	22,800	19,300	21,200	14,100	16,900	17,200	27,800	11,900
10	9,860	14,400	19,000		21,700	18,000	20,600	14,800	21,400	16,700	50,100	12,600
11	9,640	13,400	18,500		20,100	17,400	19,500	15,400	21,200	15,800	43,000	12,900
12	9,420	13,100	17,200		18,500	17,400	19,000	15,600	20,400	15,800	31,400	12,600
13	9,420	13,100	18,000	14,800	18,000	17,400	18,500	15,400	19,500	15,600	26,600	12,600
14	10,100	12,900	23,600	15,600	16,700	18,700	18,000	15,100	18,500	15,600	23,900	11,400
15	9,640	12,600	23,900	15,100	16,100	19,500	17,700	14,800	17,700	15,100	21,700	12,200
16	9,420	12,600	23,600	14,400	16,400	19,000	16,900	14,400	17,200	14,400	19,500	11,900
17	9,860	12,600	23,100	13,400	15,800	18,500	16,900	13,800	16,100	13,800	18,000	11,900
18	11,200	12,200	22,000	12,400	15,100	18,000	16,400	13,800	15,400	13,600	16,900	11,700
19	16,400	12,200	20,600	12,400	14,800	17,700	15,800	13,800	15,100	13,400	15,800	11,700
20	18,700	12,200	19,800	11,700	14,800	17,700	15,400	13,400	15,100	12,900	18,200	12,600
21	19,800	11,700	19,000		14,100	17,400	15,400	13,400	14,800	12,900	19,000	13,100
22	19,500	11,700	18,700		12,600	17,200	15,100	13,400	14,400	12,900	18,500	13,100
23	19,300	11,900	19,000		12,900	18,000	15,600	13,400	18,500	12,400	18,500	12,400
24	19,000	11,900	19,300		12,900	20,100	15,100	13,100	20,100	12,400	18,200	12,400
25	16,700	12,200	19,800	12,200	12,600	21,700	15,100	13,100	23,300	12,400	17,200	12,600
26	15,600	11,400	19,800		12,400	23,600	15,100	13,100	28,700	12,400	16,400	12,600
27	14,600	11,700	20,100		12,400	25,500	14,600	12,900	29,000	11,900	15,100	12,400
28	14,400	11,700	19,800		15,600	24,700	15,100	12,900	29,000	11,900	14,800	11,900
29	13,400	11,700	19,300	13,100	18,500	24,700	14,800	12,900	32,200	11,900	14,600	12,900
30	13,100	11,700	19,000	13,100	-------	34,200	15,100	12,900	31,800	11,900	13,800	12,900
31	13,400	-------	18,700	15,400	-------	38,000	-------	12,900	-------	11,900	13,100	-------

NOTE.—Discharge estimated on account of ice Jan. 6–12 and 21–28, from records of Des Plaines River at Joliet and Kankakee River at Custer Park. Braced figures give mean discharge for periods indicated.

Monthly discharge of Illinois River at Morris, Ill., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	19,800	9,420	12,700	May	15,800	12,900	14,100
November	15,800	11,400	12,900	June	32,200	12,400	18,700
December	23,900	11,900	18,800	July	29,000	11,900	16,000
January	-------	-------	13,800	August	50,100	11,400	19,200
February	24,900	12,400	17,200	September	14,100	11,400	12,700
March	38,000	17,200	20,600				
April	37,000	14,600	20,000	The year	50,100	9,420	16,400

ILLINOIS RIVER AT PEORIA, ILL.

LOCATION.—In sec. 2, T. 8 N., R. 8 E., at foot of Grant Street, Peoria, Peoria County, 3½ miles above station formerly maintained at Peoria & Pekin Union Railway bridge, and 4½ miles above mouth of Kickapoo Creek.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—March 8, 1910, to September 30, 1924; March 10, 1903, to July 21, 1906, at Peoria & Pekin Union Railway bridge.

GAGE.—Vertical staff gage attached to wooden pile; read by employee of United States Engineer Corps.

DISCHARGE MEASUREMENTS.—Made from downstream side of Lower Free Bridge, 2 miles below gage.

CHANNEL AND CONTROL.—Bed of river, which forms control for medium and high stages, composed of mud; may shift. Dam at Copperas Creek probably forms control for lowest stages; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 21.0 feet August 24 (discharge, 39,000 second-feet); minimum stage, 10.4 feet October 17 (discharge, 10,600 second-feet).

1910–1924: Maximum stage recorded, 24.80 feet April 15–17, 1922 (discharge, 56,700 second-feet); minimum discharge, less than 7,250 second-feet during period December 11, 1916, to January 10, 1917.

The highest known flood occurred in 1844, when a stage of about 26.6 feet on present gage was reached.

ICE.—Stage-discharge relation often affected by ice for short periods.

REGULATION.—Flow at this station includes water diverted from Lake Michigan through Chicago drainage canal. No diurnal fluctuation is noticeable.

ACCURACY.—Stage-discharge relation practically permanent during year, except as affected by ice. Rating curve fairly well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good for open-water, fair for ice periods.

COOPERATION.—Gage-height record furnished by United States Engineer Corps.

The following discharge measurement was made:

July 8, 1924: Gage height, 18.68 feet; discharge, 31,200 second-feet.

Daily discharge, in second-feet, of Illinois River at Peoria, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	11,600	15,500	13,500	22,200	18,000	20,500	30,900	21,500	15,700	32,600	17,000	29,700
2	11,600	15,300	13,500	22,000	18,500	21,000	32,300	21,000	15,700	33,700	16,800	29,700
3	11,500	15,500	13,300	21,800	19,000	22,000	33,700	20,800	15,700	34,000	16,100	28,500
4	11,400	15,500	13,700	21,000	19,800	22,500	35,100	20,800	15,300	34,000	15,700	27,300
5	11,400	15,500	14,100	20,500	20,500	23,100	35,800	20,200	15,300	33,700	15,700	26,400
6	11,400	15,300	13,500		20,500	23,400	35,800	20,000	15,300	33,000	15,700	25,500
7	11,200	15,300	13,300		20,800	23,700	35,100	20,000	15,300	32,000	16,100	24,900
8	11,200	15,300	14,100		21,000	24,300	34,800	19,800	15,500	30,600	16,100	24,000
9	11,200	15,300	14,900	19,300	21,800	24,300	34,400	19,500	15,700	29,700	18,000	23,700
10	10,800	15,300	15,700		22,200	24,300	33,400	19,200	16,500	29,100	21,500	22,500
11	10,800	15,500	16,100		23,100	24,000	32,600	19,500	17,000	27,900	25,800	22,000
12	10,800	15,500	16,100	19,500	23,700	23,700	31,600	19,000	18,000	27,600	29,100	21,200
13	10,900	15,300	17,500	19,800	23,700	23,400	30,900	19,000	19,000	27,600	30,900	20,800
14	10,800	15,500	17,500	20,200	23,700	23,400	30,300	18,800	19,500	26,700	31,600	20,000
15	10,800	15,500	17,200	20,200	23,400	23,100	29,400	18,800	19,500	25,800	31,200	20,000
16	10,600	15,300	18,800	20,500	23,100	23,100	28,500	18,500	20,000	24,600	31,200	19,500
17	10,600	15,100	19,800	20,500	22,800	23,100	27,900	17,800	19,800	24,600	30,900	19,000
18	11,200	14,900	20,500		22,500	23,400	27,000	18,200	19,800	23,400	30,000	18,500
19	11,500	14,900	21,000		22,200	23,100	26,400	18,200	19,200	22,500	28,800	18,000
20	11,600	14,300	21,500		22,000	23,400	26,100	18,200	19,500	22,000	33,700	18,500
21	12,000	14,500	21,800		21,500	23,100	24,900	17,800	19,000	21,200	37,400	18,500
22	12,900	14,500	22,000		21,000	22,800	24,900	16,800	18,500	21,000	37,000	18,500
23	13,900	14,300	22,000		20,500	22,500	23,700	17,000	18,500	20,500	38,200	18,800
24	14,500	14,100	22,000	17,200	20,000	22,500	23,100	17,000	18,500	20,000	39,000	18,500
25	15,100	13,900	22,000		19,500	22,500	22,800	16,800	20,200	19,500	39,000	18,200
26	15,300	13,900	22,000		19,000	23,100	22,800	16,500	21,500	19,000	37,400	18,000
27	15,700	13,900	22,000		18,800	23,700	22,200	16,500	23,100	18,800	36,600	17,200
28	15,700	13,700	22,000		18,800	24,900	22,000	16,500	26,100	18,200	35,400	17,500
29	15,700	13,700	22,000		19,500	26,100	21,800	16,300	30,000	17,500	34,000	17,200
30	16,100	13,500	22,500		-------	27,300	21,800	16,100	31,200	17,500	32,300	17,000
31	15,500	-------	22,200		-------	29,100	-------	15,700	-------	17,500	31,200	-------

NOTE.—Discharge estimated on account of ice Jan. 6–11 and 18–31, from comparison with records of Illinois River at Morris and at Beardstown. Braced figures show mean discharge for periods indicated.

Monthly discharge of Illinois River at Peoria, Ill., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	16,100	10,600	12,400	May	21,500	15,700	18,400
November	15,500	13,500	14,900	June	31,200	15,300	19,100
December	22,500	13,300	18,300	July	34,000	17,500	25,300
January	22,200	-------	18,900	August	39,000	15,700	28,000
February	23,700	18,000	21,100	September	29,700	17,000	21,300
March	29,100	20,500	23,600				
April	35,800	21,800	28,700	The year	39,000	10,600	20,800

ILLINOIS RIVER AT HAVANA, ILL.

LOCATION.—In sec. 1, T. 21 N., R. 9 W., at highway bridge in Havana, Mason County, half a mile below mouth of Spoon River.

DRAINAGE AREA.—17,200 square miles (since January 17, 1900, flow has been increased by diversion from Lake Michigan basin through Chicago drainage canal).

RECORDS AVAILABLE.—October 1, 1921, to September 30, 1924. Gage readings October, 1878, to May, 1881, January, 1896, to December, 1904, published in House Document 263, Fifty-ninth Congress; gage readings since December, 1904, in files of United States Engineer Corps.

GAGE.—Vertical staff gage attached to pile 30 feet downstream from draw pier of bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Channel sandy and somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 18.7 feet August 25 (discharge, 45,100 second-feet); minimum stage, 7.9 feet October 16 and 17 (discharge, 10,900 second-feet).

1921–1924: Maximum stage recorded, 22.4 feet April 20, 1922 (discharge, 65,000 second-feet); minimum stage, 7.2 feet August 31 to September 10, 1922 (discharge, 9,720 second-feet).

Maximum stage recorded since 1844 occurred in 1922.

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Flow at this station includes flow of the Chicago drainage canal.

ACCURACY.—Stage-discharge relation practically permanent during year except as affected by ice. Rating curve fairly well defined. Gage read to tenths once daily. Daily discharge determined by applying daily gage height to rating table. Records good for open water; fair for ice periods.

COOPERATION.—Gage-height record by United States Engineer Corps.

No discharge measurements were made during year.

Daily discharge, in second-feet, of Illinois River at Havana, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	12,800	17,800	15,300	26,200	22,000	23,900	31,400	25,200	18,100	39,600	22,700	36,400
2	12,800	17,800	15,300	25,900		24,600	32,200	24,900	17,800	40,700	21,700	36,000
3	12,800	17,800	15,000	25,200		24,900	32,800	24,600	17,800	41,400	21,400	35,000
4	12,500	17,800	15,000	24,900		25,200	33,900	24,300	17,800	40,300	20,800	34,200
5	12,500	17,800	15,300		24,300	25,600	34,600	24,300	17,500	39,600	20,200	32,800
6	12,300	17,500	15,300		24,900	25,900	35,300	23,900	18,100	38,900	19,900	31,400
7	12,100	17,500	15,000		25,200	25,900	35,300	23,900	18,100	38,200	19,600	30,800
8	11,900	17,500	15,300		25,200	26,200	35,700	23,600	17,800	37,100	20,200	29,700
9	11,700	17,500	15,300		25,600	26,600	35,700	23,300	18,400	35,700	21,100	29,000
10	11,500	17,500	16,400		25,900	26,600	35,700	22,700	18,700	35,000	22,300	28,300
11	11,300	17,500	16,600		25,900	26,600	35,300	22,300	19,300	33,900	24,600	27,300
12	11,300	17,500	17,800	21,500	26,200	26,600	35,000	21,700	19,600	33,200	25,900	26,600
13	11,100	17,500	18,700		26,600	26,200	34,200	21,400	19,600	33,200	28,300	26,200
14	11,100	17,500	19,900		26,900	26,200	33,200	21,400	20,500	33,200	29,700	25,600
15	11,100	17,800	20,800		26,900	26,200	32,800	21,400	21,100	31,400	30,400	24,600
16	10,900	17,800	21,100		26,900	25,900	32,200	21,100	21,700	30,800	30,800	24,300
17	10,900	17,800	21,400		26,900	25,900	31,400	20,800	21,700	29,700	31,100	23,000
18	11,500	17,500	22,300		26,900	25,900	30,800	20,500	22,000	28,600	31,100	22,700
19	12,300	16,900	23,600		26,900	25,900	30,000	20,200	22,000	28,300	30,800	22,000
20	12,800	16,600	24,300		26,600	25,900	29,700	19,900	21,700	27,600	31,100	22,700
21	13,000	16,400	24,900		26,600	25,900	29,000	19,900	21,700	26,600	32,800	22,700
22	13,700	16,400	25,600		25,900	25,900	28,600	19,900	21,400	26,900	35,000	22,000
23	14,700	16,400	25,900		25,200	25,900	28,000	19,900	21,700	27,300	36,700	21,400
24	15,300	16,100	25,900		24,900	25,900	27,300	19,900	22,000	26,600	43,600	21,400
25	15,600	16,100	26,200		24,600	25,600	26,600	19,000	24,300	25,900	45,100	21,400
26	16,400	16,100	26,200	18,200	23,900	25,600	26,600	19,000	26,200	25,900	44,700	21,100
27	16,900	15,800	26,200		23,000	26,200	26,600	19,000	28,000	25,200	43,600	20,800
28	17,500	15,800	26,200		22,700	26,600	26,600	19,000	30,000	24,600	41,400	20,500
29	17,500	15,800	26,200		22,700	28,300	26,200	18,700	32,800	23,900	39,600	20,200
30	17,800	15,800	26,200		------	29,400	25,600	18,400	35,700	23,600	39,300	19,900
31	17,800	-------	26,200		-------	30,400	-------	18,400	-------	23,600	27,800	-------

NOTE.—Discharge estimated on account of ice Jan. 5 to Feb. 4, by comparison with records on Illinois River at Morris and at Beardstown. Braced figures show mean discharge for periods indicated.

Monthly discharge of Illinois River at Havana, Ill., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	17,800	10,900	13,300	May	25,200	18,400	21,400
November	17,800	15,800	17,100	June	35,700	17,800	21,800
December	26,200	15,000	20,800	July	41,400	23,600	31,500
January	-------	-------	20,900	August	45,100	19,600	30,400
February	26,900	-------	25,000	September	36,400	19,900	26,000
March	30,400	23,900	26,200				
April	35,700	25,600	31,300	The year	45,100	10,900	23,800

ILLINOIS RIVER AT BEARDSTOWN ILL.

LOCATION.—In sec. 15, T. 18 N., R. 12 W., at highway bridge on State Street, Beardstown, Cass County, 9½ miles below mouth of Sangamon River.

DRAINAGE AREA.—23,445 square miles. Natural run-off since January 17, 1900, increased by diversion from Lake Michigan through Chicago drainage canal.

RECORDS AVAILABLE.—October 1, 1920, to September 30, 1924. Gage read October 28, 1878, to May 30, 1881; November 9, 1881, to June 26, 1884; January 5, 1885, to June 30, 1891, by employees of United States Engineer Corps, and July 1, 1891, to September 30, 1924, by United States Weather Bureau; gage-height records 1878 to 1904 published in House Document

263, 59th Congress, since 1904 in annual reports of United States Weather Bureau.

GAGE.—Vertical staff gage attached to pile on inside of cribbing 40 feet above center span of bridge; read by employee of United States Weather Bureau.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of sand and mud. Except at very high stages, control is formed by LaGrange Dam, 11 miles downstream, probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.1 feet July 4 and 5, August 28 and 29 (discharge, 55,400 second-feet); minimum stage, 8.3 feet October 17 (discharge, 11,800 second-feet).

1920–1924: Maximum stage recorded, 25.1 feet April 20, 1922 (discharge, 109,000 second-feet); minimum stage, 7.7 feet December 19–22, 1922 (discharge, 9,620 second-feet).

Maximum stage since 1844 occurred in 1922. On April 4, 1904, discharge was determined by United States Engineer Corps as 115,000 second-feet (gage-height, 20.0 feet).

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

REGULATION.—Flow at this station includes flow of the Chicago drainage canal. The stage at Beardstown is slightly affected, in occasional seasons of high water by backwater from Mississippi River and occasionally by backwater from Crooked Creek which enters 5 miles below Beardstown.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined. Gage read to tenths once daily. Daily discharge determined by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

The following discharge measurements were made:

April 10, 1924: Gage height, 17.49 feet; discharge, 52,700 second-feet;
July 9, 1924: Gage height, 17.93 feet; discharge, 49,500 second-feet.

Daily discharge, in second-feet, of Illinois River at Beardstown, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	15,400	21,300	16,900	34,100	21,700	27,600	38,600	31,800	20,600	47,300	29,900	51,100
2	15,400	21,700	16,900	33,700	22,800	28,400	40,300	30,600	20,600	51,100	28,400	50,100
3	15,000	21,700	16,900	32,900	24,700	28,700	42,000	29,900	20,600	53,900	27,200	48,700
4	14,700	21,300	16,900	32,100	24,300	29,100	43,700	29,100	20,200	55,400	26,100	47,300
5	14,300	21,300	16,900	31,400	26,900	29,500	44,600	28,400	20,200	55,400	25,000	45,500
6	13,900	21,000	17,300	30,200	31,000	29,900	46,000	28,000	22,400	54,900	23,900	43,700
7	13,600	21,000	17,600	25,400	31,400	29,900	46,400	28,000	23,200	53,500	22,800	42,000
8	13,200	21,000	18,400	24,300	30,200	30,200	47,800	27,200	23,600	52,000	22,800	40,300
9	12,900	21,000	19,100	23,200	30,200	30,600	48,300	26,900	24,300	50,100	22,800	39,000
10	12,900	20,600	20,200	21,700	31,400	30,600	47,800	26,500	24,300	48,700	23,200	37,300
11	12,500	20,600	21,000	22,100	32,100	30,600	47,300	26,100	24,300	46,900	24,700	35,700
12	12,500	20,600	21,700	22,800	32,900	31,000	46,400	25,400	24,700	45,100	26,100	34,100
13	12,100	20,600	24,300	24,300	33,300	31,000	46,000	25,000	25,400	44,200	26,900	32,900
14	12,100	21,000	25,800	25,800	33,700	30,600	44,600	24,700	25,400	43,300	28,400	31,400
15	12,100	21,000	26,900	26,100	33,700	30,600	43,700	23,900	26,100	42,000	29,900	30,200
16	12,100	20,600	27,600	25,400	33,700	30,600	42,900	23,200	26,900	40,300	31,400	29,100
17	11,800	20,600	28,700	25,000	34,100	30,600	41,500	22,800	27,200	39,000	32,500	28,400
18	12,900	20,200	29,900	24,300	33,300	30,200	40,300	22,400	27,200	37,700	33,300	26,900
19	13,200	20,200	31,400	23,900	32,900	30,200	39,400	22,100	26,900	36,500	33,700	26,100
20	13,900	19,800	32,500	23,200	32,500	30,200	38,200	22,100	26,100	35,300	34,500	25,800
21	15,400	19,500	34,100	21,700	31,400	30,600	37,300	22,100	26,100	34,100	35,300	25,400
22	16,900	19,100	34,900	21,000	31,400	30,600	36,500	21,700	25,000	33,300	36,500	25,000
23	18,000	18,700	35,700	20,600	31,000	31,000	35,300	21,300	25,000	33,300	39,000	24,700
24	19,100	18,400	36,100	19,500	31,000	31,000	34,500	21,000	24,300	32,900	43,300	24,300
25	20,200	18,000	36,100	19,500	30,200	31,000	33,700	21,000	28,700	32,900	48,700	23,900

Daily discharge, in second-feet, of Illinois River at Beardstown, Ill., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
26	21,000	18,000	36,500	18,700	29,500	31,000	32,900	20,600	31,800	32,900	52,500	23,200
27	21,700	18,000	36,500	18,000	28,700	31,000	32,500	20,200	34,900	32,500	54,400	22,800
28	22,100	17,600	36,100	18,000	28,000	31,800	31,800	20,200	37,300	32,500	55,400	22,400
29	22,100	17,300	35,700	19,800	27,600	33,300	31,000	20,200	40,700	32,100	55,400	22,100
30	22,400	17,300	35,300	19,800	-------	35,300	31,000	21,000	44,200	31,800	53,900	21,700
31	22,100	-------	34,500	20,600	-------	37,300	-------	20,600	-------	31,400	52,500	-------

NOTE.—Stage-discharge relation affected by backwater from Crooked Creek July 22–30; discharge estimated by inspection of gage-height graphs of Crooked Creek at Ripley and Illinois River at Beardstown.

Monthly discharge of Illinois River at Beardstown, Ill., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	22,400	11,800	15,700	May	31,800	20,200	24,300
November	21,700	17,300	20,000	June	44,200	20,200	26,600
December	36,500	16,900	27,000	July	55,400	31,400	41,700
January	34,100	18,000	24,200	August	55,400	22,800	34,900
February	34,100	21,700	30,200	September	51,100	21,700	32,700
March	37,300	27,600	30,800				
April	48,300	31,000	40,400	The year	55,400	11,800	29,000

KANKAKEE RIVER AT MOMENCE, ILL.

LOCATION.—In sec. 24, T. 31 N., R. 13 E., at highway bridge in Momence, Kankakee County, half a mile below Chicago & Eastern Illinois Railroad bridge and 1½ miles above Tower Creek.

DRAINAGE AREA.—2,340 square miles.

RECORDS AVAILABLE.—February 24, 1905, to July 20, 1906; December 3, 1914, to September 30, 1924.

GAGE.—Chain gage attached to bridge over left channel; read by Henry Hanson.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed of coarse gravel; somewhat shifting. River at gage divided into two channels by an island. Aquatic plants sometimes grow in bed during summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.56 feet March 30 (discharge, 6,800 second-feet); minimum discharge, 740 second-feet October 5–11.

1905–1906; 1915–1924: Maximum stage recorded, 7.5 feet January 21, 1916 (discharge not determined because of backwater from ice); maximum open-water stage, 6.4 feet January 22, 1916 (discharge estimated from extension of rating curve, 12,600 second-feet); minimum stage, 1.37 feet September 1, 16, and 17, 1919 (discharge, 306 second-feet).

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation seriously affected by ice during winter; affected by vegetation in channel during remainder of year. Standard rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by indirect method for shifting channels. Records fair.

Discharge measurements of Kankakee River at Momence, Ill., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 5	[a] 2.80	1,880	May 16	[a] 3.00	2,220
Feb. 27	2.64	1,800	July 22	2.36	1,310

[a] Stage-discharge relation affected by aquatic growth.

Daily discharge, in second-feet, of Kankakee River at Momence, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	850	1,350	1,280	3,870		2,200	6,500	2,300	1,830	5,010	1,080	960
2	850	1,280	1,280	3,600	4,500	2,200	6,200	2,200	1,830	4,430	1,080	1,020
3	795	1,280	1,280	3,600		2,100	6,200	2,200	1,830	3,870	1,080	1,020
4	795	1,350	1,420	3,600	5,010	2,200	5,600	2,100	1,920	3,600	1,020	1,020
5	740	1,830	2,300		5,600	2,740	5,300	2,100	1,920	3,600	1,140	960
6	740	1,920	3,340		5,300	2,740	5,010	2,010	2,100	3,340	1,080	905
7	795	1,920	3,870		6,200	2,400	5,010	2,010	2,200	3,090	1,210	960
8	740	1,740	3,870		5,300	2,620	5,010	2,010	2,620	3,340	1,140	905
9	740	1,580	3,600		4,430	2,620	5,010	2,300	3,340	2,850	1,350	905
10	740	1,580	3,340		3,870	2,740	5,010	2,510	4,150	2,620	1,500	905
11	740	1,580	3,340		3,600	2,620	5,010	2,620	4,150	2,400	1,420	960
12	795	1,500	3,340		3,600	2,620	4,720	2,620	4,150	2,300	1,580	960
13	795	1,500	4,720		3,340	2,740	4,720	2,620	3,870	2,200	1,500	960
14	795	1,420	5,300		3,090	3,090	4,430	2,510	3,600	2,010	1,420	905
15	850	1,350	5,600		3,340	3,090	4,150	2,400	3,600	1,920	1,350	905
16	850	1,350	5,010		2,850	2,850	3,870	2,300	3,340	1,830	1,280	850
17	905	1,350	4,720	3,500	2,740	2,850	3,600	2,200	3,340	1,660	1,140	850
18	1,020	1,350	4,430		2,510	2,850	3,340	2,100	3,090	1,500	1,080	850
19	1,920	1,350	4,150		2,510	2,850	3,090	2,100	3,090	1,500	1,080	850
20	2,100	1,280	4,150		2,300	2,850	2,850	2,100	2,850	1,420	1,280	850
21	2,010	1,280	4,150		2,400	2,850	2,850	2,100	2,850	1,350	1,280	850
22	1,830	1,280	4,150		2,300	2,740	2,740	2,100	2,740	1,350	1,280	905
23	1,740	1,280	4,150		2,010	3,600	2,740	2,010	3,340	1,280	1,210	960
24	1,660	1,280	4,430		2,200	3,870	2,620	2,010	3,090	1,280	1,140	1,020
25	1,660	1,280	4,430		1,740	3,870	2,510	1,920	4,150	1,280	1,080	1,020
26	1,580	1,280	4,430		1,660	4,430	2,300	1,920	5,010	1,210	1,080	1,020
27	1,580	1,210	4,430		1,830	4,430	2,300	1,830	5,300	1,140	1,080	960
28	1,500	1,210	4,430		2,100	4,430	2,300	1,830	5,010	1,140	1,020	960
29	1,420	1,210	4,150		2,100	5,600	2,300	1,830	6,500	1,080	1,020	905
30	1,350	1,210	4,150		-------	6,800	2,300	1,830	5,600	1,140	960	960
31	1,350	-------	4,150		-------	6,500	-------	1,830	-------	1,140	960	-------

NOTE.—Discharge Jan. 5 to Feb. 3 estimated because of ice, from gage heights, observer's notes, and comparison with record of Kankakee River at Custer Park. Braced figures show mean discharge for periods indicated.

Monthly discharge of Kankakee River at Momence, Ill., for the year ending September 30, 1924

[Drainage area, 2,340 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,100	740	1,170	0.500	0.58
November	1,920	1,210	1,410	.603	.67
December	5,600	1,280	3,790	1.62	1.87
January	----------	----------	3,520	1.50	1.73
February	----------	1,660	3,360	1.44	1.55
March	6,800	2,100	3,290	1.41	1.63
April	6,500	2,300	3,990	1.71	1.91
May	2,620	1,830	2,150	.919	1.06
June	6,500	1,830	3,410	1.46	1.63
July	5,010	1,080	2,190	.936	1.08
August	1,580	960	1,190	.509	.59
September	1,020	850	935	.400	.45
The year	6,800	740	2,530	1.08	14.75

KANKAKEE RIVER AT CUSTER PARK, ILL.

LOCATION.—In sec. 19, T. 32 N., R. 10 E., at Wabash Railroad bridge in Custer Park, Will County, half a mile above Horse Creek, and 15 miles below dam and power plant at Kankakee.

DRAINAGE AREA.—4,870 square miles.

RECORDS AVAILABLE.—November 6, 1914, to September 30, 1924.

GAGE.—Chain gage attached to bridge; read by J. H. Swords.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Bed of solid rock strewn with boulders and gravel; right half of channel deep with fissures in bed; left half shallow; affected by vegetation during summer.

EXTREMES OF DISCHARGE.—Maximum open-water stage recorded during year, 11.73 feet March 31 (discharge, 18,200 second-feet); minimum stage, 5.20 feet 6 p. m. October 7 (discharge, 625 second-feet).

1914–1924: Maximum stage recorded, 15.05 feet April 11, 1922 (discharge, 31,200 second-feet); minimum stage, 4.09 feet November 15, 1914 (discharge, 250 second-feet).

ICE.—Stage-discharge relation affected by ice.

REGULATION.—Operation of power plant at Kankakee causes slight fluctuation at gage.

ACCURACY.—Stage-discharge relation changed slightly during year by growth of vegetation in channel; affected by ice during winter. Rating curves fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for period of ice-effect. Records good except for ice periods for which they are fair.

The following discharge measurements were made:

November 6, 1923: Gage height, 7.05 feet; discharge, 3,680 second-feet.

April 3, 1924: Gage height, 10.91 feet; discharge, 15,300 second-feet.

July 23, 1924: Gage height, 6.06 feet; discharge, 1,860 second-feet.

Daily discharge, in second-feet, of Kankakee River at Custer Park, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,130	2,060	1,890	7,000		5,150	18,200	4,910	2,400	14,000	1,480	2,150
2	1,060	2,060	1,890	7,290		4,910	17,500	4,670	2,400	13,000	1,200	2,240
3	1,000	2,150	2,060	6,720	9,500	4,910	15,000	4,670	2,580	11,300	1,480	2,610
4	1,000	2,240	2,240	5,150		4,670	13,600	4,440	2,760	9,410	1,560	3,010
5	940	2,610	4,140			5,400	12,000	4,210	2,950	7,880	1,480	3,220
6	940	3,670	8,480			5,910	10,700	3,770	3,150	6,440	1,640	2,800
7	720	4,380	11,000	5,500		6,170	9,720	3,560	3,350	5,650	1,640	2,240
8	940	4,380	11,600		14,000	6,170	8,480	3,350	3,990	5,400	1,640	1,980
9	940	3,900	11,300			5,650	7,880	3,770	5,400	4,910	15,700	1,800
10	880	3,440	10,400			5,400	7,580	4,910	7,000	4,440	11,000	1,890
11	880	3,010	9,100			5,150	7,290	5,400	7,880	3,990	9,720	1,800
12	770	2,800	7,880			4,670	7,000	5,150	8,180	3,770	9,100	1,800
13	825	2,610	11,600		9,000	5,150	6,440	4,910	7,580	3,990	8,180	1,800
14	940	2,420	13,300	7,000		5,910	6,170	4,670	6,440	3,560	7,000	1,640
15	880	2,240	14,000			6,440	5,650	4,210	5,910	3,350	5,640	1,480
16	825	2,240	14,300			6,440	5,400	3,990	5,150	2,950	4,880	1,480
17	940	2,240	13,300			6,170	5,400	3,560	4,910	2,580	3,900	1,480
18	1,410	2,150	11,600		5,500	5,910	4,670	3,350	4,440	2,400	3,440	1,410
19	1,800	2,150	10,400			5,650	4,670	3,350	4,210	2,230	3,010	1,410
20	4,140	2,060	9,410			5,650	4,440	3,350	3,990	2,060	3,010	1,480
21	5,380	2,060	8,790			5,400	4,440	3,350	3,770	2,060	3,010	1,480
22	5,130	1,980	8,790			5,400	4,440	3,150	4,440	1,890	3,440	1,480
23	4,880	1,800	8,790			6,440	4,210	3,150	7,000	1,810	3,900	1,480
24	4,140	1,890	9,100	5,000		7,580	4,210	2,950	7,580	1,730	3,670	1,640
25	3,220	1,800	9,720		3,750	8,480	4,210	2,760	9,720	1,730	3,010	1,720
26	2,800	1,800	10,000			10,000	3,990	2,760	13,000	1,730	2,610	1,720
27	2,800	1,890	10,000			10,400	3,770	2,760	14,000	1,730	2,420	1,640
28	2,420	1,890	10,000			9,720	3,770	2,580	15,400	1,650	2,420	2,800
29	2,240	1,800	9,100			13,000	4,210	2,580	16,400	1,570	2,150	2,610
30	2,150	1,800	8,490		-------	17,800	4,670	2,580	15,000	1,650	1,980	2,420
31	2,060	-------	7,880		-------	18,200	--------	2,400	--------	1,570	1,800	-------

NOTE.—Stage-discharge relation affected by ice Jan. 5 to Feb. 29; discharge estimated from gage height records, observer's notes, and climatic record. Braced figures give mean discharge for periods indicated.

Monthly discharge of Kankakee River at Custer Park, Ill., for the year ending September 30, 1924

[Drainage area, 4,870 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	5,380	720	1,940	0.398	0.46
November	4,380	1,800	2,450	.503	.56
December	14,300	1,890	9,050	1.86	2.14
January	----------	----------	5,680	1.17	1.35
February	----------	----------	7,720	1.59	1.72
March	18,200	4,670	7,220	1.48	1.71
April	18,200	3,770	7,320	1.50	1.67
May	5,400	2,400	3,720	.764	.88
June	16,400	2,400	6,700	1.38	1.54
July	14,000	1,570	4,270	.877	1.01
August	15,700	1,200	4,100	.843	.97
September	3,220	1,410	1,960	.402	.45
The year	18,200	720	5,170	1.06	14.46

IROQUOIS RIVER NEAR CHEBANSE, ILL.

LOCATION.—In sec. 16, T. 29 N., R. 13 W., at highway bridge 4½ miles east of Chebanse, Kankakee County, 3 miles below Beaver Creek, and 6 miles above junction with Kankakee River.

DRAINAGE AREA.—2,120 square miles.

RECORDS AVAILABLE.—April 13, 1923, to September 30, 1924.

GAGE.—Chain gage attached to bridge; read by Charles Haselow.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed of gravel and boulders; shifts occasionally. Aquatic vegetation sometimes grows in channel during summer. Banks low and wooded. Low-water control is just below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, 10.58 feet March 31 (discharge, 10,400 second-feet); minimum stage, 0.93 foot October 10 (discharge, 95 second-feet).

1923–1924: Maximum stage occurred in 1924; minimum stage, 0.75 foot July 26, 1923 (discharge, 59 second-feet).

In the spring of 1913, a stage of approximately 19.6 feet was reached.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation changed in December by vegetation going out of channel and in August or September by regrowth of vegetation; affected by ice during winter. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying rating table to daily gage height. Records fair.

Discharge measurements of Iroquois River near Chebanse, Ill., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 5	3.04	1,090	May 16	2.91	1,140
Apr. 2	9.60	8,980	July 22	1.55	374

Daily discharge, in second-feet, of Iroquois River near Chebanse, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	112	668	510	2,840		2,040	10,200	1,950	545	8,240	248	545
2	132	695	535	2,230		2,130	8,950	1,860	622	7,540	248	820
3	150	750	612	2,040	7,750	1,950	7,260	1,770	820	5,880	248	1,120
4	128	695	870	2,040		1,950	6,140	1,390	1,120	4,460	231	1,610
5	122	1,130	2,870			2,230	4,840	1,180	1,180	3,390	248	1,250
6	112	1,770	5,750		10,900	2,950	3,620	1,060	1,250	2,330	214	880
7	118	2,340	7,260	1,450	9,550	2,950	2,950	940	1,320	2,130	208	595
8	112	2,140	7,120		9,550	2,590	2,630	940	2,040	1,690	208	471
9	122	1,860	7,120		8,240	2,230	2,130	1,530	2,530	1,530	3,390	402
10	95	1,430	6,010		6,700	1,860	1,950	2,130	3,620	1,320	5,100	360
11	99	1,200	4,840		5,280	1,770	1,610	2,040	4,100	1,180	5,490	360
12	103	810	3,930		3,860	1,610	1,460	1,860	3,860	1,180	4,970	340
13	108	810	6,010		3,060	1,950	1,320	1,530	2,950	1,180	4,340	320
14	118	750	7,400		2,530	2,330	1,250	1,390	2,230	1,180	3,280	302
15	112	695	7,820	1,950	2,430	2,840	1,180	1,180	1,690	940	2,530	283
16	122	695	8,380		2,330	2,950	1,060	1,060	1,320	820	1,950	248
17	144	668	7,400		1,950	2,630	1,000	1,000	1,120	678	1,610	214
18	640	668	6,140		1,670	2,330	1,000	940	940	595	1,250	204
19	1,200	640	5,100		1,390	2,130	1,000	940	880	545	1,060	198
20	2,240	612	4,840		1,320	2,040	940	940	760	471	880	214
21	3,450	560	4,580	1,400	1,250	1,950	940	1,000	1,180	424	1,390	231
22	3,110	462	4,100		1,250	2,240	1,060	940	3,500	381	1,950	231
23	2,340	462	4,100		1,250	2,530	1,000	880	4,100	360	1,950	256
24	1,680	485	4,340		1,120	3,390	1,120	760	3,980	340	1,530	256
25	1,200	510	4,840		1,000	4,100	1,060	705	6,280	320	1,000	283
26	930	535	5,100		1,000	4,460	940	705	7,400	320	1,060	248
27	870	535	4,840		940	4,460	880	650	8,380	320	1,060	214
28	695	462	4,710		1,530	4,340	1,120	622	8,660	256	880	208
29	585	418	4,100	2,300	1,950	6,280	1,610	570	8,660	283	678	201
30	560	462	3,860		-------	9,250	1,950	545	8,520	256	520	182
31	612	-------	3,280		-------	10,400	-------	545	-------	248	424	-------

NOTE.—Stage-discharge relation affected by ice Jan. 5 to Feb. 5; discharge estimated from gage heights, observer's notes, and weather records. Gage height missing and discharge interpolated Feb. 11, 15, 18, 20, 24, Mar. 8, and 22.

Monthly discharge of Iroquois River near Chebanse, Ill., for the year ending September 30, 1924

[Drainage area, 2,120 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,450	95	714	0.336	0.39
November	2,340	418	804	.408	.46
December	8,380	510	4,790	2.26	2.61
January			1,830	.863	.99
February	10,900	940	4,170	1.97	2.12
March	10,400	1,610	3,190	1.50	1.73
April	10,200	880	2,470	1.17	1.30
May	2,130	545	1,150	.542	.62
June	8,660	545	3,190	1.50	1.67
July	8,240	248	1,640	.774	.89
August	5,490	208	1,620	.764	.88
September	1,610	182	435	.205	.23
The year	10,900	95	2,160	1.02	13.89

DES PLAINES RIVER AT LEMONT, ILL.

LOCATION.—In sec. 20, T. 37 N., R. 11 E., at concrete highway bridge on Stephens Street, a quarter of a mile north of main section of Lemont, Cook County, and 8 miles above junction of Des Plaines River and Chicago drainage canal.

DRAINAGE AREA.—705 square miles.

RECORDS AVAILABLE.—November 3, 1914, to September 30, 1924.

GAGE.—Staff gage attached to bridge; read by William Weck, jr.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—A concrete dam, forming a new control and changing the former stage-discharge relation, was built across the channel 500 feet below gage August 20, 1916; permanent except for slight repairs in August, 1920.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.55 feet August 9 (discharge, 4,360 second-feet); minimum stage, 2.85 feet October 14 and 15 (discharge, 150 second-feet).

1915–1924; Maximum stage recorded, 6.6 feet February 16, 1918 (discharge not determined because of backwater from ice). Maximum discharge recorded, 5,520 second-feet March 15, 1919. No flow occurred September 7, 8, 14–21, and 24–27, 1919, and July 25–31, 1921.

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

DIVERSIONS.—During extremely high water part of flow spills into Chicago drainage canal at Willow Springs, 7 miles above station. Chicago Sanitary District obtained records of this overflow from 1915 to 1919. For years 1915–1919 see Water-Supply Paper 505 and for 1920–1923 see Water-Supply Paper 565. Estimates for the current year are shown in the following table:

Overflow from Des Plaines River into Chicago drainage canal at Willow Springs, Ill.

Date	Overflow in second-feet	Date	Overflow in second-feet	Date	Overflow in second-feet	Date	Overflow in second-feet
Oct. 19	80	Mar. 7	110	Mar. 15	110	Aug. 7	250
Oct. 20	520	Mar. 8	200	Mar. 29	370	Aug. 8	1,200
Oct. 21	950	Mar. 9	110	Mar. 30	540	Aug. 9	2,700
Oct. 22	520	Mar. 10	370	Mar. 31	950	Aug. 10	1,480
Oct. 23	430	Mar. 11	1,100	Apr. 1	620	Aug. 11	1,200
Oct. 24	290	Mar. 12	800	Apr. 2	520	Aug. 12	200
Oct. 25	20	Mar. 13	520	Apr. 3	370	Aug. 13	130
Mar. 6	20	Mar. 14	370	Apr. 4	110	Aug. 14	50

ACCURACY.—Stage-discharge relation permanent at low and medium stages; at high stages affected by vegetation in overflow area. Rating curve used October 1 to April 30 well defined; rating curves used May 1 to September 30, well defined below and fairly well defined above 1,400 second-feet. Gage read to quarter tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for high stages, for which they are fair.

Discharge measurements of Des Plaines River at Lemont, Ill., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Mar. 27	4.85	1,960	June 27	5.00	1,930
Mar. 31	5.70	3,510	Aug. 8	6.17	3,370

Daily discharge, in second-feet, of Des Plaines River at Lemont, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	422	745	315		461	970	3,070	740	350	1,930	315	580
2	422	700	315		500	1,440	2,870	740	315	1,730	422	540
3	350	660	350		480	1,900	2,870	700	315	1,540	540	400
4	315	620	371		460	2,040	2,500	740	245	1,270	580	422
5	280	620	385		480	2,170	2,170	740	245	1,100	700	385
6	245	660	385	540	500	2,170	1,900	700	315	1,020	1,510	315
7	245	660	385		500	2,500	1,670	700	315	980	2,500	315
8	232	700	385		500	2,500	1,500	660	422	980	3,250	350
9	212	700	371		480	2,500	1,350	660	500	860	4,360	422
10	212	660	350		460	2,870	1,060	620	620	740	3,430	580
11	180	580	315	540	452	3,510	1,020	540	660	660	3,250	620
12	180	500	315	540	444	3,280	880	540	620	660	2,380	540
13	168	422	350	500	414	2,870	835	540	540	580	2,270	460
14	150	422	385	480	385	2,870	835	580	460	460	2,060	385
15	150	385	422	460	350	2,500	790	540	385	422	2,060	315
16	180	385	385	422	315	2,170	700	540	385	385	1,870	280
17	245	371	350	385	298	1,900	620	500	350	350	1,870	245
18	2,170	350	350	368	280	1,060	540	460	350	245	1,870	245
19	2,330	350	315	350	280	880	500	422	315	245	1,780	212
20	2,870	350	315	360	280	880	500	385	245	212	1,690	385
21	3,280	315	280	371	280	835	500	315	245	200	1,780	422
22	2,870	315	315	360	280	790	460	315	280	245	1,690	460
23	2,870	350	350	350	298	790	444	350	460	245	1,510	460
24	2,680	371	385	332	315	790	422	385	700	212	1,020	500
25	2,170	371	460	315	408	1,060	385	422	1,020	232	900	540

Daily discharge, in second-feet, of Des Plaines River at Lemont, Ill., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
26	2,030	385	540	280	500	1,560	385	422	1,360	212	860	460
27	1,900	350	620	245	668	1,900	422	422	1,730	180	780	422
28	1,100	315	620	280	835	2,170	460	385	1,930	212	700	385
29	925	245	660	315	902	2,870	540	385	1,730	180	660	350
30	790	280	660	368	-------	3,070	700	371	1,930	212	620	350
31	745	-------	700	422	-------	3,280	-------	350	-------	245	620	-------

NOTE.—Discharge interpolated, because of no gage-height record, Jan. 11, 14, 16, 18, 20, 22, 24, 26, 28, 30, Feb. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, Mar. 2, and 8. Discharge estimated Jan. 1–10, from observer's notes and weather records. Braced figure shows mean discharge for period indicated.

Monthly discharge of Des Plaines River at Lemont, Ill., for the year ending September 30, 1924

[Drainage area, 705 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,280	150	1,060	----------	----------
November	745	245	471	0.668	0.74
December	700	280	410	.582	.67
January		245	434	.616	.71
February	902	280	442	.627	.68
March	3,510	790	2,000	----------	----------
April	3,070	385	1,100	----------	----------
May	740	315	522	.740	.85
June	1,930	245	645	.915	1.02
July	1,930	180	605	.858	.99
August	4,360	315	1,610	----------	----------
September	620	212	414	.587	.65
The year	4,360	150	813	----------	----------

NOTE.—Discharge in second-feet per square mile and run-off in inches not computed for October, March, April, and August, on account of overflow into Chicago drainage canal at Willow Springs.

DES PLAINES RIVER AT JOLIET, ILL.

LOCATION.—In NE. ¼ sec. 9, T. 35 N., R. 10 E., at Jackson Street Bridge, Joliet, Will County, 1,200 feet above Cass Street Bridge.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—December 3, 1914, to September 30, 1924; at Cass Street Bridge September 5 to December 19, 1914.

GAGE.—Gurley water-stage recorder installed December 3, 1914; read by H. A. McCann.

DISCHARGE MEASUREMENTS.—Made from Cass Street Bridge.

CHANNEL AND CONTROL.—Channel excavated in solid rock, with a concrete wall on either side; permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during days of record for the year, 16,000 second-feet August 9; minimum mean daily discharge, 7,600 second-feet, December 15.

1914–1924: Maximum mean daily discharge during days of record, 18,400 second-feet, March 18, 1919; minimum mean daily discharge, 5,420 second-feet, April 25, 1915.

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

DIVERSIONS.—Water is diverted to Illinois & Michigan Canal at Dam No. 1 100 feet above gage.

REGULATION.—Flow past gage is largely regulated by operation of power plant of Chicago Sanitary District at Lockport, which utilizes the flow of Chicago drainage canal and, to a lesser extent, by the operation of Economy Light & Power Co's plant, 100 feet above gage.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by use of discharge integrator. Records good except for estimated periods for which they are fair.

The following discharge measurements were made:

Des Plaines River, June 13, 1924: Gage height, 5.54 feet; discharge measured at Ruby Street, above head of Illinois & Michigan Canal 11,600 second-feet.

Illinois & Michigan Canal: May 14, discharge, 424 second-feet; June 13, discharge, 371 second-feet.

Daily discharge, in second-feet, of Des Plaines River at Joliet, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9,060	9,150	[a]8,460	8,680	7,760	9,400	13,900	9,860	9,400	[a]11,500	9,950	10,100
2	8,700	9,050	8,730	8,450	8,390	9,220	13,000	9,750	9,300	[a]12,000	9,300	10,600
3	8,560	9,200	8,160	8,140	9,070	9,500	[b]12,600	9,500	9,810	[a]11,000	9,420	10,100
4	8,880	9,800	8,630	[a]7,940	9,620	11,100	[a]12,200	9,580	9,430	[a]10,500	9,700	9,480
5	[b]8,600	10,400	[a]9,200		10,000	11,300	11,800	9,480	[b]9,800	[a]10,200	9,750	9,850
6	[a]7,800	9,550	[a]8,500		8,790	11,300	11,300	9,800	[b]9,800	[a]10,200	12,700	9,450
7	7,750	9,800	8,050		[a]8,600	10,400	11,500	9,780	[a]10,000		[a]13,000	9,150
8	8,420	9,580	8,000	[b]7,800	[a]8,400	10,800	11,200	9,900	11,000	[b]10,500	13,400	9,700
9	8,250	8,880	7,600		7,880	10,600	11,100	10,100	11,500		16,000	10,200
10	7,890	7,900	7,970		8,300	10,400	10,800	9,920	11,800	[a]10,300	15,200	10,100
11	8,020	8,640	7,800		7,840	10,700	10,600	10,000	11,000	[a]10,300	14,500	9,700
12	8,080	9,030	7,880	[a]7,700	8,060	10,700	10,200	9,900	[b]11,000	[a]10,100	13,800	9,380
13	8,120	8,890	[a]8,580	[a]7,700	8,500	10,800	9,880	9,740	[a]10,500	10,200	13,500	8,520
14	7,900	8,310	8,410		8,000	11,000	10,200	9,670	10,300	10,300	12,500	9,580
15	8,120	8,580	7,600	[b]7,700	8,180	10,900	10,000	9,750	10,700	10,000	11,900	9,750
16	8,060	7,680	8,050		8,420	10,200	9,950	9,660	10,300	9,900	10,800	9,720
17	8,810	7,980	8,120	[a]7,600	8,480	10,300	9,860	9,300	10,200	10,100	11,000	9,600
18	9,820	8,480	8,350	7,480	8,290	10,200	9,790	9,920	10,300	10,100	11,100	9,550
19	11,900	8,530	8,320	7,520	8,620	10,000	9,150	9,750	10,100	9,950	11,800	9,580
20	11,900	7,980	8,170	7,710	8,470	10,300	9,660	9,620	10,300	9,750	12,200	10,300
21	11,900	8,100	[a]8,300		8,500	[a]10,300	9,740	9,530	10,000	10,100	[a]12,000	9,600
22	12,100	8,530	[a]8,500	[b]7,600	[a]8,300	[a]10,000	[a]9,710	9,140	10,500	10,000	[a]11,800	9,680
23	11,400	8,520	9,460			9,980	[a]9,600	9,470	11,800	9,780	11,600	9,850
24	[b]11,000	8,140	8,700	[a]7,600		11,200	9,460	9,600	12,000	10,100	11,300	10,000
25	[a]10,500	8,240	8,650	7,530	[b]8,300	11,500	9,720	9,110	[a]13,200	10,200	11,600	9,800
26	9,920	8,400	8,880	7,290		11,900	9,700	9,210	[a]12,300	9,800	11,300	9,720
27	9,740	8,160	9,000	7,600		11,800	9,920	9,350	12,200	9,550	10,800	9,100
28	9,560	8,330	8,720	7,620	[a]8,600	[a]12,500	9,880	9,450	[a]12,000	9,920	10,800	9,700
29	9,420	8,180	8,600	7,850	8,800	[a]15,000	9,880	9,580	[a]13,000	9,680	[a]10,700	10,000
30	9,600	[a]8,400	9,300	8,020	-------	15,700	10,000	9,360	[a]12,000	9,850	[a]10,300	10,300
31	9,300	-------	9,580	8,010	-------	15,000	-------	9,300	-------	10,000	9,820	-------

[a] Discharge partly estimated because of incomplete gage record.
[b] No record, discharge estimated; braced figures give mean discharge for period indicated.

NOTE.—Daily discharge in the above table does not include flow in Illinois & Michigan Canal (see "Diversions" in station description).

Monthly discharge of Des Plaines River at Joliet, Ill., for the year ending September 30, 1924

Month	Discharge in second-feet			Month	Discharge in second-feet		
	Maximum	Minimum	Mean		Maximum	Minimum	Mean
October	12,100	7,750	9,330	May	10,100	9,110	9,620
November	10,400	7,680	8,680	June	13,200	9,300	10,900
December	9,580	7,600	8,460	July	12,000	9,550	10,200
January	-------	-------	7,770	August	16,000	9,300	11,700
February	10,000	-------	8,460	September	10,600	8,520	9,740
March	15,700	9,220	11,100				
April	13,900	9,150	10,500	The year	16,000	7,600	9,710

FOX RIVER AT ALGONQUIN, ILL.

LOCATION.—In NW. ¼ sec. 34, T. 43 N., R. 8 E. third principal meridian, at Chicago Street Bridge in Algonquin, McHenry County, 100 feet above Public Service Co's dam and 300 feet above Crystal Lake outlet.

RECORDS AVAILABLE.—October 1, 1915, to September 30, 1924.

DRAINAGE AREA.—1,340 square miles (measured on map of United States Geological Survey; scale, 1:500,000).

GAGE.—Enamel staff gage attached to concrete abutment of bridge; read by Edward Pedersen.

CHANNEL AND CONTROL.—Control is a concrete dam 100 feet below gage; permanent since August, 1919.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.50 feet April 4 and August 22 (discharge, 3,660 second-feet); minimum stage, 1.19 feet January 28 (discharge, 347 second-feet).

1916–1924: Maximum stage recorded, 5.3 feet March 31, 1916 (discharge, 7,120 second-feet); minimum stage, 0.59 foot August 31, 1918 (discharge, 67 second-feet).

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

REGULATION.—Gristmill at dam runs on average of about 4 hours a day except Sundays during September to March, inclusive, and one day a week during remainder of year. Effect of operation of mill on gage heights is appreciable only at low stages and gage is usually read when mill is not running.

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

The following discharge measurement was made:

April 4, 1924: Gage height, 3.47 feet; discharge, 3,610 second-feet.

Daily discharge, in second-feet, of Fox River at Algonquin, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	695	1,040	805	750	474	590	3,280	1,720	805	1,950	805	2,420
2	640	1,040	805	750	512	630	3,470	1,650	805	1,950	805	2,420
3	640	980	860	695	550	695	3,470	1,650	750	1,880	860	2,260
4	620	980	860	695	590	860	3,660	1,580	750	1,880	1,230	2,100
5	600	1,040	860	640	630	980	3,470	1,510	750	1,800	1,880	1,880
6	600	1,040	805	640	610	1,100	3,470	1,510	695	1,720	2,420	1,720
7	580	980	805	590	570	1,160	3,280	1,440	695	1,650	2,920	1,650
8	570	920	750	560	540	1,300	3,280	1,440	750	1,650	3,100	1,580
9	560	860	750	580	521	1,370	3,280	1,370	805	1,580	3,280	1,580
10	540	860	750	600	540	1,510	3,280	1,300	860	1,580	3,470	1,440
11	521	805	695	620	560	1,510	3,100	1,230	920	1,510	3,470	1,370
12	521	805	695	640	580	1,510	2,750	1,230	980	1,440	3,470	1,300
13	502	805	695	640	580	1,510	2,580	1,230	980	1,370	3,660	1,300
14	502	805	695	640	560	1,510	2,580	1,160	920	1,300	3,660	1,230
15	483	750	640	640	540	1,580	2,420	1,160	860	1,300	3,470	1,160
16	492	750	640	620	521	1,650	2,420	1,100	805	1,230	3,470	1,100
17	560	695	620	600	521	1,650	2,100	1,100	805	1,160	3,470	1,100
18	750	640	600	580	540	1,720	1,950	1,100	750	1,160	3,470	1,100
19	1,040	610	600	540	560	1,720	1,880	1,160	750	1,100	3,660	1,040
20	1,160	580	620	492	580	1,800	1,800	1,100	805	1,100	3,660	1,040
21	1,160	600	640	454	600	1,800	1,720	1,040	805	1,100	3,660	980
22	1,230	600	630	445	620	1,800	1,650	980	860	1,040	3,660	980
23	1,230	620	640	427	600	1,880	1,510	980	980	1,040	3,660	980
24	1,230	620	695	409	580	1,880	1,440	980	1,160	980	3,470	920
25	1,230	600	750	391	560	1,950	1,440	1,040	1,230	980	3,470	920
26	1,160	620	805	373	540	1,950	1,510	1,100	1,300	920	3,280	860
27	1,160	640	860	355	521	2,100	1,510	1,100	1,370	920	3,100	860
28	1,100	695	805	355	540	2,260	1,580	980	1,510	860	3,100	860
29	1,100	750	805	373	560	2,580	1,650	920	1,800	860	2,920	860
30	1,100	750	750	400	-------	2,920	1,650	920	1,880	805	2,750	860
31	1,100	-------	750	436	-------	3,100	-------	860	-------	805	2,580	-------

Monthly discharge of Fox River at Algonquin, Ill., for the year ending September 30, 1924

[Drainage area, 1,340 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,230	483	819	0.611	0.70
November	1,040	580	783	.584	.65
December	860	600	732	.546	.63
January	750	355	546	.407	.47
February	630	474	559	.417	.45
March	3,100	590	1,630	1.22	1.41
April	3,660	1,440	2,440	1.82	2.03
May	1,720	860	1,210	.903	1.04
June	1,880	695	971	.725	.81
July	1,950	805	1,310	.978	1.13
August	3,660	805	2,960	2.21	2.55
September	2,420	860	1,330	.993	1.11
The year	3,660	355	1,280	.955	12.98

FOX RIVER AT WEDRON, ILL.

LOCATION.—In sec. 9, T. 34 N., R. 4 E., at highway bridge in Wedron, La Salle County, 1,000 feet above Buck Creek.

DRAINAGE AREA.—2,500 square miles.

RECORDS AVAILABLE.—November 5, 1914, to September 30, 1924.

GAGE.—Chain gage attached to bridge; read by Charles Davis.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge.

CHANNEL AND CONTROL.—Bed of river at measuring section is soft and probably shifts. Control 1,000 feet downstream of coarse gravel and large boulders; practically permanent; affected at times by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.6 feet August 9 (discharge, 10,100 second-feet); minimum stage, 6.21 feet October 12 (discharge, 500 second-feet).

1915–1924: Maximum stage recorded, 17.22 feet January 22, 1916 (discharge not determined because of backwater from ice). Maximum open-water stage recorded, 14.2 feet March 26, 1920 (discharge, 17,900 second-feet). Minimum discharge, 105 second-feet, November 20, 1914 (measured by current meter).

REGULATION.—Slight diurnal fluctuation is caused by operation of power plants at and above Aurora.

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

ACCURACY.—Stage-discharge relation affected by vegetation in channel in fall and summer; by ice during winter. Rating curves well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during winter for which they are fair.

Discharge measurements of Fox River at Wedron, Ill., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 3	6.62	752	Feb. 29	8.58	2,920	July 24	7.21	1,240
Nov. 7	7.31	1,390	May 14	7.39	1,570			

Daily discharge, in second-feet, of Fox River at Wedron, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	750	1,360	1,070	940		3,570	5,830	2,200	1,160	3,060	980	3,220
2	750	1,360	980	528		3,220	5,830	2,070	1,020	2,900	940	3,220
3	750	1,260	940		1,700	3,220	5,610	2,200	1,160	2,750	860	3,220
4	715	1,360	1,160			3,750	5,390	1,940	1,020	2,600	820	2,750
5	680	1,260	1,160			3,220	5,390	1,940	900	2,460	1,260	2,460
				730								
6	680	1,460	1,160			3,060	5,180	1,820	900	2,320	3,940	2,320
7	680	1,360	1,070			2,190	4,970	1,940	860	2,320	7,340	2,190
8	615	1,260	980			2,190	4,970	1,940	1,360	2,320	6,580	2,060
9	648	1,260	900			2,190	4,760	1,820	3,060	2,190	8,960	2,060
10	680	1,160	860			2,190	4,760	1,690	2,750	2,190	6,580	1,930
11	648	1,020	940	1,400		2,190	4,150	1,690	1,930	2,060	5,850	1,930
12	585	900	820			2,060	3,950	1,570	1,690	2,060	5,390	1,810
13	615	1,070	1,020			2,320	3,750	1,690	1,460	1,930	5,170	1,690
14	615	1,020	820			2,460	3,560	1,570	1,360	1,810	5,170	1,460
15	585	980	820			2,460	3,380	1,570	1,260	1,690	4,960	1,360
					1,100							
16	615	980	750			2,190	3,210	1,570	1,260	1,460	4,960	1,460
17	715	980	680			2,190	3,050	1,460	1,260	1,360	4,750	1,360
18	820	900	900			2,320	2,750	1,460	1,160	1,260	4,540	1,360
19	2,060	860	785			2,320	2,750	1,400	1,070	1,160	5,390	1,260
20	2,460	980	860			2,320	2,460	1,460	1,070	1,070	8,400	2,190
21	2,190	860	820			2,320	2,330	1,400	1,020	1,020	7,600	2,060
22	1,810	820	860	1,000		2,320	2,330	1,400	1,020	1,360	7,860	1,930
23	1,930	860	940			2,320	2,070	1,300	2,320	1,260	7,080	1,460
24	1,810	900	980			2,750	2,070	1,340	2,750	1,260	6,090	1,260
25	1,690	860	1,260			3,060	1,820	1,400	4,340	1,160	5,390	1,260
26	1,690	820	1,160			4,140	1,940	1,340	4,540	1,160	4,960	1,260
27	1,690	900	1,260		1,800	3,940	2,070	1,400	4,540	1,070	4,750	1,160
28	1,570	820	1,260			3,940	2,070	1,300	4,140	980	4,340	1,160
29	1,360	860	1,260		3,390	5,170	2,200	1,150	3,570	1,070	4,140	1,070
30	1,570	940	1,260	1,900	-------	7,080	2,200	1,100	3,220	1,160	3,750	1,160
31	1,460	-------	940		-------	5,850	-------	1,100	-------	1,160	3,390	-------

NOTE.—Discharge Jan. 3 to Feb. 29 estimated, because of ice, from gage heights, results of discharge measurements, observer's notes, and weather records. Braced figures give mean discharge for periods indicated.

Monthly discharge of Fox River at Wedron, Ill., for the year ending September 30, 1924

[Drainage area, 2,500 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,460	585	1,140	0.456	0.53
November	1,460	820	1,050	.420	.47
December	1,260	680	990	.396	.46
January	----------	528	1,080	.432	.50
February	3,390	----------	1,350	.540	.58
March	7,080	2,060	3,050	1.22	1.41
April	5,830	1,820	3,560	1.42	1.58
May	2,200	1,100	1,590	.636	.73
June	4,540	860	1,970	.788	.88
July	3,060	980	1,730	.692	.80
August	8,960	820	4,910	1.96	2.26
September	3,220	1,070	1,840	.736	.82
The year	8,960	528	2,020	.808	11.02

VERMILION RIVER NEAR STREATOR, ILL.

LOCATION.—In sec. 1, T. 30 N., R. 3 E. third principal meridian, at highway bridge known as Bridge No. 3, 1½ miles south of Streator, La Salle County, and 100 feet below Santa Fe Railway bridge.

DRAINAGE AREA.—1,080 square miles.

RECORDS AVAILABLE.—July 27, 1914, to September 30, 1924.

GAGE.—Chain gage attached to highway bridge; read by Andrew Gall.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel gravel and rocks. Brush and timber growing on banks above low-water stages. Control loose rocks at low stages; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.6 feet June 28 (discharge, 6,410 second-feet); minimum stage, 0.67 foot October 1 and 2 (discharge, 0.2 second-foot).

1914–1924: Maximum stage recorded, 22.9 feet April 20, 1920 (discharge, 16,500 second-feet); minimum, no flow August 25–28, September 16–30, 1920, August 24–27, September 3, and 4, 1923.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation changed slightly during June, probably by shifting of loose rocks below gage; affected by ice for a short period during winter. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Open-water records good except for very low stages, for which they are fair; records during period of ice effect poor.

Discharge measurements of Vermilion River near Streator, Ill., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 3	0.66	[a] 0.1	Feb. 29	7.79	2,470
Nov. 7	2.04	88.0	July 24	2.20	139

[a] Estimated.

Daily discharge, in second-feet, of Vermilion River near Streator, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.2	66	61	695		2,580	2,780	660	116	2,400	21	346
2	.2	63	61	695		2,160	2,400	625	107	1,560	64	507
3	.2	63	64	695		1,610	1,980	625	107	1,310	38	474
4	.3	69	66		1,050	1,560	1,610	491	98	1,050	110	441
5	.3	58	63			1,610	1,410	425	116	672	69	377
6	.4	51	625			1,510	1,210	425	136	277	72	286
7	.3	81	930		1,510	1,360	1,050	392	392	639	59	272
8	.4	158	1,460		1,660	1,170	930	425	458	507	160	231
9	.5	158	1,810		1,610	1,050	850	425	2,640	409	4,700	182
10	.6	147	1,050	550	1,310	930	695	392	1,920	346	2,520	182
11	.7	158	930		1,090	770	625	327	1,510	286	1,660	160
12	.7	98	770		970	730	557	295	1,130	441	1,410	139
13	.7	81	1,660		930	810	491	280	930	890	1,210	101
14	.6	42	1,980		930	1,260	458	264	890	705	1,090	84
15	.6	91	2,220		930	1,210	425	249	660	606	775	129
16	.6	88	1,560		930	1,090	660	234	458	474	606	101
17	1.8	88	1,660		930	1,010	590	206	392	377	507	105
18	3.0	94	1,090		890	970	524	181	343	286	409	91
19	158	81	1,310		695	890	458	181	359	231	606	98
20	181	78	1,090		660	890	425	170	359	206	1,210	139
21	327	72	695		590	810	458	158	327	182	2,640	258
22	392	69	695		557	770	425	147	343	182	2,990	194
23	359	69	695		557	1,050	359	136	359	150	2,640	182
24	181	63	695	130	392	1,460	327	136	234	150	2,520	160
25	158	63	695		327	1,660	327	136	4,140	150	1,560	139
26	158	61	695		327	1,860	458	126	3,060	171	1,050	115
27	98	58	695		770	1,660	850	116	2,280	98	850	139
28	98	56	695		1,660	1,560	970	107	6,410	87	705	171
29	95	58	695		2,520	1,920	810	116	4,220	87	507	160
30	81	63	695		-------	3,270	730	116	3,130	81	409	150
31	66	-------	695		-------	3,270	-------	107	-------	38	286	-------

NOTE.—Stage-discharge relation affected by ice Jan. 4 to Feb. 6, discharge estimated from gage heights and weather records. Braced figures show mean discharge for periods indicated. Discharge interpolated Dec. 3.

Monthly discharge of Vermilion River near Streator, Ill., for the year ending September 30, 1924

[Drainage area, 1,080 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	392	0.2	76.3	0.071	0.08
November	158	42	81.5	.075	.08
December	2,220	61	907	.840	.97
January	----------	----------	347	.321	.37
February	2,520	----------	1,000	.926	1.00
March	3,270	730	1,430	1.32	1.52
April	2,780	327	861	.797	.89
May	660	107	280	.259	.30
June	6,410	98	1,250	1.16	1.29
July	2,400	38	489	.453	.52
August	4,700	21	1,080	1.00	1.15
September	507	84	204	.189	.21
The year	6,410	.2	667	.618	8.38

MACKINAW RIVER NEAR GREEN VALLEY, ILL.

LOCATION.—In sec. 15, T. 23 N., R. 5 W., at Chicago & Northwestern Railway bridge, 3 miles north of Green Valley, Tazewell County.

DRAINAGE AREA.—1,100 square miles (measured on United States Geological Survey map; scale, 1: 500,000).

RECORDS AVAILABLE.—March 9, 1921, to September 30, 1924.

GAGE.—Chain gage attached to guardrail on downstream side of bridge; installed March 28, 1921; read by John Eggena.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel is sandy and somewhat shifting. Banks are overflowed during extremely high water. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.32 feet August 22 (discharge, 18,500 second-feet); minimum stage, 0.78 foot October 10, 11, 12, and 16 (discharge, 38 second-feet).

1921–1924: Maximum stage occurred August 22, 1924; minimum discharge, 30 second-feet September 28 to October 5, October 13 and 14, 1922

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

ACCURACY.—Stage-discharge relation changed slightly during February, June, and August; affected by ice in winter. Rating curves well defined below and fairly well defined above 10,000 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, fair for ice periods.

Discharge measurements of Mackinaw River near Green Valley, Ill., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 4	0.90	48.6	July 8	3.70	663
Apr. 8	4.21	1,020	Aug. 23	11.16	9,650

Daily discharge, in second-feet, of Mackinaw River near Green Valley, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	68	240	142	690	3,900	1,800	2,660	700	179	4,900	189	1,100
2	63	229	150	690	3,150	1,660	1,960	700	179	2,210	268	2,080
3	51	218	150	645	2,430	1,520	1,660	570	161	1,640	220	1,760
4	49	207	176	600	2,430	1,200	1,590	490	161	1,340	199	1,440
5	47	240	265	560	4,800	1,140	1,380	455	161	1,200	179	1,160
6	45	265	735	480	4,800	1,260	1,260	420	800	935	170	970
7	40	315	1,480			1,200	1,020	455	455	715	189	805
8	40	375	1,360	700	2,850	1,080	960	490	905	665	161	620
9	40	315	1,180			905	850	420	700	575	1,960	620
10	38	290	945			800	800	402	530	535	1,560	620
11	38	265	785		2,120	750	700	385	455	455	875	575
12	38	240	690		1,960	700	700	340	355	3,600	575	535
13	42	229	2,250		2,210	750	655	325	270	2,210	268	495
14	40	218	2,340		2,840	700	610	310	233	1,480	256	495
15	40	218	2,430		2,840	905	570	295	221	935	199	455
16	38	218	1,920	2,000	3,200	905	530	282	199	715	232	420
17	89	207	1,480		3,400	800	530	282	199	620	199	420
18	229	196	1,240			750	570	270	179	495	170	420
19	600	186	1,180			750	490	258	170	420	295	370
20	1,480	186	1,120			700	455	245	161	385	2,040	1,300
21	1,420	176	1,060			700	455	245	145	340	5,850	855
22	945	167	1,000		1,600	750	420	221	130	495	18,500	710
23	735	167	1,000			850	420	210	1,590	310	11,400	620
24	600	158	1,000			1,080	385	210	570	455	8,430	535
25	480	158	1,120	1,400		1,260	370	210	2,120	665	5,850	495
26	410	158	1,180			1,380	1,260	199	1,590	340	3,800	385
27	345	150	1,240		700	1,380	800	189	1,880	325	3,240	355
28	302	150	1,180		1,880	1,260	750	179	7,890	256	2,520	385
29	278	142	1,060		1,880	3,600	750	179	8,430	220	1,840	535
30	265	142	945		-------	3,800	700	189	5,990	268	1,600	455
31	240	-------	690	4,100	-------	3,020	-------	179	-------	232	1,300	-------

NOTE.—Discharge estimated on account of ice Jan. 7–29, Feb. 7–10, 18–26, 29, and Mar. 1, from observer's notes, gage readings, and weather records.

Monthly discharge of Mackinaw River near Green Valley, Ill., for the year ending September 30, 1924

[Drainage area, 1,100 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,480	38	295	0.268	0.31
November	375	142	214	.195	.22
December	2,430	142	1,080	.982	1.13
January	4,100	----------	1,440	1.31	1.51
February	4,800	700	2,430	2.21	2.38
March	3,800	700	1,270	1.15	1.36
April	2,660	370	875	.795	.89
May	700	179	332	.302	.35
June	8,430	130	1,230	1.12	1.25
July	4,900	220	966	.878	1.01
August	18,500	161	2,400	2.18	2.51
September	2,080	355	733	.666	.74
The year	18,500	38	1,100	1.00	13.66

SPOON RIVER AT SEVILLE, ILL.

LOCATION.—In sec. 24, T. 6 N., R. 1 E. fourth principal meridian, at Toledo, Peoria & Western Railway bridge one-fourth mile east of railway station at Seville, Fulton County.

DRAINAGE AREA.—1,600 square miles.

RECORDS AVAILABLE.—July 24, 1914, to September 30, 1924.

GAGE.—Chain gage attached to bridge; read by R. M. Boales.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—A loose rock and timber dam 1½ miles below gage probably forms control at medium stages; at other stages control is clay and sand; somewhat shifting.

EXTREMES OF STAGE.—Maximum stage recorded during year, 30.5 feet August 22 (discharge, 28,900 second-feet); minimum stage, 2.97 feet October 11 (discharge, 58 second-feet).

1914–1924: Maximum stage occurred August 22, 1924; minimum stage, 1.35 feet July 31 and August 27–29, 1914 (discharge, 3.8 second-feet).

High water of September, 1911, reached a height of approximately 25.8 feet on present gage; flood of 1883 when there was backwater from ice reached a stage of about 33.0 feet on the present gage.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation changed during high water in March; affected by ice during short periods in winter and by drift during high water in August. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except for period of ice effect. Records fair, except during period of ice effect and for high stages August 23 to September 30 for which they are poor.

The following discharge measurements were made:

April 9, 1924: Gage height, 5.63 feet; discharge, 808 second-feet.

June 30, 1924: Gage height, 25.43 feet; discharge, 19,900 second-feet.

August 24, 1924: Gage height, 24.71 feet; discharge, 16,900 second-feet.

Daily discharge, in second-feet, of Spoon River at Seville, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,100	156	180	322		4,120	1,770	550	228	16,400	670	1,050
2	560	150	180	281		3,240	1,540	470	256	11,600	590	2,610
3	375	150	195			2,430	1,380	435	256	2,550	1,210	1,890
4	240	156	225			1,430	1,210	400	256	2,010	550	1,710
5	162	142	210			1,260	1,100	382	590	1,710	452	1,000
				160								
6	142	150	195			950	1,000	365	400	1,480	435	850
7	118	156	180			805	900	348	435	1,260	2,070	715
8	107	142	180			630	850	365	760	1,260	1,160	630
9	96	135	174			470	805	348	1,050	1,000	4,980	760
10	70	130	156			400	805	400	2,250	900	3,700	670
11	58	135	171			550	630	348	1,950	850	2,790	630
12	85	130	180			510	550	330	950	715	2,430	590
13	96	125	520			550	550	315	1,000	1,830	1,160	550
14	89	130	392			510	590	285	670	1,050	900	510
15	85	150	410		1,500	510	550	285	2,070	715	805	470
16	89	180	322			452	470	270	1,100	630	715	452
17	210	180	270			435	452	270	590	630	670	435
18	322	156	270			418	452	256	510	510	590	435
19	358	180	288			435	435	270	435	510	510	418
20	410	195	305	1,300		418	400	256	382	550	3,040	760
21	480	180	288			400	382	242	330	550	5,360	630
22	358	174	270			435	365	228	300	3,500	25,200	1,480
23	305	180	288			550	365	215	550	1,830	23,000	760
24	255	180	322			715	270	285	1,540	1,650	17,800	590
25	210	156	392			805	330	270	10,600	2,130	14,100	510
26	180	150	462			950	760	256	7,900	1,380	8,080	452
27	168	150	480			1,160	715	228	6,040	1,000	2,310	418
28	150	142	428			805	670	228	10,900	715	1,770	452
29	140	145	358			1,480	630	270	12,600	590	1,480	435
30	168	156	340		-------	2,670	630	256	20,400	1,770	1,260	452
31	162	-------	340		-------	2,130	-------	242	-------	1,210	1,100	-------

NOTE.—Discharge Jan. 3 to Feb. 29 estimated because of ice, from gage heights, observer's notes, and weather records.

Monthly discharge of Spoon River at Seville, Ill., for the year ending September 30, 1924

[Drainage area, 1,600 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,100	58	237	0.148	0.17
November	195	125	155	.097	.11
December	520	156	289	.181	.21
January	----------	----------	1,010	.631	.73
February	----------	----------	[a] 1,500	.938	1.01
March	4,120	400	1,050	.656	.76
April	1,770	270	719	.449	.50
May	550	215	312	.195	.22
June	20,400	228	2,910	1.82	2.03
July	16,400	510	2,080	1.30	1.50
August	25,200	435	4,220	2.64	3.04
September	2,610	418	777	.486	.54
The year	25,200	58	1,270	.794	10.82

[a] Estimated.

SANGAMON RIVER AT MONTICELLO, ILL.

LOCATION.—In sec. 12, T. 18 N., R. 5 E. third principal meridian, at Illinois Central Railroad bridge half a mile west of Monticello, Piatt County.

DRAINAGE AREA.—550 square miles.

RECORDS AVAILABLE.—February 4, 1908, to December 31, 1912; June 23, 1914, to September 30, 1924.

GAGE.—Chain gage attached to downstream side of bridge; read by Malon Taylor.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge and wooden trestle approach or by wading.

CHANNEL AND CONTROL.—Control consists of fine gravel; likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.4 feet August 21 (discharge, 5,250 second-feet); minimum stage, 2.60 feet October 11–13 and August 8 (discharge, 40 second-feet).

1908–1912; 1914–1924: Maximum stage recorded, 15.2 feet May 14, 1908 (discharge, 9,280 second-feet); minimum stage, 1.5 feet July 31 to August 3, 1914 (discharge, 1 second-foot).

Maximum stage during flood of March and April, 1913, 17.7 feet March 25 (discharge unknown).

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

ACCURACY.—Stage-discharge relation changed slightly during August; affected by ice January 25–30. Rating curves well defined below 1,000 second-feet; fairly well defined above. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Sangamon River at Monticello, Ill., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 5	3.26	84.2	July 3	10.79	1,990
Apr. 11	7.24	612	Sept. 28	3.63	96.3

Daily discharge, in second-feet, of Sangamon River at Monticello, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	203	726	263	684	1,520	664	1,820	770	239	4,650	46	1,290
2	147	684	288	644	1,570	560	1,690	726	275	3,170	59	1,420
3	117	644	314	606	1,630	455	1,470	664	301	2,150	62	1,750
4	99	802	396	588	1,690	440	1,290	618	288	1,420	66	1,520
5	90	960	1,630	553	1,970	410	1,050	471	275	1,050	59	1,090
6	82	1,170	1,820	544	2,150	536	940	410	960	784	52	950
7	70	1,250	2,060	536	2,350	588	820	396	1,630	519	46	702
8	59	1,170	2,460	503	2,060	553	726	382	1,760	455	40	454
9	52	990	1,920	553	1,420	512	644	354	1,890	410	314	393
10	46	726	1,370	726	1,100	471	624	327	1,470	368	362	335
11	40	648	1,290	795	770	455	606	314	1,050	327	410	293
12	40	570	1,210	845	726	440	588	301	770	288	251	253
13	40	519	2,350	786	644	455	514	275	664	270	158	227
14	46	471	2,930	726	553	553	440	263	519	251	137	202
15	52	455	2,810	624	536	684	410	251	458	215	108	178
16	52	440	2,250	588	503	627	396	227	396	191	90	166
17	251	471	1,690	396	536	570	440	203	340	180	78	155
18	770	420	1,630	382	570	519	410	221	314	158	66	144
19	1,330	368	1,570	354	553	487	382	239	275	147	59	133
20	1,630	327	1,370	354	487	471	368	215	263	137	1,170	123

Daily discharge, in second-feet, of Sangamon River at Monticello, Ill., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
21	2,100	314	1,420	354	471	455	354	203	410	127	4,950	201
22	2,570	301	1,470	340	440	440	327	191	640	117	3,170	279
23	1,820	288	1,360	327	425	542	314	180	870	108	2,150	214
24	1,470	275	1,250	314	350	644	275	203	930	99	2,600	155
25	1,170	269	1,210	288	275	684	263	192	1,020	90	3,050	123
26	960	263	1,170	275	263	726	410	180	1,170	82	1,690	103
27	770	263	1,210	322	368	770	628	158	1,130	78	1,470	93
28	759	251	1,170	368	410	845	845	147	1,290	74	1,330	84
29	748	239	1,090	410	503	1,570	770	215	3,200	66	1,210	75
30	704	251	1,010	1,250	-------	1,910	748	227	5,100	59	1,090	66
31	644	-------	930	1,470	-------	2,350	-------	203	-------	52	1,190	-------

NOTE.—Gage not read on Sundays; discharge interpolated. Discharge Jan. 25–30 estimated on account of ice from weather records, gage heights, and observer's notes.

Monthly discharge of Sangamon River at Monticello, Ill., for the year ending September 30, 1924

[Drainage area, 550 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	2,570	40	611	1.11	1.28
November	1,250	239	551	1.00	1.12
December	2,930	263	1,450	2.64	3.04
January	1,470	275	565	1.03	1.19
February	2,350	263	925	1.68	1.81
March	2,350	410	690	1.25	1.44
April	1,820	263	685	1.25	1.40
May	770	147	314	.571	.66
June	5,100	239	997	1.81	2.02
July	4,650	52	584	1.06	1.22
August	4,950	40	888	1.61	1.86
September	1,750	66	439	.798	.89
The year	5,100	40	724	1.32	17.93

SANGAMON RIVER AT RIVERTON ILL.

LOCATION.—In SE. ¼ SW. ¼ sec. 9, T. 16 N., R. 4 W. third principal meridian, at Wabash Railroad bridge, one-fourth mile west of Riverton, Sangamon County, and 2½ miles below mouth of South Fork.

DRAINAGE AREA.—2,560 square miles.

RECORDS AVAILABLE.—February 13, 1908, to December 31, 1912; August 7, 1914, to September 30, 1924.

GAGE.—Chain gage attached to bridge; read by J. J. Washburn.

DISCHARGE MEASUREMENTS.—Made from railroad bridge, from highway bridge one-fourth mile upstream, or by wading.

CHANNEL AND CONTROL.—Measuring section is at a pool; control consists of fine gravel; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage during year probably occurred in December when no record was obtained; maximum stage recorded, 22.90 feet June 28 (discharge, 9,500 second-feet); minimum discharge, 214 second-feet, August 19.

1908–1912; 1914–1924: Maximum stage recorded, 28.22 feet April 11, 1922 (discharge, 22,700 second-feet); minimum stage, 6.9 feet October 3–15, 1915 (discharge, 3 second-feet).

High water of 1883 reached a height of approximately 32 feet on present gage, and that of 1875 is said to have been 0.5 foot lower (discharge not determined).

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

ACCURACY.—Stage-discharge relation changed slightly during winter. Rating curves well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

The following discharge measurements were made:
October 4, 1923: Gage height, 10.00 feet; discharge, 607 second-feet.
April 11, 1924: Gage height, 15.81 feet; discharge, 2,690 second-feet.
July 3, 1924: Gage height, 19.38 feet; discharge, 4,830 second-feet.

Daily discharge, in second-feet, of Sangamon River at Riverton, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,500	2,840	1,010	------	1,660	8,500	1,550	1,620	6,800	398	1,940
2	943	2,950	1,040	------	1,700	8,500	1,580	1,500	6,200	398	1,700
3	717	3,120	1,180	------	1,740	8,500	1,540	1,660	4,930	398	1,740
4	597	2,730	1,460	------	1,780	8,500	1,420	1,700	4,180	448	1,420
5	513	3,420	3,360	------	1,780	7,900	1,420	1,980	4,600	423	1,460
6	460	3,800	5,300	------	1,780	6,900	1,280	3,540	4,930	398	1,620
7	410	3,940	------	------	1,780	6,700	1,280	3,840	4,460	328	1,350
8	364	4,010	------	------	1,660	4,180	1,320	3,840	3,180	285	1,210
9	342	3,600	------	------	1,660	3,840	1,180	4,320	2,020	264	1,240
10	300	3,420	------	5,800	1,660	3,180	1,070	4,180	1,820	285	930
11	280	2,840	------	4,840	1,900	2,530	1,070	4,180	1,380	398	765
12	260	2,840	------	4,320	1,580	2,380	930	4,250	1,280	448	671
13	260	2,580	------	3,780	1,580	2,340	1,000	4,110	1,240	448	733
14	280	2,270	------	3,030	1,820	2,060	830	3,660	1,140	448	641
15	300	1,920	------	2,480	1,900	1,820	765	2,930	965	328	474
16	321	1,780	------	2,300	1,860	1,700	733	1,980	1,000	264	448
17	717	1,660	------	2,380	1,980	1,580	733	1,660	965	264	306
18	1,460	1,620	------	3,030	2,020	1,420	733	1,420	863	234	328
19	5,820	1,500	------	3,420	1,980	1,350	765	1,210	830	214	328
20	7,390	1,420	------	3,420	1,900	1,280	702	1,140	797	224	328
21	7,800	1,340	------	3,030	1,940	1,280	702	1,210	765	398	306
22	7,800	1,220	------	2,580	1,980	1,240	474	1,980	733	671	285
23	7,520	1,220	------	2,300	2,020	1,140	733	2,980	671	1,320	306
24	6,870	1,180	------	2,060	2,300	1,100	733	3,540	702	1,980	306
25	6,040	1,120	------	1,780	2,430	1,040	733	6,300	1,000	2,480	285
26	5,300	1,080	------	1,700	2,630		702	8,100	1,070	3,180	285
27	4,660	1,040	------	1,620	2,780		702	9,500	896	3,660	306
28	4,360	1,010	------	1,620	2,730	1,250	765	9,500	930	3,780	306
29	3,800	976	------	1,580	3,300		1,500	9,200	765	3,540	285
30	3,420	1,010	------	------	7,100		1,900	7,800	641	3,080	234
31	3,060	------	------	------	8,100	------	1,900	------	448	2,780	------

NOTE.—No records Dec. 7 to Feb. 9 on account of gage being removed; No gage readings Apr. 26 to May 1; discharge estimated from records on Sangamon River at Monticello and South Fork of Sangamon River near Taylorville.

Monthly discharge of Sangamon River at Riverton, Ill., for the year ending September 30, 1924

[Drainage area, 2,560 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	7,800	260	2,710	1.06	1.22
November	4,010	976	2,180	.852	.95
February 10–29	5,800	1,580	2,850	1.11	.83
March	8,100	1,580	2,360	.922	1.06
April	8,500		3,240	1.27	1.42
May	1,900	474	1,060	.414	.48
June	9,500	1,140	3,830	1.50	1.67
July	6,800	448	2,010	.785	.90
August	3,780	214	1,090	.426	.49
September	1,940	234	751	.293	.33

SOUTH FORK OF SANGAMON RIVER AT POWER PLANT, NEAR TAYLORVILLE, ILL.

LOCATION.—In sec. 14, T. 13 N., R. 3 W., at Chicago & Illinois Midland Railroad bridge 6 miles northwest of Taylorville, Christian County, 500 feet east of power plant of Central Illinois Public Service Co., 5 miles below mouth of Bear Creek, and 8 miles below station formerly maintained at Wabash Railroad bridge.

DRAINAGE AREA.—510 square miles.

RECORDS AVAILABLE.—May 18, 1917, to September 30, 1924.

GAGE.—Chain gage attached to bridge; read by H. Hendricks.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel of clay and mud; filled in with coal mine waste; shifting. Banks wooded; overflow above medium stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.10 feet December 15 (discharge, 6,000 second-feet); minimum discharge, 5.6 second-feet September 9–11 and 21.

1917–1924: Maximum discharge recorded, 11,800 second-feet, March 15, 1922; minimum discharge, no flow August 29 and October 6–23, 1922.

A stage of about 27.3 feet is said to have been reached January 31, 1916 (discharge, 11,300 second-feet).

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

DIVERSIONS.—An average of about 0.5 second-foot is used for boiler feed and other purposes at power plant just above gage.

ACCURACY.—Stage-discharge relation changed during year by washing down to low-water control of coal wastes placed in channel July, 1923; dates of shifts uncertain. Rating curves fairly well defined. Daily discharge ascertained by applying daily gage height to rating table. Records fair for medium and high stages; fair for low stages for months when measurements were made; poor for other periods.

Discharge measurements of South Fork of Sangamon River at power plant, near Taylorville, Ill., during the year ending September 30, 1924

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 5	5.37	55.0	July 2	10.94	627
May 24	6.24	89.8	Sept. 27	5.13	9.70

Daily discharge, in second-feet, of South Fork of Sangamon River at power plant, near Taylorville, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	183	610	275	254	2,830	254	3,250	133	254	1,930	75	34
2	174	520	275	151	3,570	254	2,760	133	371	850	64	19
3	124	595	334	151	2,830	254	1,880	117	612	356	75	15
4	88	660	393	254	2,190	254	1,640	101	556	295	126	34
5	56	720	1,120	282	2,080	244	1,140	94	584	225	90	26
6	51	790	1,840	311	1,980	243	640	87	612	155	54	19
7	46	850	2,000	254	1,780	254	448	101	640	155	30	11
8	46	595	2,050	151	1,150	254	371	101	850	150	30	10
9	46	525	2,100	254	1,150	254	371	101	1,150	145	51	5.6
10	36	455	1,860	412	612	254	371	101	1,290	145	72	5.6
11	36	393	1,620	570	435	311	254	87	1,290	135	74	5.6
12	34	333	1,380	500	371	335	254	84	1,030	135	75	15
13	32	333	3,350	311	287	371	170	84	570	150	72	41
14	33	275	5,000	254	287	435	170	80	383	165	72	41
15	35	253	6,000	254	371	640	151	76	323	165	16	29
16	36	253	5,800	210	371	435	151	70	254	87	14	19
17	148	275	4,050	190	435	371	180	70	180	117	14	11
18	850	275	3,250	200	970	371	170	76	151	126	12	11
19	1,570	251	2,550	210	1,290	409	170	79	151	83	12	10
20	1,760	227	2,140	143	830	390	132	81	346	74	12	7.8
21	1,940	203	1,730	76	371	371	94	84	640	64	12	5.6
22	1,610	174	1,680	70	371	409	101	84	1,640	61	12	15
23	1,380	174	1,640	101	365	514	117	84	1,880	155	30	15
24	900	223	1,260	109	359	584	101	87	1,980	155	145	11
25	595	174	1,290	142	359	640	101	142	2,190	655	68	10
26	393	174	1,260	151	254	640	117	180	2,550	655	145	11
27	275	156	850	109	265	612	117	117	2,900	640	61	10
28	275	165	850	109	254	570	117	94	2,760	421	41	8.4
29	275	165	640	254	254	1,320	117	117	2,310	249	22	8.4
30	455	165	371	1,150	-------	1,730	117	170	2,030	175	20	6.6
31	595	-------	254	1,560	-------	3,180	-------	254	-------	75	14	-------

NOTE.—Discharge interpolated because of no gage-height record Oct. 6, 14, 15, 20, Nov. 4, 5, 6, 9, 19, 20, Dec. 3, 5, 10, 11, 20, Jan. 5, 10, 20, Feb. 5, 20, 23, Mar. 5, 20, Apr. 5, 20, May 5, 19, 20, June 5, 20, July 5, 8, 13, 20, Aug. 5, 9, 11, 20, Sept. 5, 20.

Monthly discharge of South Fork of Sangamon River at power plant, near Taylorville, Ill., for the year ending September 30, 1924

[Drainage area, 510 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,940	32	454	0.890	1.03
November	850	156	365	.716	.80
December	6,000	254	1,910	3.75	4.32
January	1,560	70	295	.578	.67
February	3,570	254	989	1.94	2.09
March	3,180	243	553	1.08	1.24
April	3,250	94	526	1.03	1.15
May	254	70	105	.206	.24
June	2,900	151	1,080	2.12	2.36
July	1,930	61	289	.567	.65
August	145	12	51.9	.102	.12
September	41	5.6	15.7	.031	.03
The year	6,000	5.6	551	1.08	14.70

CROOKED CREEK AT RIPLEY, ILL.

LOCATION.—In sec. 33, T. 1 N., R. 2 W., at highway bridge one-fourth mile east of Ripley, Brown County.

DRAINAGE AREA.—1,310 square miles (measured on United States Geological Survey map; scale, 1: 500,000).

RECORDS AVAILABLE.—March 12, 1921, to September 30, 1924.

GAGE.—Chain gage attached to downstream side of bridge; read by Mrs. John Hess.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of soft mud and clay. Banks high; overflowed only during extreme stages. Control not well defined; likely to shift. Backwater from Illinois River occurs at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 25.0 feet, July 25 (determined from high-water marks, discharge, estimated 12,500 second-feet); minimum stage, 2.18 feet October 13 (discharge, 23 second-feet.)

1921–1924: Maximum stage occurred in 1924; minimum discharge, 9 second-feet September 8 and 9, 1922.

Old high-water marks, date unknown, are at a stage of about 26.0 feet on gage.

ICE.—Stage-discharge relation affected by ice.

ACCURACY.—Stage-discharge relation probably changed during July; affected by ice and by backwater from Illinois River. Rating curves fairly well defined below and poorly defined above 5,650 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair for low and medium stages during open water and periods of no backwater, poor for high stages and during periods of ice effect and backwater.

The following discharge measurements [11] were made:

April 10, 1924: Gage height, 6.66 feet; discharge, 620 second-feet.

July 1, 1924: Gage height, 19.01 feet; discharge, 5,790 second-feet.

August 25, 1924: Gage height, 12.73 feet; discharge, 2,700 second-feet.

Daily discharge, in second-feet, of Crooked Creek at Ripley, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	730	73	85	205	2,550	1,120	1,920	820	365	6,190	1,290	485
2	425	73	145	190	2,550	1,060	1,210	730	305	4,120	1,070	660
3	345	68	190	168	2,460	820	850	345	245	2,460	890	980
4	305	68	160		2,500	820	760	325	205	1,500	660	585
5	152	68	152		2,120	790	625	325	175	910	610	485
6	152	62	152	120	2,040	760	500	325	4,470	760	1,220	310
7	145	62	145		820	760	600	385	4,020	700	1,500	290
8	122	60	138		820	760	1,060	450	2,040	550	2,320	290
9	108	58	145	600	760	760	625	365	1,180	500	1,920	290
10	73	56	152	3,270	790	730	500	168	850	475	2,370	290
11	60	60	152	2,820	820	675	405	160	550	405	3,220	250
12	35	68	820	1,880	910	365	405	160	425	550	2,370	220
13	23	68	1,500	970	940	365	385	160	365	730	1,760	220
14	60	122	1,000	450	1,060	345	385	160	345	940	1,260	220
15	56	122	625	205	1,360	345	385	160	940	1,180	510	200

[11] Stage-discharge relation for all measurements affected by backwater from Illinois River.

Daily discharge, in second-feet, of Crooked Creek at Ripley, Ill., for the year ending September 30, 1924—Continued

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
16	54	115	575		1,360	345	385	152	1,720	1,120	385	210
17	145	108	500		1,330	345	385	152	1,240	1,060	360	220
18	152	108	425		1,270	365	365	160	940	1,000	510	220
19	168	100	305		1,150	365	365	160	600	970	635	335
20	175	115	265		760	365	365	160	500	650	710	310
21	168	122	245		730	385	365	145	425	525	740	310
22	145	115	225		700	500	285	138	550	3,090	800	290
23	115	108	225	220	650	525	245	122	850	4,750	890	290
24	108	100	265		625	1,460	205	122	970	8,580	1,720	290
25	85	92	265		650	1,300	145	130	4,070	12,500	3,040	250
26	79	79	305		850	1,150	1,460	138	5,110	10,600	2,120	220
27	79	73	305		940	1,000	760	160	6,130	8,670	1,800	210
28	79	73	305		1,030	910	700	152	7,460	7,390	1,640	180
29	85	73	315		1,120	4,630	675	1,270	8,400	6,130	1,040	160
30	92	79	325	1,720	-------	4,070	1,270	1 150	7,600	3,180	485	105
31	85	-------	205	2,500	-------	2,280	-------	425	-------	2,000	485	-------

NOTE.—Discharge estimated because of ice Jan. 4–8, and 16–29, from gage heights, observer's notes, records on Spoon River at Seville, and weather records. Discharge estimated Apr. 1–20, June 29 to July 18, Aug. 23 to Sept. 9, because of backwater from Illinois River from results of discharge measurements and gage heights of Illinois River at Beardstown. Braced figures show mean discharges for periods indicated.

Monthly discharge of Crooked Creek at Ripley, Ill., for the year ending September 30, 1924

[Drainage area, 1,310 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	730	23	149	0.114	0.13
November	122	56	84.9	.065	.07
December	1,500	85	342	.261	.30
January	3,270	----------	602	.460	.53
February	2,550	625	1,230	.939	1.01
March	4,630	345	983	.750	.86
April	1,920	145	620	.473	.53
May	1,270	122	315	.240	.28
June	8,400	175	2,100	1.60	1.78
July	12,500	405	3,040	2.32	2.67
August	3,220	360	1,300	.992	1.14
September	980	105	312	.238	.26
The year	12,500	23	923	.705	9.56

MACOUPIN CREEK NEAR KANE, ILL.

LOCATION.—In sec. 7, T. 9 N., R. 11 W., on Chicago & Alton Railway Bridge, 3 miles northwest of Kane, Greene County.

DRAINAGE AREA.—865 square miles (measured on United States Geological Survey map; scale 1:500,000).

RECORDS AVAILABLE.—March 11, 1921, to September 30, 1924.

GAGE.—Vertical staff; lower section on old piling between piers, intermediate section on left pier, high-water section on left abutment; read by Claude Linn.

DISCHARGE MEASUREMENTS.—Made from railway bridge, from bridges over flood channels one-fourth mile south and one-eighth mile north, respectively, of main channel, or by wading.

CHANNEL AND CONTROL.—New channel dredged in July, 1923, decreased length and increased slope of stream. Channel was not changed for about 150 feet below gage and in this distance has been eroding down to grade of excavation. Control at medium and high stages is in new channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.1 feet December 16 (discharge, 5,050 second-feet); minimum stage, 0.25 foot August 20, 23, September 8, and 10 (discharge, 22 second-feet).

1921–1924: Maximum stage recorded, 21.6 feet March 15, 1922 (discharge, 15,000 second-feet); minimum discharge, 1 second-foot September 29, October 3, 5, and 15, 1922.

High water of 1915 reached a stage of 26.5 feet.

ICE.—Stage-discharge generally affected by ice.

ACCURACY.—Low-water control shifted in December. Rating at medium and high stages computed by Kutter's formula for new channel. Rating curve used October 1 to December 15 well defined from 296 to 480 second-feet, fairly well defined below and poorly defined above these limits. Rating curve used December 16 to September 30 fairly well defined between 45 and 730 second-feet; poorly defined beyond these limits. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair for medium stages, poor for low and high stages.

The following discharge measurements were made:

May 20, 1924: Gage height, 1.81 feet; discharge, 110 second-feet.

July 1, 1924: Gage height, 2.47 feet; discharge, 202 second-feet.

Daily discharge, in second-feet, of Macoupin Creek near Kane, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,180	680	178	301	2,340	249	1,450	283	301	202	42	580
2	460	400	178	283	1,360	249	680	134	780	173	39	301
3	345	280	150	249	780	249	488	123	422	146	202	65
4	280	235	220	249	605	233	444	107	217	134	283	44
5	90	296	1,800	233	730	217	400	98	187	82	85	31
6	73	730	2,680	173	1,060	233	360	89	2,660	146	59	31
7	65	280	2,850	173	532	217	320	102	855	123	35	23
8	65	345	2,200	166	320	217	301	123	1,240	107	44	22
9	62	235	605	173	340	134	283	118	2,700	78	54	23
10	51	220	530	202	301	146	249	85	1,270	78	42	22
11	51	206	480	655	320	202	187	107	488	71	37	444
12	48	192	555	630	301	233	202	102	488	71	31	217
13	36	150	3,840	320	320	202	173	93	283	146	33	249
14	51	136	4,850	217	301	187	159	89	266	123	31	78
15	73	164	5,000	159	301	301	173	85	680	85	31	44
16	77	164	5,050	134	320	217	159	82	360	71	31	39
17	280	178	2,740	159	1,540	249	146	82	202	65	27	31
18	1,620	164	1,360	134	2,260	320	140	71	2,620	59	25	27
19	3,390	150	730	134	1,890	360	134	85	1,300	85	23	31
20	3,480	164	940	146	780	340	118	112	400	107	22	31
21	2,940	124	1,540	134	444	266	123	102	2,300	146	23	134
22	605	150	1,360	217	340	360	112	93	1,750	134	23	134
23	420	136	1,060	134	301	466	107	112	2,700	93	22	146
24	345	124	1,360	146	301	360	102	555	2,740	89	422	54
25	250	150	780	159	320	320	102	510	2,260	85	134	29
26	220	136	605	233	249	266	123	187	1,420	134	49	27
27	206	164	555	202	233	283	102	159	1,120	85	31	25
28	192	136	510	187	249	360	93	146	655	44	31	23
29	150	178	488	1,360	249	2,740	98	422	555	42	33	23
30	760	150	422	2,940	-------	3,560	128	680	283	44	27	23
31	910	-------	380	2,980	-------	3,600	-------	360	-------	44	33	-----

Monthly discharge of Macoupin Creek near Kane, Ill., for the year ending September 30, 1924

[Drainage area, 865 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,480	36	606	0.701	0.81
November	730	124	227	.262	.29
December	5,050	150	1,480	1.71	1.97
January	2,980	134	438	.506	.58
February	2,340	233	668	.772	.83
March	3,600	134	559	.646	.74
April	1,450	93	255	.295	.33
May	680	71	177	.205	.24
June	2,740	187	1,120	1.29	1.44
July	202	42	99.7	.115	.13
August	422	22	64.6	.075	.09
September	580	22	98.4	.114	.13
The year	5,050	22	482	.557	7.58

KASKASKIA RIVER AT VANDALIA, ILL.

LOCATION.—In sec. 16, T. 6. N., R. 1 E. third principal meridian, at highway bridge at east end of Main Street, Vandalia, Fayette County, 3½ miles above Hickory Creek.

DRAINAGE AREA.—1,980 square miles.

RECORDS AVAILABLE.—February 26, 1908, to December 31, 1912; August 11, 1914, to September 30, 1924.

GAGE.—Chain gage attached to bridge; read by Wilson Haley.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Measuring section is at a pool; control likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage during year, 19.82 feet December 15 (discharge, 10,500 second-feet); minimum stage, 1.37 feet August 24 (discharge, 78 second-feet).

1908–1912; 1914–1924: Maximum stage recorded, 23.0 feet June 5, 1917. Maximum discharge, 18,800 second-feet April 18, 1922; minimum discharge, 3.5 second-feet August 22, 1911.

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

ACCURACY.—Stage-discharge relation unchanged during year; affected by ice for short period. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

The following discharge measurements were made:

May 23, 1924: Gage height, 3.52 feet; discharge, 487 second-feet.

September 23, 1924: Gage height, 4.02 feet; discharge, 611 second-feet.

Daily discharge, in second-feet, of Kaskaskia River at Vandalia, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	318	780	705	2,040	6,880	1,080	6,880	1,330	2,080	1,920	235	296
2	235	755	630	1,890	6,660	1,080	5,630	1,440	3,640	1,780	226	432
3	216	730	580	1,750	6,460	1,080	4,190	1,470	3,200	1,610	275	386
4	189	905	705	1,540	6,270	1,080	3,120	1,440	2,760	1,400	386	363
5	164	1,640	3,440		6,660	1,110	2,640	1,330	2,480	1,330	275	340
6	156	1,440	4,890		6,560	1,080	2,880	1,260	2,960	1,140	275	340
7	141	1,260	5,070		6,180	1,080	2,280	1,140	3,390	1,020	226	340
8	134	1,110	4,140		5,420	1,050	2,000	1,050	3,940	880	198	318
9	127	1,050	3,200		4,890	1,050	1,750	960	5,410	780	172	296
10	120	990	2,880	1,500	4,140	1,080	1,610	905	5,210	755	156	255
11	107	930	2,800		4,090	1,080	1,500	830	3,740	730	148	235
12	107	905	2,680		3,240	1,140	1,470	780	3,000	655	134	363
13	101	830	6,090		2,880	1,440	1,440	730	2,440	605	164	386
14	95	755	8,320		2,520	1,360	1,400	680	2,240	580	141	275
15	95	755	10,500		1,960	1,330	1,360	630	1,960	530	120	226
16	89	990	9,180		1,890	1,330	960	605	1,750	505	114	189
17	318	930	8,600		2,800	1,300	930	580	1,720	455	107	164
18	1,540	780	7,680		4,890	1,300	960	555	1,260	432	101	148
19	3,440	730	6,770		4,190	1,300	960	555	1,110	409	89	141
20	3,340	680	6,270		2,560	1,300	905	605	990	386	89	363
21	2,040	630	5,930		2,040	1,300	880	580	1,080	386	101	855
22	1,580	580	5,700	930	1,540	1,360	805	530	1,140	409	89	555
23	1,400	555	5,560		1,500	1,960	780	480	1,680	432	83	605
24	1,330	530	5,280		1,360	1,890	755	3,340	2,440	455	78	432
25	1,260	530	4,650		1,260	1,780	755	4,950	2,880	830	156	318
26	1,050	505	3,790		1,200	1,750	730	2,040	3,080	605	318	255
27	960	480	3,290		1,140	1,750	755	3,160	3,200	318	363	207
28	855	480	2,960		1,080	2,080	780	3,440	3,000	275	296	180
29	755	455	2,680		1,080	6,090	830	3,120	2,600	235	275	156
30	705	505	2,480	6,010	-------	7,100	1,110	3,790	2,120	216	226	141
31	855	-------	2,240	7,210	-------	8,740	-------	2,360	-------	505	245	-------

NOTE.—Discharge estimated Jan. 5–29 on account of ice, from gage readings, observer's notes, and weather records. Braced figures give mean discharge for period indicated.

Monthly discharge of Kaskaskia River at Vandalia, Ill., for the year ending September 30, 1924

[Drainage area, 1,980 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	3,440	89	768	0.388	0.45
November	1,640	480	806	.407	.45
December	10,500	580	4,510	2.28	2.63
January			1,610	.813	.94
February	6,880	1,080	3,560	1.80	1.94
March	8,740	1,050	1,920	.970	1.12
April	6,880	730	1,770	.894	1.00
May	4,950	480	1,510	.763	.88
June	5,210	990	2,610	1.32	1.47
July	1,920	216	728	.368	.42
August	386	78	189	.095	.11
September	855	141	319	.161	.18
The year	10,500	78	1,680	.848	11.59

BIG MUDDY RIVER AT PLUMFIELD ILL.

LOCATION.—In W. ½ sec. 20, T. 7 S., R. 2 E., at highway bridge at Plumfield, Franklin County, 6 miles west of West Frankfort, 1½ miles below mouth of Middle Fork, and 2 miles below station formerly maintained at Chicago, Burlington & Quincy Railroad bridge.

DRAINAGE AREA.—753 square miles.

RECORDS AVAILABLE.—August 18, 1914, to September 30, 1924. June 16, 1908, to December 31, 1912, records obtained at Chicago, Burlington & Quincy Railroad bridge.

GAGE.—Chain gage attached to bridge; read by Louis Robertson.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Practically permanent at low stages. Banks wooded; right bank is overflowed at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.4 feet, December 15 (discharge, 4,880 second-feet); minimum stage, 1.10 feet August 24 (discharge, 3.5 second-feet).

1914–1924 Maximum stage recorded, 30.2 feet February 1, 1916 (discharge, 16,300 second-feet); no flow August 18–26, 1914.

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

ACCURACY.—Stage-discharge relation practically constant except as affected by vegetation at high stages during year; slightly affected by ice during winter. Rating curve well defined below 1,000 second-feet and fairly well defined above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good for medium stages, otherwise fair.

The following discharge measurements were made:

May 21, 1924: Gage height, 8.00 feet; discharge, 767 second-feet.

September 26, 1924: Gage height, 1.51 feet; discharge, 12.0 second-feet.

Daily discharge, in second-feet, of Big Muddy River at Plumfield, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	28	193	248	906	463	284	2,150	150	1,440	658	47	16
2	20	204	260	1,080	523	248	2,280	204	1,340	160	23	15
3	15	322	226	906	643	237	2,210	260	787	74	14	14
4	13	1,220	204	448	940	237	1,850	204	237	53	11	12
5	14	1,520	448	226	1,260	375	1,120	111	553	44	9.0	9.9
6	15	1,770	1,030	204	1,440	838	538	66	516	33	8.2	7.6
7	13	2,000	1,230	140	1,480	872	193	66	478	30	7.8	7.2
8	11	2,060	1,440	85	1,080	403	226	130	296	26	7.4	6.4
9	10	1,850	1,770	70	493	237	1,440	348	237	22	7.2	5.6
10	8.2	1,200	2,030	182	722	182	1,850	237	140	21	6.8	5.0
11	7.6	553	2,620	855	215	171	2,360	140	89	20	7.6	4.4
12	6.8	204	3,220	1,220	204	120	2,680	120	70	22	7.2	4.8
13	6.6	120	4,110	1,400	215	553	2,440	116	348	22	6.8	6.4
14	7.0	98	4,600	1,460	248	976	1,720	85	1,240	53	6.0	6.4
15	4.8	77	4,880	1,360	248	1,200	940	63	1,080	89	5.6	6.2
16	4.7	70	4,740	1,140	284	1,240	478	66	976	272	5.4	5.6
17	5.4	63	4,180	1,180	375	1,070	309	53	583	260	5.2	5.2
18	284	56	3,670	1,320	923	722	193	41	1,280	140	4.8	4.7
19	1,140	53	3,020	1,420	1,320	538	140	30	2,480	160	4.8	4.8
20	1,360	50	2,360	1,180	1,600	598	106	375	3,850	160	4.7	63
21	1,520	47	2,150	690	1,700	1,030	89	770	4,600	120	4.6	77
22	1,600	44	2,240	348	1,460	1,340	85	690	4,530	150	4.1	60
23	1,240	44	2,770	204	940	1,480	93	375	4,320	171	4.1	30
24	710	44	3,320	130	643	1,570	77	508	4,110	106	3.5	20
25	182	44	3,370	130	598	1,520	63	804	3,910	74	5.4	15
26	150	44	3,220	85	613	1,400	56	940	3,670	53	4.7	11
27	118	41	2,720	204	553	958	50	628	3,430	38	29	9.6
28	85	41	2,240	130	448	568	53	493	3,020	29	26	9.9
29	53	50	1,700	140	348	1,160	50	889	2,280	22	24	9.0
30	63	130	1,180	215	-------	1,500	70	1,140	1,400	17	20	7.8
31	111	-------	838	375	-------	1,880	-------	1,340	-------	16	18	-------

NOTE.—Gage not read and discharge interpolated Oct. 24, 26–28, Dec. 7, 11, June 6, and Aug. 28. Stage-discharge relation slightly affected by ice Jan. 14–29; discharge estimated.

Monthly discharge of Big Muddy River at Plumfield, Ill., for the year ending September 30, 1924

[Drainage area, 753 square miles]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	1,600	4.7	284	0.377	0.43
November	2,060	41	474	.629	.70
December	4,880	204	2,320	3.08	3.55
January	1,460	70	627	.833	.96
February	1,700	204	758	1.01	1.09
March	1,880	120	823	1.09	1.26
April	2,680	50	864	1.15	1.28
May	1,340	30	369	.490	.56
June	4,600	70	1,780	2.36	2.63
July	658	16	100	.133	.15
August	47	3.5	11.1	.015	.02
September	77	4.4	15.3	.020	.02
The year	4,880	3.5	701	.931	12.65

BIG MUDDY RIVER AT MURPHYSBORO, ILL.

LOCATION.—In SW. ¼ sec. 8, T. 9 S., R. 2 W., at lower highway bridge on South Twentieth Street, Murphysboro, Jackson County, a quarter of a mile below mouth of Louis Creek.

RECORDS AVAILABLE.—December 6, 1916, to September 30, 1924; fragmentary.

DRAINAGE AREA.—2,170 square miles (measured on map of United States Geological Survey; scale, 1: 500,000).

GAGE.—Chain gage attached to bridge; read by Clarence Jacobs.

CHANNEL AND CONTROL.—Bed of heavy clay; likely to shift.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 26.40 feet December 17 (backwater from Mississippi River); minimum stage, 2.28 feet September 30 (discharge, 14 second-feet).

1917–1924: Maximum discharge recorded, 15,600 second-feet January 10, 1917; minimum discharge, 1.0 second-foot August 1, 1921.

About February 2, 1916, a stage of 39.6 feet (the highest known stage) was reached (discharge, ascertained from extension of rating curve, 28,000 second-feet).

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

ACCURACY.—Stage-discharge relation changed during high water in December; not affected by ice during winter; affected by backwater from Mississippi River whenever height on gage of United States Weather Bureau at Chester, Ill., is above approximately 10 feet. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table; not determined for periods of backwater. Records fair.

The following discharge measurement was made:
September 26, 1924: Gage height, 3.85 feet, discharge, 113 second-feet.

Daily gage height, in feet, of Big Muddy River at Murphysboro, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3.02	3.67	-------	13.05	6.50	7.90	15.50	5.94	15.60	19.70	5.53	8.02
2	3.32	4.12	6.11	12.32	7.80	6.20	19.15	6.34	15.35	18.40	4.73	7.77
3	4.52	5.42	5.86	10.30	8.90	6.10	18.00	6.39	13.35	17.60	4.68	7.72
4	3.62	9.92	5.96	9.66	10.12	5.95	16.75	6.34	12.34	17.10	4.08	6.72
5	3.72	8.92	10.00	8.51	10.80	5.85	15.75	6.19	10.60	16.50	3.68	5.17
6	3.52	8.12	10.50	6.31	13.20	7.90	14.50	6.14	9.69	15.10	3.38	4.67
7	3.42	7.62	10.62	5.66	12.10	8.80	11.80	6.14	8.94	13.40	3.08	4.17
8	3.12	6.92	13.64	5.01	11.80	8.60	9.39	6.19	8.94	11.70	3.03	3.67
9	2.92	6.72	15.70	4.51	10.15	7.70	11.80	6.14	7.79	10.20	2.92	3.37
10	2.82	6.17	18.15	6.16	8.90	6.75	15.70	6.19	6.79	8.73	2.84	3.07
11	2.74	5.21	20.10	10.02	6.60	5.95	17.80	6.24	6.59	7.73	4.08	2.93
12	2.62	5.11	21.80	13.40	6.20	5.45	19.40	5.64	7.84	7.38	5.33	2.77
13	2.54	4.71	23.70	12.40	5.65	7.20	15.35	5.19	16.85	6.43	5.93	2.81
14	2.47	4.41	24.65	10.04	5.40	9.40	15.35	4.84	17.65	7.38	6.83	2.69
15	2.42	4.11	25.30	11.50	5.65	9.60	15.40	4.69	18.30	6.38	7.08	2.57
16	2.72	4.21	26.35	13.60	5.60	13.20	14.75	4.54	17.75	6.08	7.28	2.51
17	4.92	4.01	26.40	13.65	5.80	12.44	12.50	4.34	16.20	7.73	6.73	2.49
18	6.12	4.01	25.40	13.40	7.90	11.72	10.10	4.09	14.40	8.78	5.63	2.45
19	10.10	-------	24.30	13.65	10.28	10.80	9.84	3.79	13.60	11.44	4.28	2.43
20	10.35	-------	23.05	12.32	13.40	10.04	8.89	7.59	17.65	14.40	4.13	4.42
21	14.05	-------	21.60	11.40	14.20	10.10	8.69	10.12	20.05	14.30	3.83	5.77
22	13.20	-------	23.35	10.90	13.90	11.35	7.69	11.20	21.60	11.50	3.88	5.47
23	12.10	-------	23.00	9.80	13.40	15.40	8.19	10.64	23.00	10.42	4.08	4.47
24	10.20	-------	23.20	8.10	12.20	15.60	7.79	9.84	23.15	9.83	5.03	4.17
25	9.17	-------	23.55	7.85	10.72	14.90	6.89	11.72	23.55	9.58	5.78	3.87
26	6.97	-------	20.50	6.10	10.10	14.05	6.09	13.45	23.55	9.18	6.73	3.82
27	5.32	-------	21.80	5.95	9.20	12.46	5.94	12.72	22.74	8.73	7.03	3.40
28	4.22	-------	18.65	6.75	8.40	14.20	5.74	12.14	22.54	8.18	7.78	3.30
29	3.92	-------	17.35	6.75	8.20	15.80	5.39	14.15	22.24	8.03	7.93	3.06
30	3.72	-------	17.10	5.90	-------	15.40	5.39	14.65	21.00	7.23	8.03	2.28
31	3.62	-------	16.40	5.95	-------	15.45	-------	15.60	-------	6.48	8.13	-------

NOTE.—No gage readings Nov. 19 to Dec. 1.

Daily discharge, in second-feet, of Big Muddy River at Murphysboro, Ill., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Sept.
1	125	250	-------	2,900	685	1,100	-------
2	173	330	850	2,620	1,070	610	-------
3	415	640	790	1,900	1,400	585	-------
4	230	2,020	820	1,680	1,820	560	-------
5	-------	1,690	2,050	1,280	2,070	510	-------
6	-------	1,450	2,220	635	2,990	1,100	-------
7	-------	1,300	3,000	485	2,540	-------	-------
8	-------	1,090	3,430	325	2,420	-------	-------
9	-------	1,030	4,420	225	1,860	-------	-------
10	-------	880	5,670	610	1,400	-------	-------
11	-------	590	6,620	1,790	710	-------	-------
12	-------	565	7,480	3,080	610	-------	-------
13	-------	465	8,520	2,660	460	-------	-------
14	-------	390	-------	1,790	410	-------	-------
15	-------	330	-------	2,320	460	-------	-------
16	-------	350	-------	3,170	460	-------	22
17	-------	310	-------	3,170	-------	-------	22
18	-------	310	-------	3,080	-------	-------	20
19	-------	-------	-------	3,170	-------	-------	19
20	-------	-------	-------	2,620	-------	-------	-------
21	-------	-------	-------	2,280	-------	-------	-------
22	-------	-------	-------	2,100	-------	-------	-------
23	-------	-------	-------	1,720	-------	-------	-------
24	-------	-------	-------	1,160	-------	-------	-------
25	-------	-------	8,470	1,070	-------	-------	116
26	-------	-------	6,780	585			110
27	615		7,480	560	1,510	-------	74
28	350	-------	5,830	770	1,250	-------	66
29	290	-------	5,070	770	1,190	-------	49
30	250	-------	4,900	535	-------	-------	14
31	230	-------	4,550	560	-------	-------	-------

NOTE.—Discharge not determined; stage-discharge relation affected by backwater from Mississippi River Oct. 5–26, Dec. 14–24, Feb. 17–26, Mar. 7 to Sept. 15, Sept. 20–24. Mean discharge for January, 1,670 second-feet.

MISCELLANEOUS DISCHARGE MEASUREMENTS

Discharge measurements of streams in the Upper Mississippi River basin at points other than regular gaging stations are listed in the following table:

Miscellaneous discharge measurements in Upper Mississippi River drainage basin during the year ending September 30, 1924

Date	Stream	Tributary to—	Locality	Gage height	Discharge
				Feet	*Sec.-ft.*
Apr. 29	East Des Moines River.	Des Moines River	Tuttle Lake outlet near Dolliver, Iowa.	167.63	30.3
Apr. 29	do	do	do	167.63	30.1
July 16	Wapsipinicon River	Mississippi River	Near McCausland, Iowa	-------	829
Aug. 26	do	do	Near Noel, Iowa	-------	7,190

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