

U. S. GEOLOGICAL SURVEY  
WATER RESOURCES DIVISION

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ROLLA, MISSOURI

# Compilation of Records of Surface Waters of the United States, October 1950 to September 1960

## Part 4. St. Lawrence River Basin

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GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1727





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## Part 4. St. Lawrence River Basin

*Prepared under the direction of E. L. HENDRICKS, Chief, Surface Water Branch*

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GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1727



**UNITED STATES DEPARTMENT OF THE INTERIOR**

**STEWART L. UDALL, *Secretary***

**GEOLOGICAL SURVEY**

**Thomas B. Nolan, *Director***



## PREFACE

This report contains summaries of streamflow records in the St. Lawrence River basin. It was prepared by the United States Geological Survey in the Water Resources Division, L. B. Leopold, chief, under the general direction of E. L. Hendricks, chief, Surface Water Branch, and F. J. Flynn, chief, Reports Section.

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## COMPILATION OF RECORDS OF SURFACE WATERS OF ST. LAWRENCE RIVER BASIN, 1951-60

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### PURPOSE AND SCOPE

This volume is one of a series of reports presenting monthly and yearly summaries of streamflow and reservoir data collected by the Geological Survey during the period October 1, 1950, to September 30, 1960. Included with these data are some records furnished by other Federal, State, and private agencies. This series of reports is a condensation of the detailed streamflow information presented in the annual series of reports known as "Surface Water Supply of the United States" for each of the years 1951 through 1960. The area covered by this report is the St. Lawrence River basin.

The purpose of the present series of reports is to make available in summarized form all of the surface-water records collected October 1, 1950, to September 30, 1960, and to continue the series of reports known as Water-Supply Papers 1301-19 and 1372 which summarized all surface-water records through September 30, 1950. The present series of reports includes corrections of errors which have been found in the earlier series. Also included are some records collected prior to October 1, 1950, that were omitted from the 1950 compilation series.

The Geological Survey collected the records mainly in cooperation with State, municipal, and other Federal agencies, and published them in detail in the series of annual reports known as "Surface Water Supply of the United States." Some records furnished by other agencies have been included in the annual reports and in the present series of reports; such records are identified in the station description.

The data presented consist of records of discharge of streams and contents of reservoirs summarized on a monthly and yearly basis. Results of miscellaneous discharge measurements and, in general, stage records have been excluded. Included is a map of the area showing the location of each station (pl. 1). The reports of the present series are generally similar in the type of data they contain and in the form of presentation; moreover, they conform in style with the earlier series of compilation reports so that the entire record for any station up to September 30, 1960, is available in one or two volumes.

All records compiled for these summary reports were examined for major errors. A few revisions were made and the revised figures, noted as such, are included. Some previously unpublished information is included, as well as a few estimates of discharge that were made to fill short gaps in an otherwise complete period of record.

### DESCRIPTION OF DATA

The gaging-station records are arranged in downstream order. The order used in this report is the same as that adopted for use in the annual series of reports on surface-water supply beginning with the water year 1951. In a downstream direction along the main stem, all stations on a tributary entering above a main-stem station are listed before that station. If a tributary enters between two main-stem stations, it is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. To indicate the rank of any tributary on which a gaging station is situated and the stream to which it is immediately tributary, each indention in

the listing of gaging stations in the table of contents represents one rank. This downstream order and system of indentation show which gaging stations are on tributaries between any two stations on a main stem and the rank of the tributary on which each gaging station is situated.

As an added means of identification, each station was assigned a number which is shown on the index map and which is a part of the station name in the heading of the description in the text. The numbers are assigned in downstream order in each part (see explanation of "parts" under the heading "Publications," p. 4) beginning with the most upstream station. The numbers are not consecutive because gaps are left to allow for new stations that may be established.

The data presented for most of the gaging stations comprise a description of the station, a table of monthly discharge in cubic feet per second, a table of monthly runoff in inches, and a yearly summary table. The station description gives the name of the river basin, the station number and name, the location, drainage area, records available, types and datums of gages, average discharge, extremes of discharge, general remarks concerning the data, and a credit statement if records were furnished by another agency.

The location of the gaging station and the drainage area are obtained from the best available maps. When more than one site was used during water years 1951-60 and the difference in drainage areas is significant, the area for the latest site is shown first followed by the areas for other sites in chronological order. In some instances drainage-area figures have not been obtained because of the lack of suitable maps or because the boundaries cannot be defined or the effective drainage area determined.

The paragraph "Records available" lists all periods for which there are published records generally equivalent to those at the present site. If equivalent records have been published under another station name, that fact is also noted.

The gage described first is the present gage or the one used most recently. Information is then given in chronological order for all gages used earlier, giving changes in location, type of gage, or datum. The location or datum of all earlier gages is given with reference to the present or most recently used gage. The datum of the gage is the elevation of the zero of the gage above mean sea level. Where information as to datum is not available, the altitude of the gage is given.

The average discharge for a station is the average of all complete water years and is published only if there are five or more complete water years of record. The years used to determine the average are not necessarily consecutive. The average discharge is not published for some stations because of extensive changes in diversion or storage, or other water development, that have occurred upstream.

In general, the momentary maximum and minimum discharges and stages for the entire period of record are published in the "Extremes" paragraph. These are qualified if necessary according to the type of gage used and the completeness of the record. Maximum and minimum discharges at nonrecording gaging stations are qualified as "observed" unless determined from a graph drawn through actual gage heights which approximates the actual hydrograph.

Under "Remarks" information is given on factors which affect the basin runoff characteristics. These include upstream regulation, diversion, and utilization--a history of changes in these items during the period 1951-60 is given when known. Also, references are made to the records of storage or diversion upstream and to records concerning quality of water, if published.

When discharge records are furnished by another agency, credit is given under "Cooperation."

The streamflow data summarized in this report generally are contained in two monthly tables and one yearly table. The first monthly table is a tabulation of monthly and yearly mean discharges in cubic feet per second. These figures represent discharge passing the station; they are unadjusted for storage or diversion upstream unless otherwise specified under "Remarks" for the individual station. Each monthly figure is the mean flow for the entire month; generally no record for part of a month is tabulated. Likewise, each yearly figure is the mean flow for a full year, and no figure is shown for a partial year. Usually the months are arranged on a water-year basis. Exceptions to this rule are made in connection with seasonal records wherein the months are grouped to give a complete season for each calendar year.

The second monthly table is a tabulation of monthly and yearly runoff in inches. For streams that are subject to considerable regulation, the second table contains the adjusted runoff in inches. The table of runoff in inches is omitted if the data do not represent natural yield without gross error, whether adjusted or unadjusted.

The third table contains a yearly summary of the streamflow data. The column headed "WSP" lists the number of the water-supply paper in which the figures of daily and monthly discharge are published. If a part of the record has been revised and the revision published, then reference is made to both the original report and the one containing the revised record; if the daily discharge record for the entire year has been republished to include the revisions, then only the later report is listed. However, there is no reference in this column for revisions published for the first time in this report as the corresponding revised figures of daily discharge will be published in a water-supply paper which will contain daily records for the period 1961-65. For some stations the third table is omitted; however, the report containing records for any particular year can generally be found by referring to the table given on page 6.

In the third table the momentary maximum discharge for each water year and the date of its occurrence is given if known. For nonrecording gage records, momentary maximums were obtained from graphs drawn through the gage readings. The momentary maximum discharge, however obtained, is not qualified in any way if it is believed to be representative of the absolute maximum for the water year.

The minimum daily discharge for each water year is listed if known. Other data listed in this table are the annual mean discharge and runoff for both the water year and the calendar year. The figures listed for the water year are the same as those given in the yearly columns of the preceding tables. In addition, the annual mean discharge per square mile is listed for the water year. If figures of runoff have been adjusted for regulation or diversion in the preceding table, adjusted figures are listed in the yearly summary table. For a few stations regulation affects monthly figures seriously, but the effect on annual figures is either negligible or can be adequately adjusted for; for these stations the monthly table of runoff in inches is omitted, but the annual runoff is given.

Most canal and diversion records are given in a single table. There are some records for large canals, however, that are published in the same detail as those for streams. Records of reservoirs also are given in a single table which shows the contents at the end of each month.

Revised figures of discharge for water years 1951-60 are not so indicated if they have been published in an annual report, but are noted as "revised" if they have not been published in an annual report. Revised daily figures which have not been published in annual reports will be published in the water-supply paper containing records for water years 1961-65, except for special cases involving only a few figures which are included in this series of reports. Figures that represent corrections of typographical or computational errors whereas no figures of daily discharge have been revised or changed are indicated as "corrected" in this report, except corrected figures of runoff in inches which are not noted if the correction is due solely to a revision of drainage area. Estimates of discharge made to complete months or years for this report are noted as estimates and as "not previously published."

Revisions or corrections of records published in WSP 1307 are included in this report. However, revised figures of runoff in inches or discharge per square mile for records prior to October 1, 1950, resulting solely from a revision of drainage area, are not given.

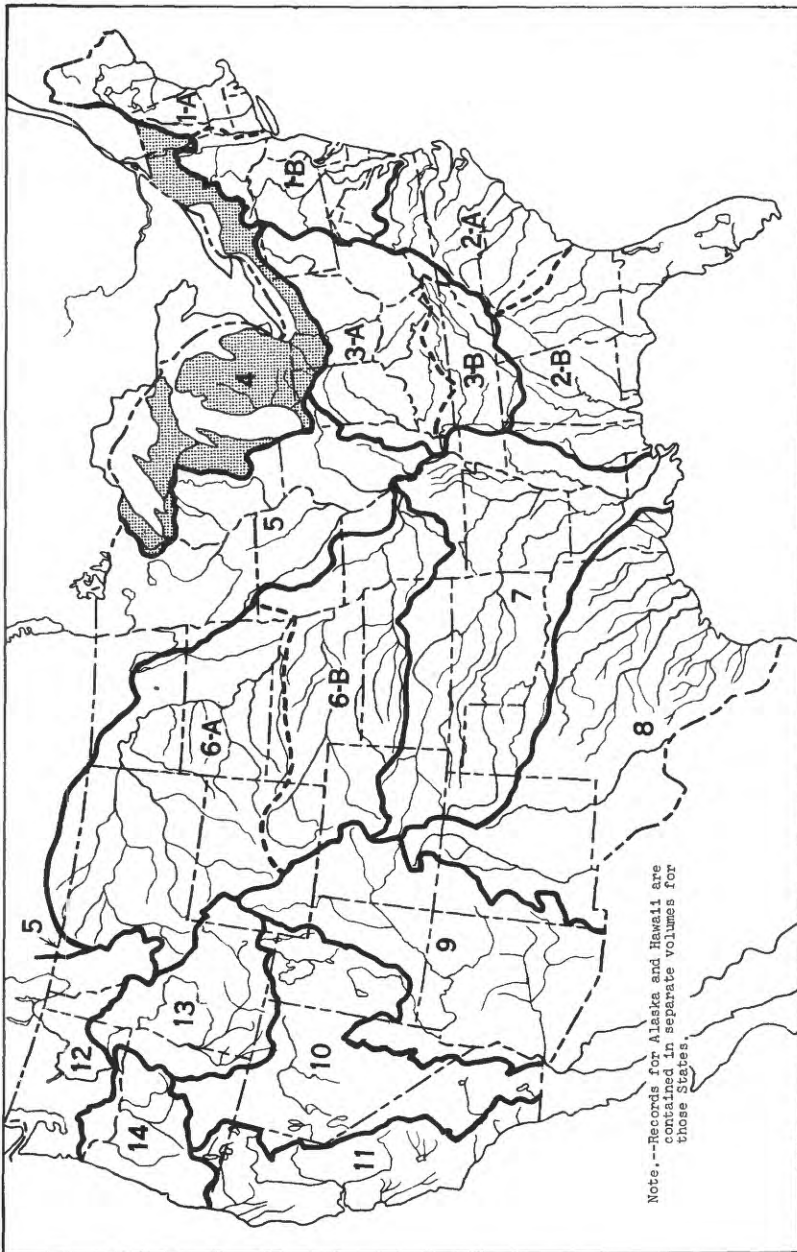
#### PUBLICATIONS

This series of reports comprises 20 volumes of water-supply papers (WSP) as numbered below. The "Part" numbers and the areas covered are the same as those used for the annual series of reports on surface-water supply of the United States since 1951. The boundaries of the parts are indicated on figure 1.

Numbers of water-supply papers for 1950 series of compilation reports		
WSP	Part	Area
1721	1-A	North Atlantic slope basins, Maine to Connecticut.
1722	1-B	North Atlantic slope basins, New York to York River.
1723	2-A	South Atlantic slope basins, James River to Savannah River.
1724	2-B	South Atlantic slope and eastern Gulf of Mexico basins, Ogeechee River to Pearl River.
1725	3-A	Ohio River basin except Cumberland and Tennessee River basins.
1726	3-B	Cumberland and Tennessee River basins.
1727	4	St. Lawrence River basin.
1728	5	Hudson Bay and upper Mississippi River basins.
1729	6-A	Missouri River basin above Sioux City, Iowa.
1730	6-B	Missouri River basin below Sioux City, Iowa.
1731	7	Lower Mississippi River basin.
1732	8	Western Gulf of Mexico basins.
1733	9	Colorado River basin.
1734	10	The Great Basin.
1735	11	Pacific slope basins in California.
1736	12	Pacific slope basins in Washington and upper Columbia River basin.
1737	13	Snake River basin.
1738	14	Pacific slope basins in Oregon and lower Columbia River basin.
1739	-	Hawaii.
1740	-	Alaska.

Records prior to September 30, 1950, were summarized in a series of water-supply papers as listed below. Each of these volumes contains a list of the annual reports from which data prior to 1951 were summarized.

Number of water-supply papers for 1950 series of compilation reports					
WSP	Part	WSP	Part	WSP	Part
1301	1-A	1308	5	1315-A	11-B
1302	1-B	1309	6-A	1315-B	11-A
1303	2-A	1310	6-B	1316	12
1304	2-B	1311	7	1317	13
1305	3-A	1312	8	1318	14
1306	3-B	1313	9	1319	Hawaii
1307	4	1314	10	1372	Alaska



Note.--Records for Alaska and Hawaii are contained in separate volumes for those States.

This report is summarized from the following 10 annual reports which contain records of daily discharge for each of the water years from 1951 to 1960.

Annual water-supply papers, Part 4, 1951-60			
Water year	WSP	Water year	WSP
1951	1207	1956	1437
1952	1237	1957	1507
1953	1277	1958	1557
1954	1337	1959	1627
1955	1387	1960	1707

In addition to the customary records of discharge collected during the systematic operation of gaging stations there is much additional hydrologic information available, both published and unpublished.

A list of flood reports and other special reports is contained in the introductory pages of each of the annual reports listed above.

Records for many stations have been analyzed by an electronic computer to give: the number of days in each year that the discharge was between selected limits (duration tables); the lowest and highest mean discharges for selected numbers of consecutive days in each year; and other statistical summaries.

Data on low flow or peak flows or both are available for many sites other than gaging stations.

Specific information on unpublished data available can be obtained by writing directly to the district engineer for the State in which the site or gaging station is located.

#### HYDROLOGIC CONDITIONS

Streamflow, a residual of precipitation after other demands have been met, varies considerably from year to year and from place to place. Figure 2 shows yearly discharge for three gaging stations in the St. Lawrence River basin. The pattern of yearly runoff shown by these streams is generally representative of hydrologic conditions in their parts of the report area.

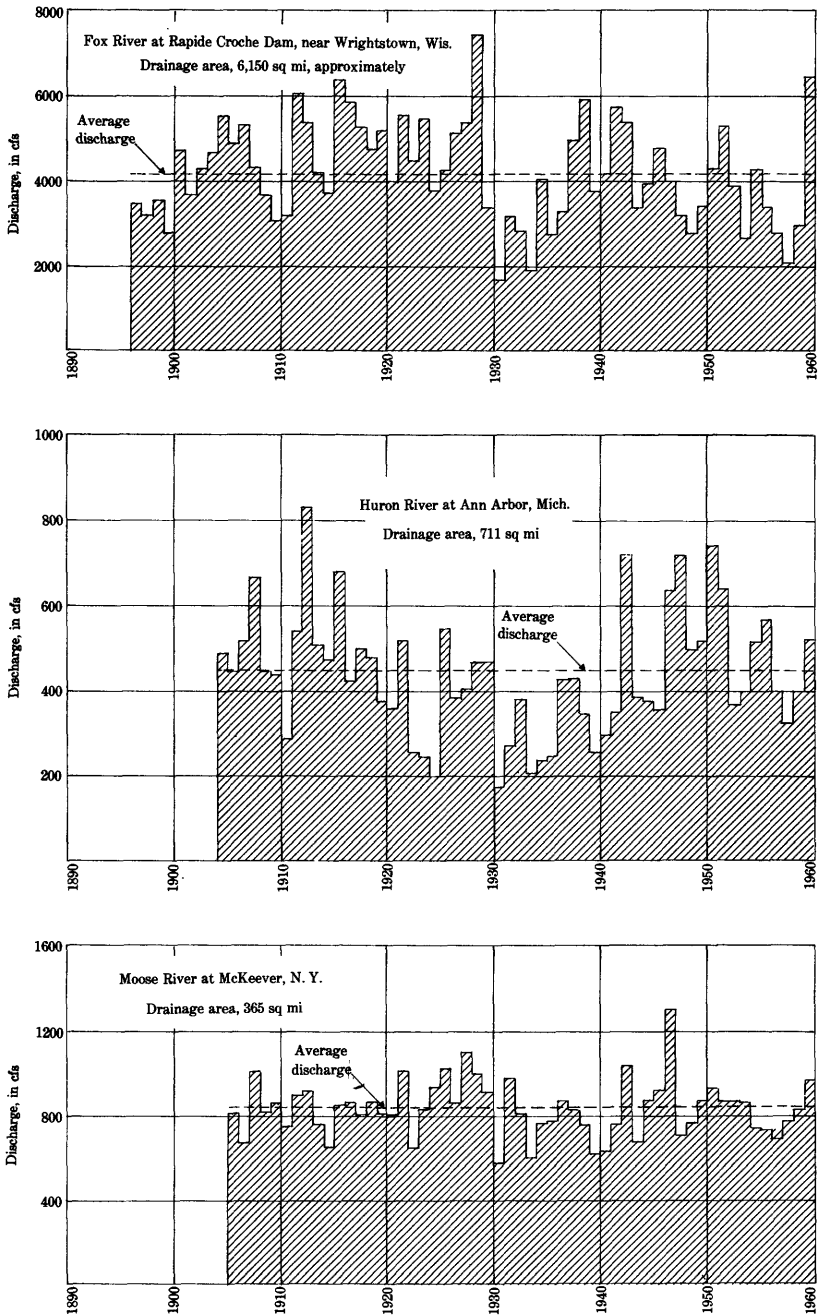


Figure 2.—Yearly discharge at three representative gaging stations.

## GAGING-STATION RECORDS

## STREAMS TRIBUTARY TO LAKE SUPERIOR

105. Pigeon River at Middle Falls, below International Bridge, Minn.

(International gaging station)

Location--Lat 48°00'44", long 89°36'58", in NE $\frac{1}{4}$  sec.24, T.64 N., R.6 E., on right bank 400 ft upstream from Middle Falls, 3 $\frac{1}{2}$  miles upstream from mouth, and 5 $\frac{1}{2}$  miles downstream from International Bridge.

Drainage area--600 sq mi.

Records available--June to October 1921, April to November 1922, March 1923 to September 1960. Published as "at International Bridge" April 1924 to September 1940. Monthly discharge only for some periods, published in WSP 1307.

Gage--Water-stage recorder. Datum of gage is 789.58 ft above mean sea level, datum of 1929. Prior to Sept. 2, 1936, staff gage and Sept. 2, 1936, to Sept. 30, 1940, wire-weight gage at International Bridge, 5 $\frac{1}{2}$  miles upstream at datum 100.24 ft higher.

Average discharge--37 years (1923-60), 488 cfs.

Extremes--1923-60: Maximum discharge, 11,000 cfs May 5, 1934 (gage height, 7.6 ft, site and datum then in use), from rating curve extended above 7,000 cfs; minimum, 27 cfs Nov. 4, 1945 (gage height, -0.08 ft).

Remarks--Prior to 1940, some regulation for short periods during log-driving operations.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	711	371	312	245	220	228	1,680	3,021	1,110	338	190	648	758
1952	862	734	502	314	239	191	1,325	1,060	438	592	569	251	590
1953	149	124	103	99.0	101	125	908	1,636	1,552	506	248	182	478
1954	126	96.2	83.2	58.3	62.4	74.4	1,288	2,744	1,154	465	270	208	555
1955	151	141	101	92.5	98.3	121	1,528	587	218	139	103	86.1	280
1956	256	372	148	149	154	140	1,025	2,321	698	319	211	282	507
1957	148	192	155	120	107	134	1,528	1,123	788	293	156	139	406
1958	111	165	105	90.9	68.6	93.1	422	222	130	78.0	64.9	327	158
1959	206	351	172	114	79.5	93.2	510	1,348	716	160	317	429	376
1960	511	242	187	146	94.2	92.3	1,180	1,113	428	238	143	108	374

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.37	0.69	0.60	0.47	0.38	0.44	3.12	5.81	2.06	0.65	0.37	1.20	17.16
1952	1.66	1.36	.96	.60	.43	.37	2.46	2.04	.81	1.14	1.09	.47	13.39
1953	.29	.23	.20	.19	.17	.24	1.69	3.14	2.89	.97	.48	.34	10.63
1954	.24	.18	.16	.11	.11	.14	2.39	5.27	2.15	.69	.52	.39	12.55
1955	.29	.26	.19	.18	.17	.23	2.84	1.13	.41	.27	.20	.16	6.33
1956	.49	.69	.28	.29	.28	.27	1.91	4.46	1.30	.61	.40	.52	11.50
1957	.28	.36	.30	.23	.19	.26	2.83	2.16	1.46	.56	.30	.26	9.20
1958	.21	.31	.20	.17	.15	.18	.79	.43	.24	.15	.12	.61	3.56
1959	.40	.65	.33	.22	.14	.18	.95	2.59	1.33	.51	.61	.80	8.51
1960	.98	.45	.36	.28	.17	.18	2.19	2.14	.80	.46	.28	.20	8.49

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	848	19.21
1951	1207	7,490	May 2, 1951	172	758	1.26	17.16	817	18.48
1952	1237	4,900	Apr. 19, 1952	165	590	.983	13.39	446	10.13
1953	1277	4,180	May 31, 1953	95	478	.797	10.83	473	10.69
1954	1357	9,250	May 1, 1954	55	555	.925	12.55	562	12.71
1955	1387	3,180	Apr. 20, 1955	48	280	.467	6.33	312	7.05
1956	1437	4,200	May 14, 1956	102	507	.845	11.50	484	10.98
1957	1507	5,580	Apr. 25, 1957	95	406	.677	9.20	397	8.98
1958	1557	793	Apr. 16, 1958	57	158	.263	3.56	187	4.22
1959	1627	2,160	May 7, 1959	68	376	.627	8.51	394	8.92
1960	1707	3,140	Apr. 25, 1960	83	374	.623	8.49	-	-



## 125. Poplar River at Lutsen, Minn.

Location.--Lat 47°38'23", long 90°42'31", in SW $\frac{1}{4}$ NE $\frac{1}{4}$  sec.33, T.60 N., R.3 W., on right bank 350 ft upstream from concrete bridge on U.S. Highway 61 at Lutsen and 1,650 ft upstream from mouth.

Drainage area.--114 sq mi.

Records available.--May to November 1911 and August to September 1912 (gage heights only, published as "at mouth"), October 1912 to September 1917, July 1928 to September 1947, August 1952 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder and concrete control. Datum of gage is 697.89 ft above mean sea level. May 6 to Nov. 4, 1911, staff gage at site 1,250 ft downstream and Aug. 22, 1912, to Sept. 30, 1917, at site 900 ft downstream at different datum. July 17, 1928, to Mar. 30, 1937, chain gage at site 150 ft downstream at datum 6.90 ft lower.

Average discharge.--32 years (1912-17, 1928-47, 1952-60), 104 cfs.

Extremes.--1912-17, 1928-47, 1952-60: Maximum discharge, 1,880 cfs May 1, 1954 (gage height, 6.23 ft); minimum, 2.3 cfs Dec. 3, 1939 (gage height, 1.73 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	45.6	52.8	40.2	30.9	32.7	49.5	158	239	253	106	67.3	58.4	94.6
1954	34.1	31.8	39.0	32.7	34.1	29.2	269	523	179	69.7	43.9	43.3	111
1955	42.2	41.1	34.8	22.3	23.1	27.5	263	141	65.7	29.4	49.5	46.0	65.4
1956	81.2	93.0	64.3	50.3	46.2	37.6	208	651	204	98.0	54.1	50.8	137
1957	32.4	55.3	52.9	38.4	31.4	34.4	346	329	304	184	58.4	37.6	125
1958	55.6	77.9	47.2	37.1	27.1	27.7	97.4	55.1	63.9	38.9	16.8	56.0	50.0
1959	25.9	79.4	62.6	36.6	23.6	23.1	77.5	194	153	55.0	89.0	102	77.0
1960	117	69.7	47.0	31.7	18.0	15.1	338	422	154	51.1	30.2	20.5	110

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	0.89	-
1953	0.46	0.52	0.41	0.31	0.30	0.50	1.55	2.41	2.48	1.07	0.68	.57	11.26
1954	.34	.31	.39	.33	.31	.30	2.63	5.29	1.74	.70	.44	.42	13.20
1955	.43	.40	.35	.23	.21	.28	2.57	1.43	.64	.30	.50	.45	7.79
1956	.82	.91	.65	.51	.44	.38	2.03	6.58	2.00	.99	.55	.50	16.36
1957	.33	.54	.54	.39	.29	.35	3.38	3.33	2.97	1.86	.59	.37	14.94
1958	.56	.76	.48	.38	.25	.28	.95	.56	.63	.39	.17	.55	5.96
1959	.26	.78	.63	.37	.22	.23	.76	1.96	1.50	.56	.90	1.00	9.17
1960	1.18	.68	.48	.32	.17	.15	3.31	4.27	1.51	.52	.31	.20	13.10

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	1277	548	May 31, 1953	26	94.6	0.830	11.26	91.8	10.91
1954	1337	1,880	May 1, 1954	15	111	.974	13.20	112	13.34
1955	1387	564	Apr. 21, 1955	10	65.4	.574	7.79	75.5	8.99
1956	1437	1,290	May 14, 1956	27	137	1.20	16.36	129	15.39
1957	1507	1,170	Apr. 25, 1957	19	125	1.10	14.94	129	15.33
1958	1557	238	June 5, 1958	4.8	50.0	.439	5.96	48.9	5.83
1959	1627	742	Aug. 26, 1959	21	77.0	.675	9.17	82.6	9.84
1960	1707	1,050	Apr. 25, 1960	11	110	.965	13.10	-	-

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 145. Baptism River near Beaver Bay, Minn.

Location--Lat 47°20'15", long 91°12'00", in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.15, T.56 N., R.7 W., on right bank 260 ft upstream from bridge on U.S. Highway 61, 0.2 mile upstream from mouth, 4 miles northeast of Silver Bay, and 7 miles (revised) northeast of village of Beaver Bay.

Drainage area--140 sq mi.

Records available--October 1927 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage--Water-stage recorder. Datum of gage is 609.97 ft above mean sea level (Corps of Engineers bench mark). Prior to Oct. 5, 1934, staff gage at same site and datum.

Average discharge--33 years (1927-60), 160 cfs.

Extremes--1927-60: Maximum discharge recorded, 9,350 cfs Aug. 9, 1939 (gage height, 8.11 ft), from rating curve extended above 4,000 cfs; minimum daily, 0.4 cfs Jan. 5, 6, 1940.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	292	70.6	45.8	26.9	22.4	37.6	716	590	348	81.0	42.9	294	214
1952	335	190	76.6	31.1	28.3	26.7	674	196	156	320	144	83.1	187
1953	27.8	49.1	33.8	17.6	17.0	31.8	348	512	399	93.4	127	40.4	142
1954	25.5	41.5	27.0	17.5	15.7	19.0	812	614	310	39.4	18.0	46.0	165
1955	57.2	44.1	19.3	12.7	12.6	14.7	660	259	229	107	88.8	199	141
1956	172	116	63.3	49.6	42.0	39.0	474	987	110	80.7	134	173	204
1957	94.2	171	76.2	46.0	32.9	47.6	846	328	452	147	18.4	28.8	190
1958	52.6	116	36.9	20.7	16.2	22.1	194	95.4	152	126	114	214	96.6
1959	79.5	227	74.4	38.5	20.2	26.2	204	335	131	29.4	57.5	117	112
1960	196	61.7	32.9	27.0	16.0	10.2	665	452	81.9	48.3	34.8	16.1	137

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2.41	0.56	0.38	0.22	0.17	0.31	5.70	4.86	2.77	0.67	0.35	2.35	20.75
1952	2.76	1.52	.63	.26	.22	.22	5.37	1.61	1.08	2.63	1.19	.66	18.15
1953	.23	.39	.28	.14	.13	.26	2.77	4.21	3.18	.77	1.05	.32	13.73
1954	.21	.33	.22	.14	.12	.16	6.47	5.06	2.47	.32	.15	.37	16.02
1955	.47	.35	.16	.10	.09	.12	5.26	2.13	1.82	.88	.73	1.59	13.70
1956	1.42	.92	.52	.41	.32	.32	3.78	8.13	.87	.66	1.10	1.38	19.83
1957	.78	1.36	.63	.38	.24	.39	6.74	2.70	3.61	1.21	.15	.23	18.42
1958	.43	.93	.30	.17	.12	.18	1.55	.79	1.21	1.04	.94	1.71	9.37
1959	.66	1.81	.61	.32	.15	.22	1.63	2.76	1.05	.24	.47	.93	10.85
1960	1.61	.49	.27	.22	.12	.08	5.30	3.72	.65	.40	.29	.13	13.28

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	258	25.06
1951	1207	2,910	Oct. 2, 1950	16	214	1.53	20.75	230	22.31
1952	1237	2,790	Apr. 19, 1952	23	187	1.34	18.15	145	14.14
1953	1277	1,610	May 30, 1953	13	142	1.01	13.73	140	13.59
1954	1337	3,500	May 1, 1954	12	165	1.18	16.02	167	16.24
1955	1387	1,660	Apr. 11, 1955	9.6	141	1.01	13.70	161	15.58
1956	1437	2,650	May 14, 1956	22	204	1.46	19.83	203	19.74
1957	1507	2,940	Apr. 24, 1957	11	190	1.36	18.42	179	17.31
1958	1557	928	Sept. 6, 1958	11	96.6	.690	9.37	111	10.79
1959	1627	1,220	Nov. 18, 1958	6.7	112	.300	10.85	105	10.14
1960	1707	3,040	Apr. 24, 1960	9.2	137	.979	13.28	-	-

## 155. Second Creek near Aurora, Minn.

Location.--Lat 47°31'25", long 92°11'35", in SW $\frac{1}{4}$  sec.12, T.58 N., R.15 W., on left bank 0.1 mile downstream from First Creek, 0.4 mile upstream from mouth, and 2.1 miles east of Aurora.

Drainage area.--26.3 sq mi.

Records available.--March 1955 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,410.36 ft above mean sea level, datum of 1929 (levels by Erie Mining Co.).

Average discharge.--5 years (1955-60), 16.7 cfs.

Extremes.--1955-60: Maximum discharge, 208 cfs Apr. 21, 1957; maximum gage height, 5.75 ft Mar. 28, 1957 (backwater from ice); minimum discharge, 1.9 cfs Aug. 3, 1956 (gage height, 3.18 ft).

Remarks.--Records of chemical analyses and water temperatures for the periods of April 1956 to September 1959, July to September 1960, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	49.4	20.5	24.9	14.8	7.83	9.95	-
1956	7.25	9.63	4.73	3.00	3.18	3.86	77.7	41.4	8.04	6.54	9.31	7.74	15.2
1957	11.2	16.6	8.51	6.31	6.27	12.8	72.5	22.6	32.0	28.5	10.1	12.3	19.9
1958	10.8	14.7	8.44	3.52	3.65	12.3	14.4	9.67	19.7	26.9	10.8	31.9	13.9
1959	15.3	17.0	7.02	4.41	2.60	4.09	24.1	32.5	28.5	22.1	14.5	23.6	16.4
1960	16.8	6.44	7.81	9.29	7.84	8.54	46.7	45.5	26.1	14.7	13.2	12.9	†18.0

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	2.09	0.90	1.06	0.65	0.34	0.42	-
1956	0.32	0.41	0.21	0.13	0.13	0.17	3.30	1.82	.34	.29	.41	.33	7.86
1957	.49	.70	.37	.28	.25	.56	3.08	.99	1.36	1.25	.44	.52	10.29
1958	.47	.63	.37	.15	.14	.54	.61	.42	.84	1.18	.47	1.35	7.17
1959	.67	.72	.31	.19	.10	.18	1.02	1.42	1.21	.97	.63	1.00	8.42
1960	.74	.27	.34	.41	.32	.37	1.98	1.99	1.11	.64	.58	.55	9.30

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-
1955	1437	130	Apr. 12, 1955	-	-	-	-	-	-
1956	1437	107	Apr. 13, 1956	2.8	15.2	0.578	7.86	16.4	8.48
1957	1507	208	Apr. 21, 1957	6.1	19.9	.757	10.29	19.8	10.20
1958	1557	108	July 1, 1958	2.5	13.9	.529	7.17	14.4	7.40
1959	1627	81	July 8, 1959	2.4	16.4	.624	8.32	15.7	8.07
1960	1707	129	Apr. 25, 1960	4.0	†18.0	.684	9.30	-	-

† Corrected.

## 160. Partridge River near Aurora, Minn.

Location.--Lat 47°31'02", long 92°11'24", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec.12, T.58 N., R.15 W., on right bank at upstream side of highway bridge, 1,000 ft downstream from Second Creek,  $2\frac{1}{2}$  miles east of Aurora, and  $2\frac{1}{2}$  miles upstream from mouth.

Drainage area.--156 sq mi.

Records available.--August 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,402.30 ft above mean sea level, datum of 1929. Aug. 5, 1942, to Aug. 25, 1944, staff gage and Aug. 26, 1944, to July 1, 1956, water-stage recorder, at site 45 ft downstream at same datum.

Average discharge.--18 years (1942-60), 127 cfs (adjusted for storage and diversion).

Extremes.--1942-60: Maximum discharge, 3,230 cfs May 10, 1950 (gage height, 7.86 ft); minimum, 3.1 cfs Sept. 22, 23, 1948 (gage height, 0.77 ft).

Remarks.--Flow regulated at times by storage in off-channel Partridge Reservoir, formerly known as Whitewater Lake. Reservoir formed from lake by levees around marsh areas and natural outlet. Available capacity, 20,000 acre-ft between elevations 1,410 ft (natural lake level) and 1,440 ft. Storage began Apr. 9, 1955. Storage in reservoir obtained from Colby Lake during periods of high flow; release from storage returned to Colby Lake to maintain lake elevation during diversion for iron-ore processing. Diversion began Feb. 7, 1956. Some seepage losses from reservoir bypass station. Records of chemical analyses and water temperatures for the periods April 1956 to September 1959, July to September 1960, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	108	36.7	28.2	21.5	25.4	17.5	382	394	179	71.5	34.6	176	123
1952	212	134	59.4	21.9	17.0	14.7	399	154	186	234	140	112	140
1953	25.3	38.4	24.2	15.7	14.1	28.8	330	309	362	135	151	192	135
1954	50.1	39.4	38.2	21.6	17.6	24.9	706	703	280	46.0	11.6	9.81	162
1955	23.5	26.5	16.6	8.50	7.05	7.29	78.0	56.4	59.3	40.4	31.1	28.8	32.0
1956	38.0	42.2	29.3	19.1	13.1	12.6	234	473	63.1	28.3	28.9	45.5	85.8
1957	28.9	50.3	28.5	16.5	11.4	18.1	379	163	201	193	27.6	25.5	95.2
1958	35.9	50.4	29.7	14.3	9.10	20.8	43.9	42.2	95.4	113	54.4	180	57.5
1959	95.0	94.4	37.9	17.0	8.24	17.5	50.2	207	199	61.2	37.4	134	80.0
1960	65.3	42.6	19.7	12.1	7.69	7.24	148	354	135	36.9	31.6	20.2	73.7

Monthly and yearly runoff, in inches (adjusted) a/

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.80	0.26	0.21	0.16	0.17	0.13	2.73	2.91	1.28	0.53	0.26	1.26	10.70
1952	1.56	.96	.44	.16	.12	.11	2.85	1.13	1.33	1.73	1.03	.80	12.22
1953	.19	.27	.18	.12	.09	.21	2.36	2.28	2.59	1.00	1.12	1.37	11.78
1954	.37	.28	.28	.16	.12	.18	5.05	5.19	2.00	.34	.09	.07	14.13
1955	.17	.19	.12	.06	.05	.05	1.90	.90	.80	.30	.23	.21	4.98
1956	.28	.30	.22	.14	.08	.09	2.24	3.61	.45	.21	.21	.33	8.16
1957	.21	.42	.21	.12	.08	.14	3.60	1.43	1.54	1.46	.21	.22	9.64
1958	.30	.51	.23	.11	.06	.15	.70	.56	.92	.98	.43	1.47	6.42
1959	.84	.80	.51	.13	.06	.12	.79	1.79	1.62	.53	.34	.98	8.31
1960	.55	.32	.14	.08	.05	.05	1.82	2.90	1.04	.41	.30	.14	7.80

a Adjusted for storage in Partridge Reservoir since April 1955.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year			
		Observed					Adjusted a/		Observed		Adjusted a/	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches	Mean	Mean
		Discharge	Date									
1950	-	-	-	-	-	-	-	-	-	-	-	-
1951	1207	1,360	May 1, 1951	15	123	-	0.788	10.70	205	-	-	17.80
1952	1237	1,190	Apr. 22, 1952	13	140	-	.897	12.22	142	-	-	12.38
1953	1277	711	June 2, 1953	13	135	-	.865	11.78	139	-	-	9.90
1954	1337	2,150	Apr. 18, 1954	5.2	162	-	1.04	14.13	157	-	-	12.07
1955	1387	174	Apr. 12, 1955	5.2	32.0	57.4	1.368	4.98	35.6	61.0	5.30	13.68
1956	1437	784	May 7, 1956	11	85.8	93.4	.599	8.16	85.7	93.9	8.20	9.84
1957	1507	1,630	Apr. 24, 1957	10	95.2	110	.705	9.64	95.9	113	9.84	7.35
1958	1557	300	Sept. 28, 1958	7.5	57.5	73.9	.474	6.42	66.8	84.8	7.35	7.37
1959	1627	463	June 14, 1959	8.0	80.0	95.5	.612	8.31	71.7	84.7	-	-
1960	1707	823	Apr. 29, 1960	7.0	73.7	89.8	.576	7.80	-	-	-	-

† Corrected.

a Adjusted for storage in Partridge Reservoir since April 1955.

## 165. St. Louis River near Aurora, Minn.

Location.--Lat 47°29'30", long 92°14'20", in SW $\frac{1}{4}$  sec.22, T.58 N., R.15 W., on left bank at upstream side of highway bridge three-quarters of a mile downstream from Partridge River and  $\frac{1}{2}$  miles south of Aurora.

Drainage area.--312 sq mi.

Records available.--August 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,371.24 ft above mean sea level, datum of 1929. Prior to Aug. 26, 1944, chain gage at same site and datum.

Average discharge.--18 years (1942-60), 244 cfs (adjusted for storage and diversion).

Extremes.--1942-60: Maximum discharge, 5,380 cfs May 14, 1950 (gage height, 8.37 ft); minimum, 4.0 cfs Oct. 2, 3, 1948 (gage height, 0.30 ft).

Remarks.--Flow regulated at times by storage in off-channel Partridge Reservoir, formerly known as Whitewater Lake. Reservoir formed from lake by levees around marsh areas and natural outlet, available capacity, 20,000 acre-ft between elevation, 1,410 ft (natural lake level) and 1,440 ft. Storage began Apr. 9, 1955. Storage in reservoir obtained from Colby Lake during periods of high flow; release from storage returned to Colby Lake to maintain lake elevation during diversion for iron-ore processing. Diversion began Feb. 7, 1956. Some seepage losses from reservoir enter above station. Records of chemical analyses for the periods of April 1956 to September 1959, July to September 1960, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	231	86.7	61.0	37.1	27.9	36.9	631	749	389	209	76.0	338	240
1952	436	297	126	53.7	43.8	36.3	634	343	276	406	286	253	266
1953	65.3	73.7	51.7	34.6	33.4	67.5	541	592	707	298	372	347	266
1954	110	76.8	79.9	41.9	32.0	30.9	1,094	1,406	548	133	31.3	19.8	301
1955	40.1	48.4	36.4	18.6	14.4	13.1	286	223	210	135	175	105	109
1956	145	119	55.8	35.9	31.6	32.8	531	927	158	64.2	60.3	71.9	187
1957	67.9	105	65.2	44.9	33.3	47.4	685	462	381	412	73.8	44.1	202
1958	65.2	127	70.7	39.4	25.6	41.9	123	130	311	248	130	352	139
1959	199	190	118	53.2	29.9	54.6	136	440	430	136	90.6	261	178
1960	166	126	87.6	70.7	51.3	47.0	334	737	285	117	87.5	44.6	180

Monthly and yearly runoff, in inches (adjusted) a/

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.85	0.31	0.23	0.14	0.09	0.14	2.26	2.77	1.39	0.77	0.28	1.21	10.44
1952	1.61	1.06	.47	.20	.15	.13	2.27	1.27	.99	1.50	1.06	.91	11.82
1953	.24	.28	.19	.13	.11	.25	1.95	2.19	2.53	1.10	1.38	1.24	11.55
1954	.41	.27	.30	.15	.11	.11	3.91	5.20	1.96	.49	.12	.07	13.10
1955	.15	.17	.13	.07	.05	.05	1.70	1.07	.94	.50	.65	.38	5.86
1956	.54	.43	.21	.13	.11	.12	2.19	3.48	.56	.24	.22	.26	8.49
1957	.25	.40	.24	.17	.11	.18	2.89	1.82	1.42	1.53	.27	.17	9.45
1958	.26	.53	.27	.15	.08	.15	.65	.59	1.24	.96	.49	1.35	7.48
1959	.81	.74	.45	.20	.10	.20	.70	1.75	1.63	.54	.37	.94	8.43
1960	.65	.46	.32	.26	.18	.17	1.57	2.87	1.06	.50	.36	.16	8.56

a Adjusted for storage in Partridge Reservoir since April 1955.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30										Calendar year		
		observed					Adjusted a/					Observed	Adjusted a/	
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date											
1950	-	-	-	-	-	-	-	-	-	-	-	392	-	17.03
1951	1207	1,880	May 1, 1951	24	240	-	0.789	10.44	280	-	-	280	-	12.19
1952	1237	1,640	Apr. 23, 1952	34	266	-	.853	11.62	210	-	-	210	-	9.17
1953	1277	1,240	June 1, 1953	33	266	-	.853	11.55	272	-	-	272	-	11.84
1954	1337	2,770	Apr. 17, 1954	15	301	-	.965	13.10	269	-	-	269	-	12.57
1955	1387	637	July 31, 1955	12	109	134	.429	5.86	125	180	6.59	125	180	6.59
1956	1437	1,290	May 8, 1956	29	187	195	.625	8.49	180	188	8.20	180	188	8.20
1957	1507	2,090	Apr. 24, 1957	27	202	217	.696	9.45	204	221	9.62	204	221	9.62
1958	1557	592	June 9-10, 1958	21	139	156	.500	7.48	160	178	7.66	160	178	7.66
1959	1627	810	May 23, 1959	26	178	194	.622	8.43	168	181	7.86	168	181	7.86
1960	1707	1,340	May 6, 1960	32	180	196	.628	8.56	-	-	-	-	-	-

a Adjusted for storage in Partridge Reservoir since April 1955.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 170. Embarrass River at Embarrass, Minn.

Location.--Lat 47°39'24", long 92°11'51", in NW $\frac{1}{4}$  sec.25, T.60 N., R.15 W., on left bank at Embarrass, 30 ft upstream from highway bridge and 100 ft upstream from railroad bridge.

Drainage area.--93.8 sq mi.

Records available.--August 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,410.36 ft above mean sea level, datum of 1929. Prior to Aug. 28, 1944, chain gage at same site and datum.

Average discharge.--18 years (1942-60), 68.3 cfs.

Extremes.--1942-60: Maximum discharge, 1,740 cfs May 8, 9, 1950; maximum gage height, 10.92 ft May 9, 1950; minimum daily discharge, 1.9 cfs Mar. 15-22, 1949; minimum gage height, 0.67 ft Mar. 20, 21, 1949.

Remarks.--Records of chemical analyses for the periods April 1956 to September 1959, July to September 1960, and of water temperatures for the period April 1956 to September 1957 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	†49.6	17.2	9.82	5.24	4.88	6.35	248	198	62.4	20.4	13.2	82.3	59.7
1952	107	64.6	21.7	7.04	5.33	5.05	225	84.7	36.9	223	139	41.1	80.3
1953	17.5	20.6	13.8	7.30	5.65	13.5	164	161	172	78.1	82.3	178	76.1
1954	30.6	21.4	19.3	11.4	9.18	11.1	380	361	131	21.1	7.86	6.16	84.2
1955	13.0	16.4	10.2	5.02	4.79	5.31	185	76.5	63.0	12.2	8.65	17.2	34.6
1956	22.3	26.0	15.1	8.23	5.66	4.48	235	238	22.2	13.9	17.5	15.0	51.9
1957	15.5	35.1	12.5	6.58	4.11	10.6	299	97.8	118	86.3	13.0	20.8	59.8*
1958	27.0	42.7	16.5	4.90	4.34	10.3	64.3	51.9	58.9	54.1	9.32	48.1	32.7
1959	34.1	54.4	14.0	6.04	3.07	7.80	62.4	142	71.7	21.1	22.3	85.0	43.7
1960	55.1	21.2	9.65	8.03	5.72	4.48	123	212	86.6	16.0	7.89	3.03	46.1

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.61	0.20	0.12	0.06	0.05	0.08	2.95	2.43	0.74	0.25	0.16	0.98	6.63
1952	1.32	.77	.27	.09	.06	.06	2.68	1.04	.44	2.74	1.71	.49	11.67
1953	.21	.24	.17	.09	.06	.17	1.95	1.98	2.04	.96	1.01	2.12	11.00
1954	.38	.25	.24	.14	.10	.14	4.51	4.43	1.56	.26	.10	.07	12.18
1955	.16	.19	.13	.06	.05	.09	2.20	.94	.75	.15	.11	.20	5.03
1956	.27	.31	.19	.10	.07	.06	2.79	2.93	.26	.17	.22	.18	7.55
1957	.19	.42	.15	.08	.05	.13	3.56	1.20	1.40	1.06	.16	.25	8.65
1958	.33	.51	.20	.06	.05	.13	.77	.64	.70	.67	.11	.57	4.74
1959	.42	.65	.17	.07	.03	.10	.74	1.75	.85	.26	.27	1.01	6.32
1960	.68	.25	.12	.10	.07	.06	1.47	2.60	1.03	.20	.10	.04	6.72

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950		-	-	-	-	-	-	106	15.36
1951	1207	828	Apr. 30, 1951	3.8	59.7	0.636	9.63	69.5	10.06
1952	1237	803	July 21, 1952	4.6	80.3	.856	11.67	68.5	9.93
1953	1277	619	Sept. 5, 1953	5.4	76.1	.811	11.00	77.8	11.25
1954	1337	1,260	Apr. 17, 1954	4.7	84.2	.898	12.18	81.5	11.79
1955	1387	360	Apr. 15, 1955	2.2	34.6	.369	5.03	36.6	5.32
1956	1437	440	Apr. 22, 1956	3.4	51.9	.553	7.55	51.9	7.54
1957	1507	930	Apr. 22, 1957	3.9	59.8	.638	8.65	61.7	8.93
1958	1557	199	July 2, 1958	3.3	32.7	.349	4.74	34.1	4.94
1959	1627	224	May 23, 1959	2.8	43.7	.466	6.32	42.4	6.13
1960	1707	376	May 7, 1960	2.5	46.1	.491	6.72	-	-

## 180. Embarrass River near McKinley, Minn.

Location.--Lat 47°27'10", long 92°23'00", in NW $\frac{1}{4}$  sec.4, T.57 N., R.16 W., on left bank 40 ft upstream from highway bridge, 0.9 mile downstream from outlet of Esquagama Lake, and 4 $\frac{1}{2}$  miles southeast of McKinley.

Drainage area.--171 sq mi.

Records available.--October 1953 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,338.65 ft above mean sea level, datum of 1929.

Average discharge.--7 years (1953-60), 109 cfs.

Extremes.--1953-60: Maximum discharge, 1,690 cfs Apr. 20, 1954 (gage height, 11.72 ft); minimum, 11 cfs Sept. 7, 1955; minimum gage height, 2.66 ft June 26, 1959.

Remarks.--Records of chemical analyses for the periods April 1956 to September 1959, July to September 1960, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	78.0	55.1	53.5	42.5	33.7	42.3	673	739	265	80.2	30.3	28.6	177
1955	35.9	40.0	35.4	24.7	27.2	26.8	348	181	124	58.2	42.3	35.4	81.4
1956	59.1	54.4	42.8	30.3	27.7	27.5	394	481	69.5	38.0	47.1	37.4	109
1957	35.2	82.3	41.1	28.1	24.2	30.2	440	271	175	215	49.3	31.7	119
1958	75.5	72.9	44.4	26.1	25.4	41.3	88.2	81.7	143	134	41.0	109	73.6
1959	86.9	89.6	54.2	26.2	22.6	37.2	123	248	163	59.3	30.4	163	92.0
1960	107	62.9	34.8	31.9	28.2	27.0	213	434	243	68.9	54.5	40.5	112

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	0.53	0.36	0.36	0.29	0.21	0.29	4.39	4.98	1.73	0.54	0.20	0.19	14.07
1955	.24	.26	.24	.17	.17	.18	2.27	1.22	.81	.39	.29	.23	6.47
1956	.40	.36	.29	.20	.17	.19	2.57	3.24	.45	.26	.32	.23	8.68
1957	.24	.54	.28	.19	.15	.20	2.87	1.83	1.14	1.45	.33	.21	9.43
1958	.51	.48	.30	.18	.15	.28	.58	.55	.93	.90	.28	.71	5.86
1959	.59	.58	.37	.18	.14	.25	.80	1.67	1.06	.39	.20	1.06	7.29
1960	.72	.41	.23	.22	.18	.18	1.39	2.93	1.59	.46	.37	.26	8.94

Note.--Runoff prior to October 1958 not previously published.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	1337	1,690	Apr. 20, 1954	26	177	+1.04	+14.07	171	+13.56
1955	1387	575	Apr. 18, 1955	12	81.4	+4.76	+6.47	85.2	+6.78
1956	1437	704	Apr. 27, 1956	25	109	+6.37	+8.68	109	+8.69
1957	1507	1,240	Apr. 26, 1957	20	119	+6.66	+9.43	122	+9.66
1958	1557	344	June 8, 1958	14	73.6	+4.30	+5.86	76.7	6.10
1959	1627	354	May 27, 1959	13	92.0	.538	7.29	89.8	7.11
1960	1707	580	May 5, 1960	19	112	.655	8.94	-	-

\* Not previously published.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 190. West Two River near Iron Junction, Minn.

Location.--Lat 47°24'05", long 92°42'10", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.24, T.57 N., R.19 W., on right bank 40 ft upstream from bridge on State Highway 216, 5 miles southwest of Iron Junction, and  $\frac{9}{16}$  miles upstream from St. Louis River.

Drainage area.--68.4 sq mi.

Records available.--October 1953 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,322.05 ft above mean sea level, datum of 1929 (Minnesota Highway Department bench mark).

Average discharge.--7 years (1953-60), 45.0 cfs.

Extremes.--1953-60: Maximum discharge, 916 cfs Apr. 17, 1954 (gage height, 9.85 ft); minimum daily, 3.0 cfs Jan. 22 to Feb. 6, 1957; minimum gage height, 2.35 ft July 14, 1960.

Remarks.--Records of chemical analyses for the periods of April 1956 to September 1959, July to September 1960, and of water temperatures for the period April 1956 to September 1957 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	23.4	19.4	12.9	9.69	13.1	22.9	335	181	44.1	15.9	14.3	20.0	59.2
1955	14.9	16.2	12.5	6.73	4.24	5.02	228	62.6	61.1	125	35.6	40.0	51.0
1956	29.2	24.8	16.9	12.4	10.2	11.1	289	61.9	19.4	11.4	19.0	13.8	42.9
1957	11.7	15.7	6.98	3.26	3.22	11.0	248	45.4	60.9	145	20.1	13.8	48.3
1958	19.0	23.9	9.90	6.95	8.03	20.4	36.9	19.2	81.6	74.1	21.4	42.4	30.3
1959	26.6	55.2	10.5	7.93	7.71	24.5	69.3	134	56.8	31.8	34.3	59.5	43.3
1960	39.6	18.6	13.9	9.74	7.07	7.10	173	98.0	59.3	19.9	15.1	22.7	40.2

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	0.39	0.32	0.22	0.16	0.20	0.39	5.46	3.05	0.72	0.27	0.24	0.33	11.75
1955	.25	.26	.21	.11	.06	.08	3.72	1.06	1.00	2.10	.60	.65	10.10
1956	.49	.40	.28	.21	.16	.19	4.71	1.04	.32	.19	.32	.23	8.54
1957	.20	.26	.12	.05	.05	.19	4.04	.73	.98	2.41	.34	.22	9.59
1958	.32	.39	.17	.12	.12	.34	.60	.32	1.33	1.25	.36	.69	6.01
1959	.45	.90	.18	.13	.12	.41	1.13	2.26	.95	.54	.58	.97	8.60
1960	.67	.30	.23	.16	.11	.12	2.83	1.65	.97	.34	.25	.37	8.00

Note.--Runoff prior to October 1958 not previously published.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	1337	916	Apr. 17, 1954	9.0	59.2	±0.865	±11.75	58.1	±11.54
1955	1387	705	July 24, 1955	3.8	51.0	±.746	±10.10	53.3	±10.55
1956	1437	626	Apr. 15, 1956	7.8	42.9	±.627	±8.54	39.9	±7.95
1957	1507	796	Apr. 22, 1957	3.0	48.3	±.706	±9.59	49.8	±9.89
1958	1557	328	June 10, 1958	6.5	30.3	±.443	±6.01	33.6	±6.66
1959	1627	385	May 21, 1959	7.2	43.3	.633	8.60	41.7	8.27
1960	1707	532	Apr. 15, 1960	5.1	40.2	.598	8.00	-	-

± Not previously published.



## 195. East Swan River near Toivola, Minn.

Location--Lat 47°16'55", long 92°50'05", in NE¼NE¼ sec.2, T.55 N., R.20 W., on left bank 350 ft downstream from bridge on St. Louis County Road 442, 4.8 miles upstream from confluence with West Swan River, 8 miles northwest of Toivola, and 8½ miles upstream from mouth of Swan River.

Drainage area--112 sq mi.

Records available--September 1953 to September 1960.

Gage--Water-stage recorder. Datum of gage is 1,260.46 ft above mean sea level, datum of 1929.

Average discharge--7 years (1953-60), 89.8 cfs.

Extremes--1953-60: Maximum discharge, 1,690 cfs Apr. 15, 1956 (gage height, 17.94 ft); maximum gage height, 18.45 ft Apr. 12, 1954 (backwater from ice); minimum daily discharge, 13 cfs Jan. 28 to Feb. 3, 1955; minimum gage height, 3.24 ft Nov. 10, 1954. Flood in May 1950 reached a stage of about 20.0 ft from information by local residents.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	51.2	46.3	28.7	26.9	38.8	65.3	574	335	78.9	33.2	25.2	34.2	111
1955	35.3	26.0	23.2	18.6	14.3	26.5	363	147	95.3	216	119	62.0	95.7
1956	69.7	50.3	38.5	27.4	24.0	29.2	534	93.7	29.4	26.4	35.3	29.9	81.8
1957	31.5	36.7	19.0	14.7	15.1	20.5	434	95.5	118	235	42.3	41.0	91.8
1958	50.4	49.6	31.7	26.7	25.2	28.2	51.0	33.3	122	203	70.0	115	67.3
1959	72.7	112	21.1	19.0	18.4	38.1	98.5	282	133	80.7	50.6	144	89.4
1960	94.9	48.9	36.2	26.3	22.1	22.5	298	244	167	42.4	46.7	54.2	91.8

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	0.53	0.46	0.30	0.28	0.36	0.65	5.72	3.44	0.79	0.34	0.26	0.34	13.47
1955	.36	.26	.24	.19	.13	.27	3.61	1.51	.95	2.23	1.22	.62	11.59
1956	.72	.50	.40	.28	.23	.30	5.32	.96	.29	.27	.36	.30	9.93
1957	.32	.37	.20	.15	.14	.21	4.32	.98	1.18	2.42	.43	.41	11.13
1958	.52	.49	.33	.27	.23	.29	.51	.34	1.21	2.09	.72	1.15	8.15
1959	.75	1.12	.22	.20	.17	.39	.98	2.90	1.32	.83	.52	1.43	10.83
1960	.98	.49	.37	.27	.21	.23	2.97	2.51	1.67	.44	.48	.54	11.16

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	1337	1,510	Apr. 13, 1954	19	111	0.991	13.47	108	13.04
1955	1387	1,260	Apr. 10, 1955	13	95.7	.854	11.59	102	12.35
1956	1437	1,690	Apr. 15, 1956	21	81.8	.730	9.93	75.8	9.20
1957	1507	1,370	Apr. 21, 1957	14	91.8	.820	11.13	95.6	11.58
1958	1557	814	July 28, 1958	23	67.3	.601	8.15	73.5	8.90
1959	1627	802	May 20, 1959	18	89.4	.798	10.83	87.3	10.58
1960	1707	949	May 30, 1960	22	91.8	.820	11.16	-	-

## STREAMS TRIBUTARY TO LAKE SUPERIOR

200. Swan River near Toivola, Minn.

Location.--Lat 47°15'02", long 92°48'36", in NE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.13, T.55 N., R.20 W., on left bank at upstream side of bridge on St. Louis County Highway 5, 0.4 mile downstream from confluence of East Swan and West Swan Rivers,  $3\frac{1}{2}$  miles upstream from mouth, and  $5\frac{1}{2}$  miles north of Toivola.

Drainage area.--254 sq mi.

Records available.--October 1952 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,251.78 ft above mean sea level, datum of 1929.

Average discharge.--8 years (1952-60), 175 cfs.

Extremes.--1952-60: Maximum discharge, 2,980 cfs Apr. 13, 1954 (gage height, 17.17 ft, backwater from ice); minimum, 20 cfs Nov. 13, 1952, Jan. 5 to Feb. 5, 1957; minimum gage height, 2.33 ft July 26, 1954.

Remarks.--Records of chemical analyses for the periods July 1958 to September 1959, July to September 1960, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	53.0	55.7	41.3	36.3	33.4	96.8	505	521	441	689	325	442	271
1954	74.0	81.6	55.9	44.4	55.2	89.9	1,121	665	146	44.4	37.3	46.1	205
1955	50.4	40.7	36.8	31.9	28.0	32.3	720	308	163	366	228	87.2	175
1956	112	71.1	58.5	49.0	42.8	45.8	1,033	202	46.2	31.0	37.2	30.6	145
1957	36.2	47.2	25.4	20.1	22.0	37.6	718	201	228	412	64.5	55.7	156
1958	67.4	79.5	47.0	37.2	41.4	57.1	8.33	53.2	236	467	140	183	125
1959	106	178	38.6	31.3	31.9	54.1	163	599	265	127	71.6	267	161
1960	158	80.7	55.1	39.3	32.6	34.4	539	498	323	63.2	65.1	70.0	163

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	0.24	0.24	0.19	0.16	0.14	0.44	2.22	2.36	1.94	3.13	1.47	1.94	14.47
1954	.34	.36	.25	.20	.23	.41	4.92	3.02	.64	.20	.17	.20	10.94
1955	.23	.18	.17	.14	.11	.15	3.16	1.40	.71	1.66	1.03	.38	9.32
1956	.51	.31	.27	.22	.18	.21	4.54	.92	.20	.14	.17	.13	7.80
1957	.16	.21	.12	.09	.09	.17	3.15	.91	1.00	1.87	.29	.24	8.30
1958	.31	.35	.21	.17	.17	.26	.37	.24	1.04	2.12	.64	.81	6.69
1959	.48	.78	.18	.14	.13	.25	.72	2.72	1.16	.57	.33	1.17	8.63
1960	.72	.35	.25	.18	.14	.16	2.37	2.26	1.42	.29	.30	.31	8.75

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	1277	2,410	July 4, 1953	23	271	†1.07	14.47	276	14.75
1954	1337	2,980	Apr. 13, 1954	26	205	.807	10.94	198	10.57
1955	1387	2,050	Apr. 11, 1955	25	175	.689	9.32	184	9.83
1956	1437	2,700	Apr. 15, 1956	24	145	.571	7.80	134	7.20
1957	1507	2,540	Apr. 22, 1957	20	156	.614	8.30	163	8.68
1958	1557	2,070	July 28, 1958	31	125	.492	6.69	136	7.26
1959	1627	1,400	May 20, 1959	30	161	.634	8.63	159	8.51
1960	1707	1,610	May 30, 1960	32	163	.642	8.75	-	-

† Corrected.

240. St. Louis River at Scanlon, Minn.  
(Formerly published as St. Louis River near Thomson)

Location.--Lat 46°42'12", long 92°25'07", in NW<sup>1</sup> sec.30, T.49 N., R.16 W., on right bank 25 ft downstream from lower bridge on U.S. Highway 61 at Scanlon, 0.6 mile downstream from Minnesota Power and Light Co. powerplant, 3 miles upstream from Thomson Reservoir, and 3.2 miles upstream from Midway River.

Drainage area.--3,430 sq mi, approximately. At site used prior to Aug. 5, 1953, 3,570 sq mi, approximately.

Records available.--January 1908 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Published as "near Thomson" 1908-50.

Gage.--Water-stage recorder. Datum of gage is 1,101.23 ft above mean sea level, datum of 1929. Oct. 5, 1909, to Sept. 5, 1914, chain gage 3 miles downstream and 50 ft below powerplant at datum about 420 ft lower. Sept. 6, 1914, to Aug. 4, 1953, power-plant record at Thomson hydroelectric plant.

Average discharge.--52 years (1908-60), 2,202 cfs (unadjusted).

Extremes.--1908-60: Maximum daily discharge, 37,900 cfs May 9, 1950; maximum gage height, 15.8 ft May 9, 1950, from Minnesota Highway Department (discharge uncertain); minimum daily discharge, 109 cfs Feb. 7, 1924.

Remarks.--Diurnal fluctuation caused by powerplant upstream. Flow regulated by Whiteface Reservoir and Boulder, Island, Rice, and Fish Lakes (combined capacity, 332,160 acre-ft). Records of chemical analyses for the periods July 1958 to September 1959, July to September 1960, are published in reports of the Geological Survey.

Cooperation.--Records for period Oct. 1, 1950, to Aug. 4, 1953, furnished by Minnesota Power & Light Co.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,472	960	1,405	959	892	1,276	8,855	4,412	2,750	1,734	1,431	6,651	2,726
1952	5,459	3,794	1,826	1,662	1,757	1,592	7,562	2,153	1,256	4,072	3,029	2,248	3,034
1953	995	1,056	1,165	1,003	1,062	2,219	5,260	5,289	5,550	6,798	9,197	3,291	3,592
1954	1,796	1,532	1,519	1,387	1,473	1,449	10,760	10,310	5,294	1,744	963	983	3,268
1955	1,054	1,078	1,034	871	897	729	5,477	2,553	1,991	3,033	3,391	1,536	1,973
1956	1,510	1,570	1,500	1,310	1,290	1,220	9,360	4,590	1,600	635	743	695	2,160
1957	782	1,118	908	802	793	943	6,927	2,972	4,164	5,449	1,381	951	2,867
1958	824	1,177	1,538	1,374	1,205	1,628	1,321	897	2,731	4,633	1,548	3,097	1,633
1959	1,394	1,713	1,397	1,310	1,312	1,349	1,427	4,357	3,888	1,522	1,003	2,263	1,912
1960	1,569	1,006	1,458	1,245	1,117	1,159	4,976	6,758	3,379	1,268	964	997	2,159

Monthly and yearly runoff, in inches (adjusted) <sup>a</sup>/

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.59	0.21	0.17	0.14	0.11	0.15	3.54	1.88	1.02	0.53	0.49	2.22	11.05
1952	1.75	1.16	1.44	.15	.19	.16	3.11	.81	1.45	1.57	.99	.51	11.29
1953	.18	.16	.20	.13	.10	.64	2.12	2.12	1.75	2.20	3.07	.97	13.64
1954	.28	.36	.28	.19	.17	.25	4.51	4.04	1.67	.26	.14	.22	12.37
1955	.27	.24	.14	.11	.10	.10	2.34	1.12	.86	1.19	1.13	.49	8.09
1956	.47	.40	.24	.19	.14	.14	3.86	2.13	.32	.13	.24	.16	8.42
1957	.17	.30	.20	.10	.07	.19	2.71	1.19	1.62	1.85	.20	.25	8.95
1958	.31	.46	.14	.09	.13	.22	.73	.37	1.16	1.80	.43	1.27	7.13
1959	.52	.69	.19	.07	.11	.25	.71	1.80	1.51	.45	.26	.87	7.43
1960	.67	.33	.12	.14	.14	.13	2.30	2.90	1.14	.42	.18	.24	8.71

<sup>a</sup> Adjusted for change in contents in Whiteface Reservoir and Boulder, Island, Rice, and Fish Lakes.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted <sup>a</sup> /			Observed		
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	3,747	3,685	14.04
1951	1337	b18,200	Apr. 15, 1951	690	2,726	2,905	0.814	11.05	3,333	3,531	13.43
1952	1337	b12,500	Apr. 17, 1952	782	3,034	2,966	.831	11.29	2,375	2,227	8.48
1953	1337	22,100	Aug. 7, 1953	534	3,532	3,546	.993	13.64	3,729	3,637	14.02
1954	1337	25,100	Apr. 16, 1954	770	3,268	3,127	.912	12.37	3,126	3,054	12.10
1955	1387	18,500	Apr. 11, 1955	682	1,973	2,042	.595	8.09	2,090	2,159	8.55
1956	1437	21,400	Apr. 15, 1956	480	2,160	2,123	.619	8.42	2,012	2,015	7.98
1957	1507	18,100	Apr. 22, 1957	450	2,267	2,234	.651	8.83	2,329	2,296	9.07
1958	1557	16,300	July 1, 1958	587	1,833	1,801	.525	7.13	1,913	1,924	7.62
1959	1627	14,800	June 1, 1959	746	1,912	1,875	.547	7.43	1,874	+1,806	7.15
1960	1707	16,500	Apr. 26, 1960	678	2,159	2,199	.641	8.71	-	-	-

<sup>†</sup> Corrected.

<sup>a</sup> Adjusted for change in contents in Whiteface Reservoir and Boulder, Island, Rice, and Fish Lakes.

<sup>b</sup> Maximum daily discharge.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 255. Bois Brule River at Brule, Wis.

Location.--Lat 46°32'15", long 91°35'45", in NW 1/4 sec. 23, T. 47 N., R. 10 W., on right bank 1.4 miles southwest of Brule Post Office, 1.4 miles downstream from Nebagamon Creek, and 1.7 miles upstream from Little Brule River.

Drainage area.--113 sq mi.

Records available.--October 1942 to September 1960. Prior to January 1943 monthly discharge only, published in WSP 1307.

Gage.--Chain gage supplemented by recorder record in summer of 1959, 1960. Datum of gage is 948.49 ft above mean sea level, datum of 1929.

Average discharge.--18 years (1942-60), 173 cfs.

Extremes.--1942-60: Maximum discharge, 1,520 cfs June 5, 1944 (gage height, 5.2 ft, from graph based on gage readings), from rating curve extended above 750 cfs; minimum observed, 67 cfs Mar. 13, 1943.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	164	141	138	131	128	151	371	277	348	258	155	237	213
1952	215	225	171	146	152	159	395	212	205	345	213	157	217
1953	136	132	139	135	128	195	300	316	406	345	235	146	218
1954	144	166	180	149	157	158	303	386	277	182	158	181	203
1955	176	169	153	149	147	133	278	182	195	177	200	149	176
1956	159	189	159	144	133	133	313	225	149	128	144	133	167
1957	139	158	151	138	148	137	250	182	181	189	128	140	162
1958	141	171	148	142	138	140	193	140	151	266	151	210	166
1959	148	176	129	107	109	113	157	210	184	143	131	153	147
1960	148	127	126	123	114	117	324	269	179	129	137	144	161

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.67	1.40	1.41	1.34	1.18	1.54	3.66	2.82	3.44	2.63	1.58	2.93	25.60
1952	2.20	2.23	1.74	1.49	1.45	1.62	3.90	2.17	2.03	3.52	2.22	1.55	26.12
1953	1.38	1.30	1.42	1.38	1.18	1.99	2.96	3.22	4.01	3.52	2.39	1.45	26.20
1954	1.47	1.64	1.83	1.52	1.45	1.61	2.99	3.93	2.74	1.86	1.61	1.78	24.43
1955	1.79	1.67	1.56	1.52	1.35	1.36	2.74	1.85	1.93	1.81	2.04	1.47	21.09
1956	1.62	1.87	1.63	1.47	1.27	1.35	3.09	2.30	1.47	1.30	1.47	1.31	20.15
1957	1.42	1.56	1.55	1.41	1.37	1.40	2.47	1.86	1.79	1.93	1.31	1.38	19.45
1958	1.43	1.68	1.51	1.45	1.27	1.43	1.91	1.43	1.49	2.71	1.55	2.07	19.93
1959	1.51	1.74	1.31	1.09	1.01	1.15	1.55	2.14	1.82	1.46	1.34	1.51	17.63
1960	1.51	1.26	1.29	1.26	1.08	1.20	3.19	2.74	1.77	1.31	1.40	1.42	19.43

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	177	21.32
1951	1207	779	June 24, 1951	119	213	1.88	25.60	227	27.29
1952	1237	1,020	July 18, 1952	140	217	1.92	26.12	200	24.05
1953	1277	1,320	June 20, 1953	110	218	1.93	26.20	225	27.04
1954	1337	1,120	May 1, 1954	137	203	1.80	24.43	204	24.51
1955	1387	394	July 30, 1955	120	176	1.56	21.09	176	21.19
1956	1437	482	Apr. 16, 1956	115	167	1.48	20.15	162	19.56
1957	1507	513	Apr. 20, 1957	111	162	1.43	19.45	163	19.54
1958	1557	832	July 1, 1958	122	166	1.47	19.93	165	19.87
1959	1627	339	June 29, 1959	103	147	1.30	17.63	143	17.13
1960	1707	1,020	Apr. 25, 1960	110	161	1.42	19.43	-	-

## 265. Bad River at Mellen, Wis.

Location.--Lat 46°19'30", long 90°39'35", in sec.6, T.44 N., R.2 W., on upstream side of bridge on U.S. Highway 13 in Mellen, 0.4 mile upstream from Devils Creek and 3.1 miles downstream from Rocky Run.

Drainage area.--101 sq mi.

Records available.--May 1948 to September 1955.

Gage.--Chain gage. Datum of gage is 1,217.49 ft above mean sea level, datum of 1929.

Average discharge.--7 years (1948-55), 131 cfs.

Extremes.--1948-55: Maximum discharge, 4,340 cfs July 4, 1949 (gage height, 14.0 ft); minimum observed, 3.8 cfs Aug. 26-27, 1948 (gage height, 1.98 ft).  
Flood of June 24, 1946, reached a stage of 18.60 ft, from floodmark, from information by local resident (discharge not determined).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	22.1	45.4	32.2	20.0	21.5	64.7	606	442	378	108	40.8	179	163
1952	121	162	84.7	50.1	28.6	32.6	568	159	171	320	124	35.0	153
1953	22.2	21.0	27.1	17.9	18.4	143	421	334	282	227	130	16.1	139
1954	16.3	42.8	68.5	25.5	30.4	44.5	509	442	215	35.5	45.1	91.8	131
1955	142	103	76.3	37.1	26.7	35.7	506	96.5	87.8	59.3	203	77.9	121

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.25	0.50	0.37	0.23	0.22	0.74	6.89	5.05	4.17	1.23	0.47	1.98	21.90
1952	1.38	1.78	.97	.34	.28	1.37	6.27	1.82	1.89	3.66	1.42	.39	20.57
1953	.25	.23	.31	.20	.19	1.65	4.65	3.81	3.12	2.59	1.49	.18	18.65
1954	.19	.47	.78	.29	.31	.51	5.63	5.05	2.38	.41	.51	1.01	17.54
1955	1.62	1.14	.87	.42	.28	.41	5.59	1.10	.97	.68	2.31	.86	16.25

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	114	15.34
1951	1207	*3,400	Apr. 28, 1951*	13	163	1.61	21.90	165	24.91
1952	1237	*2,270	Apr. 19, 1952*	23	153	1.51	20.57	128	17.23
1953	1277	1,650	July 1, 1953	12	139	1.38	18.65	144	19.30
1954	1337	3,050	May 1, 1954	11	131	1.30	17.54	147	19.73
1955	1387	1,180	Apr. 10, 1955	10	121	1.20	16.25	-	-

\* Revised.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

270. Bad River near Odanah, Wis.

Location.--Lat 46°29'15", long 90°41'45", in SE $\frac{1}{4}$  sec. 2, T.46 N., R.3 W., at downstream end of center pier of Elm Holst Bridge, 5.0 miles downstream from Potato River, 8.5 miles south of Odanah, and 23 miles from mouth.

Drainage area.--611 sq mi.

Records available.--July 1914 to December 1922, May 1948 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight gage. Altitude of gage is 680 ft (from river-profile map). May 17, 1948, to Nov. 6, 1959, water-stage recorder at same site and datum. Prior to Nov. 11, 1922, water-stage recorder at site 2 miles downstream at different datum.

Average discharge.--20 years (1914-22, 1948-60), 622 cfs.

Extremes.--1914-22, 1948-60: Maximum discharge, 27,700 cfs Apr. 24 (gage height, 21.7 ft, from floodmarks), from rating curve extended above 12,000 cfs and comparison with contracted-opening measurement of peak flow (45,600 cfs) at Odanah, drainage area 970 sq mi, approximately; minimum, 50 cfs Nov. 29, 1948 (gage height, 2.02 ft). Flood of June 24, 1946, reached a stage of at least 22.2 ft (top of bridge submerged), from information by Indian Service.

Correction.--In WSP 504 and 1307, the July 1920 and water and calendar year mean and discharge data are listed in error; they should be:

Month	Mean	Per square mile	Runoff in inches
July 1920.....	629	1.02	1.17
Water year 1919-20.....	649	1.05	14.30
Calendar year 1920.....	617	.998	13.59

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	161	359	240	136	134	499	2,936	2,536	2,054	766	365	822	917
1952	761	1,183	549	224	185	219	3,257	871	1,339	1,738	530	181	917
1953	143	136	164	129	126	1,217	2,438	1,973	1,690	1,561	747	138	875
1954	128	257	424	159	223	318	2,906	2,475	1,280	256	156	358	743
1955	750	674	399	237	190	279	2,939	646	516	517	1,038	341	710
1956	522	729	386	296	209	193	2,253	1,024	491	375	470	182	593
1957	144	204	224	155	135	429	1,775	585	608	510	119	188	422
1958	151	354	268	181	163	310	1,324	268	176	1,225	378	834	468
1959	273	523	171	132	102	274	1,317	1,274	565	216	356	621	486
1960	533	298	307	327	211	316	4,187	1,042	492	320	458	882	777

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.30	0.66	0.45	0.28	0.23	0.94	5.37	4.78	3.75	1.44	0.69	1.51	20.38
1952	1.44	2.16	1.04	.42	.33	.41	5.95	1.64	2.44	3.28	1.00	.33	20.44
1953	.27	.25	.31	.24	.21	2.30	4.45	3.72	3.08	2.94	1.41	.25	19.43
1954	.24	.47	.80	.30	.38	.60	5.31	4.67	2.34	.44	.29	.65	16.49
1955	1.42	1.23	.75	.45	.32	.53	5.37	1.22	.94	.98	1.96	.62	15.79
1956	.99	1.33	.73	.56	.37	.36	4.11	1.93	.90	.71	.89	.33	13.21
1957	.27	.37	.42	.29	.23	.81	3.25	1.10	1.11	.96	.22	.34	9.37
1958	.25	.65	.51	.34	.28	.58	2.42	.51	.32	2.51	.71	1.52	10.40
1959	.52	.96	.32	.25	.17	.52	2.40	2.40	1.03	.41	.67	1.13	10.78
1960	1.01	.54	.58	.62	.37	.60	7.65	1.97	.90	.60	.86	1.61	17.31

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	595	15.24
1951	1207	12,200	Apr. 29, 1951	120	917	1.50	20.38	1,062	23.61
1952	1237	11,500	Apr. 19, 1952	120	917	1.50	20.44	747	16.63
1953	1277	13,800	July 1, 1953	104	875	1.43	19.43	906	20.11
1954	1337	14,600	May 1, 1954	77	743	1.22	16.49	828	18.38
1955	1387	6,770	Apr. 10, 1955	117	710	1.16	15.79	694	15.44
1956	1437	5,500	May 14, 1956	104	593	.971	13.21	504	11.22
1957	1507	5,930	Apr. 20, 1957	94	422	.691	9.37	437	9.72
1958	1557	6,410	July 2, 1958	100	468	.786	10.40	486	10.79
1959	1627	3,480	June 1, 1959	72	466	.795	10.78	501	11.11
1960	1707	27,700	Apr. 24, 1960	100	777	1.27	17.31	-	-

## 275. White River near Ashland, Wis.

Location.--Lat 46°29'50", long 90°54'15", in sec.6, T.46 N., R.4 W., at downstream end of powerplant of Lake Superior District Power Co., 0.3 mile downstream from bridge on State Highway 112 over dam, and 4.5 miles south of Ashland city limits.

Drainage area.--269 sq mi.

Records available.--May 1948 to September 1960.

Gage.--Chain gage. Datum of gage is 660.15 ft above mean sea level, datum of 1929 (Lake Superior District Power Co. bench mark).

Average discharge.--12 years (1948-60), 313 cfs.

Extremes.--1948-60: Maximum discharge, 6,270 cfs July 1, 1953 (gage height, 7.90 ft), from rating curve extended above 3,000 cfs; minimum, 3.1 cfs Apr. 28-30, 1949 (gage height, 0.09 ft).

Remarks.--Diurnal fluctuation caused by powerplant at gage, but only moderate regulation as service pond is small.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	190	223	179	191	185	243	993	446	498	412	241	427	352
1952	355	445	258	248	223	228	998	358	707	529	519	263	406
1953	218	222	248	221	237	600	617	729	652	697	417	235	428
1954	233	274	267	224	248	277	703	750	589	277	272	275	366
1955	309	244	218	213	222	231	724	320	334	300	385	235	311
1956	281	284	239	216	217	218	721	338	230	232	268	203	287
1957	201	224	215	182	206	336	433	258	269	282	169	186	247
1958	177	247	196	193	169	280	317	199	185	365	186	305	237
1959	197	231	188	185	186	258	293	385	278	220	185	218	256
1960	216	169	188	190	182	207	1,017	450	294	204	303	635	337

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.81	0.92	0.77	0.82	0.72	1.04	4.12	1.91	2.06	1.76	1.03	1.77	17.73
1952	1.44	1.84	1.02	1.06	.90	.97	4.14	1.53	2.93	2.27	1.37	1.09	20.56
1953	.94	.92	1.06	.95	.92	2.57	2.56	3.12	2.70	2.99	1.79	.98	21.50
1954	1.00	1.14	1.14	.96	.96	1.19	2.91	3.21	2.44	1.19	1.17	1.14	18.45
1955	1.35	1.01	.93	.91	.86	.99	3.00	1.37	1.58	1.28	1.65	.98	15.69
1956	1.20	1.18	1.02	.92	.87	.93	2.99	1.45	.95	.99	1.15	.84	14.49
1957	.86	.93	.82	.78	.80	1.44	1.79	1.11	1.12	1.21	.72	.77	12.45
1958	.76	1.03	.84	.83	.66	1.20	1.31	.85	.77	1.65	.80	1.27	11.97
1959	.85	.96	.80	.79	.73	1.10	1.21	1.65	1.15	.94	.79	.91	11.88
1960	.92	.70	.81	.82	.73	.89	4.22	1.98	1.22	.87	1.30	2.63	17.04

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	305	15.33
1951	1207	3,480	July 4, 1951	105	352	1.31	17.73	387	19.53
1952	1237	5,390	June 24, 1952	112	406	1.51	20.56	379	19.18
1953	1277	6,270	July 1, 1953	85	426	1.58	21.50	433	21.86
1954	1337	3,800	May 1, 1954	112	366	1.36	18.45	366	18.44
1955	1387	2,200	Apr. 1, 1955	72	311	1.16	15.69	314	15.82
1956	1437	2,060	Apr. 3, 1956	149	287	1.07	14.49	273	13.80
1957	1507	1,010	Mar. 30, 1957	88	247	.918	12.45	245	12.37
1958	1557	1,430	July 1, 1958	97	237	.881	11.97	237	11.95
1959	1627	940	June 28, 1959	114	236	.877	11.88	232	11.70
1960	1707	4,630	Apr. 24, 1960	96	337	1.25	17.04	-	-

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 280. Montreal River at Ironwood, Mich.

Location.--Lat 46°27'00", long 90°10'40", in sec.24, T.46 N., R.2 E., at downstream side of main highway bridge on State line between Hurley, Wis., and Ironwood, Mich., 8 miles upstream from West Branch Montreal River.

Drainage area.--63.0 sq mi (revised).

Records available.--April 1918 to June 1922, July 1924 to November 1925, September 1949 to September 1954.

Gage.--Chain gage. Datum of gage is 1,464.13 ft above mean sea level, datum of 1929.

Average discharge.--9 years (1918-21, 1924-25, 1949-54) 75.3 cfs.

Extremes.--1918-22, 1924-25, 1949-54: Maximum discharge observed, 1,810 cfs Apr. 19, 1952 (gage height, 5.10 ft), from rating curve extended above 1,100 cfs; minimum, 0.1 cfs Sept. 26, 1925 (gage height, 0.56 ft).

Flood of Apr. 24, 1960, reached a discharge of 3,400 cfs (computed estimate) at a site about 2 miles downstream.

Remarks.--Occasional diurnal fluctuation caused by dam upstream.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	10.8	32.9	24.1	15.4	14.4	36.4	428	236	313	50.0	28.1	76.4	105
1952	74.8	66.6	59.2	21.0	18.3	19.5	409	38.1	90.0	231	60.3	24.2	92.5
1953	12.4	19.7	9.40	10.3	9.76	154	152	302	281	138	28.1	11.2	94.4
1954	10.9	11.8	13.7	18.2	33.8	78.2	495	261	145	24.7	12.4	29.1	94.0

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.20	0.58	0.44	0.28	0.24	0.67	7.59	4.31	5.55	0.92	0.51	1.35	22.64
1952	1.37	1.18	1.08	.38	.31	.36	7.24	.70	1.59	4.23	1.10	.43	19.97
1953	.23	.35	.17	.19	.16	2.83	2.69	5.53	4.97	2.52	.51	.20	20.35
1954	.20	.21	.25	.33	.56	1.43	8.76	4.77	2.54	.45	.23	.52	20.25

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	77.0	16.59
1951	1207	1,110	June 25, 1951	3.0	105	1.67	22.64	116	25.05
1952	1237	1,810	Apr. 19, 1952	7.8	92.5	1.47	19.97	79.1	17.09
1953	1277	1,110	May 21, 1953	4.8	94.4	1.50	20.35	94.0	20.25
1954	1337	1,080	May 2, 1954	3.0	94.0	1.49	20.25	-	-



## 300. Montreal River near Saxon, Wis.

Location.--Lat 46°32'45", long 90°24'05", in NW $\frac{1}{4}$  sec.23, T.48 N., R.49 W., on right bank 2 miles upstream from mouth and 3.5 miles north of Saxon.

Drainage area.--262 sq mi (revised).

Records available.--September 1938 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 760 ft (from power company data).

Average discharge.--22 years (1938-60), 333 cfs.

Extremes.--1938-60: Maximum discharge, 6,600 cfs Apr. 24, 1960 (gage height, 7.50 ft); minimum, 2 cfs Sept. 21, Oct. 8, 1939.

Remarks.--Diurnal fluctuation caused by Saxon Falls powerplant 1.5 miles upstream. Flow regulated by Gile Reservoir on West Branch Montreal River (capacity, 1,290,000,000 cu ft) since April 1941.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	60.5	130	137	153	163	212	1,152	1,001	924	412	247	506	424
1952	465	627	391	231	235	289	1,239	427	647	844	300	155	487
1953	99.7	136	125	172	194	543	909	808	747	533	432	183	407
1954	111	128	188	201	204	173	1,548	1,180	807	247	181	194	413
1955	404	312	311	246	202	205	1,293	465	288	270	359	226	362
1956	270	271	226	247	243	235	942	393	246	196	228	194	307
1957	173	186	200	163	69.9	216	831	220	210	204	159	132	230
1958	100	211	166	193	161	190	824	176	164	299	219	327	252
1959	178	259	168	173	164	110	631	336	270	186	176	219	239
1960	221	174	185	174	178	191	1,484	549	218	174	220	233	332

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.27	0.55	0.60	0.67	0.65	0.93	4.90	4.40	3.94	1.81	1.09	2.16	21.97
1952	2.05	2.67	1.72	1.02	.97	1.27	5.28	1.88	2.76	3.71	1.32	.66	25.31
1953	.44	.58	.55	.76	.77	2.39	3.87	3.55	3.18	2.35	1.90	.78	21.12
1954	.49	.54	.83	.88	.81	.76	5.74	5.19	3.44	1.09	.80	.83	21.40
1955	1.78	1.33	1.37	1.08	.80	.90	5.51	2.05	1.23	1.19	1.58	.98	19.78
1956	1.19	1.15	1.00	1.09	1.00	1.04	4.01	1.73	1.05	.86	1.00	.83	15.95
1957	.76	.79	.88	.72	.28	.95	3.54	.97	.89	.90	.70	.56	11.94
1958	.44	.90	.73	.85	.64	.84	3.51	.77	.70	1.32	.96	1.39	13.05
1959	.78	1.10	.74	.76	.65	.49	2.69	1.48	1.15	.82	.77	.93	12.36
1960	.97	.74	.81	.77	.73	.84	6.32	2.41	.93	.77	.97	.99	17.25

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	5,100	Apr. 29, 1951	30	424	1.62	21.97	292	15.14
1952	1237	4,650	Apr. 20, 1952	146	487	1.86	25.31	393	20.44
1953	1277	4,500	June 21, 1953	21	407	1.55	21.12	413	21.41
1954	1337	4,500	May 1, 1954	52	413	1.58	21.40	463	24.02
1955	1387	3,100	May 2, 1955	162	382	1.46	19.78	360	18.64
1956	1437	3,160	Apr. 11, 1956	105	307	1.17	15.95	289	15.04
1957	1507	2,920	Apr. 20, 1957	47	230	.878	11.94	223	11.58
1958	1557	3,260	Apr. 15, 1958	50	252	.962	13.05	263	13.60
1959	1627	1,700	Apr. 8, 1959	25	239	.912	12.36	237	12.26
1960	1707	6,600	Apr. 24, 1960	26	332	1.27	17.25	-	-

## 310. Black River near Bessemer, Mich.

Location.--Lat 46°30'55", long 90°04'10", in SE $\frac{1}{4}$  sec. 32, T. 48 N., R. 46 W., on right bank 450 ft downstream from bridge on county highway, 500 ft downstream from Powder Mill Creek, and 2 $\frac{1}{2}$  miles north of Bessemer.

Drainage area.--202 sq mi.

Records available.--October 1954 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,150 ft (from topographic map).

Average discharge.--6 years (1954-60), 225 cfs.

Extremes.--1954-60: Maximum discharge, 14,800 cfs Apr. 24, 1960 (gage height, 14.27 ft, from floodmark), from rating curve extended above 4,700 cfs on basis of slope-area measurement of peak flow; minimum, 15 cfs Aug. 21, 22, 23, 1957 (gage height, 0.91 ft).

Remarks.--Some ground water pumped from mines at Bessemer. Records of water temperatures for the period October 1954 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	451	217	95.8	65.6	52.7	58.6	1,233	360	128	158	338	145	275
1956	229	262	162	107	72.5	54.5	1,034	523	170	60.6	125	74.4	239
1957	40.9	122	113	57.6	42.8	128	1,093	133	100	62.9	28.3	156	172
1958	59.3	199	102	68.2	73.9	120	951	110	73.0	286	124	220	198
1959	99.8	287	64.0	41.5	36.7	80.7	805	300	234	98.5	64.2	164	189
1960	223	141	88.2	69.4	54.8	66.3	1,808	382	106	108	135	145	276

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	2.57	1.19	0.55	0.37	0.27	0.33	6.81	2.05	0.71	0.90	1.92	0.80	18.47
1956	1.30	1.45	.92	.61	.39	.31	5.71	2.99	.94	.35	.71	.41	16.09
1957	.23	.87	.64	.33	.22	.73	6.04	.76	.55	.36	.16	.88	11.55
1958	.34	1.10	.58	.39	.38	.68	5.26	.63	.40	1.64	.71	1.22	13.33
1959	.57	1.58	.37	.24	.19	.46	4.45	1.72	1.29	.56	.37	.91	12.71
1960	1.27	.78	.50	.40	.29	.38	9.99	2.18	.59	.62	.77	.80	18.57

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-
1955	1587	3,620	Apr. 11, 1955	38	275	1.36	18.47	266	17.83
1956	1437	2,240	Apr. 12, 1956	32	239	1.13	16.09	207	13.96
1957	1507	5,420	Apr. 21, 1957	20	172	.851	11.55	179	12.03
1958	1557	2,090	Apr. 15, 1958	32	198	.980	13.33	205	13.83
1959	1627	2,020	Apr. 7, 1959	27	189	.936	12.71	189	12.74
1960	1707	14,800	Apr. 24, 1960	36	276	1.37	18.57	-	-

## 315. Presque Isle River at Marenisco, Mich.

Location.--Lat 46°22", long 89°41", in NW $\frac{1}{4}$  sec.21, T.46 N., R.43 W., on left bank a quarter of a mile upstream from highway bridge in Marenisco and 2 $\frac{1}{4}$  miles downstream from confluence of East and West Branches of Presque Isle River.

Drainage area.--175 sq mi.

Records available.--February 1945 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,489.30 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to May 27, 1949, wire-weight gage at site a quarter of a mile downstream at different datum.

Average discharge.--15 years (1945-60), 178 cfs.

Extremes.--1945-60: Maximum discharge, 3,520 cfs Apr. 25, 1960 (gage height, 11.25 ft); minimum observed, 13 cfs Sept. 30, 1948 (gage height, 2.25 ft, site and datum then in use).

Remarks.--Occasional regulation for lake or pond level control at several places above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	31.5	85.2	75.1	58.8	48.5	97.3	780	574	416	363	150	313	249
1952	379	356	205	112	104	103	756	302	216	465	333	122	288
1953	69.2	77.6	81.9	70.2	75.1	235	501	422	502	333	235	82.6	224
1954	52.0	88.0	118	79.6	87.2	105	683	649	440	154	91.7	144	224
1955	317	187	119	102	89.0	91.2	593	241	123	87.1	171	67.8	182
1956	99.3	137	115	99.9	82.6	75.5	405	276	160	129	151	75.8	150
1957	49.1	114	102	78.1	67.7	150	474	186	119	79.7	54.0	118	132
1958	71.7	136	110	79.5	80.9	94.0	364	125	99.3	270	101	118	138
1959	77.6	148	74.5	63.5	57.1	67.0	260	220	115	101	72.7	233	124
1960	289	187	104	107	87.2	78.9	858	544	181	98.6	94.2	175	233

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.21	0.54	0.49	0.39	0.29	0.64	4.98	3.78	2.66	2.39	0.99	2.00	19.36
1952	2.50	2.27	1.35	.74	.64	.68	4.82	1.99	1.38	3.06	2.20	.78	22.41
1953	.46	.49	.54	.46	.45	1.55	3.20	2.78	3.20	2.19	1.55	.53	17.40
1954	.34	.56	.78	.52	.52	.69	4.35	4.28	2.80	1.01	.60	.92	17.37
1955	2.09	1.19	.78	.67	.53	.60	3.72	1.59	.78	.57	1.13	.43	14.08
1956	.65	.87	.76	.66	.51	.50	2.58	1.82	1.02	.85	.99	.48	11.69
1957	.32	.73	.67	.51	.40	.99	3.02	1.22	.76	.52	.36	.75	10.25
1958	.47	.87	.73	.52	.48	.62	2.32	.92	.63	1.78	.67	.75	10.66
1959	.51	.94	.49	.42	.34	.44	1.66	1.45	.73	.67	.48	1.48	9.61
1960	1.90	1.19	.68	.70	.54	.52	5.47	3.58	1.15	.65	.62	1.12	18.12

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	172	13.33	
1951	1207	2,600	Apr. 29, 1951	27	249	1.42	19.36	312	24.24	
1952	1237	2,670	Apr. 21, 1952	74	288	1.65	22.41	229	17.78	
1953	1277	1,230	June 21, 1953	61	224	1.28	17.40	227	17.59	
1954	1337	1,680	Apr. 28, 1954	42	224	1.28	17.37	255	19.75	
1955	1387	1,060	Apr. 11, 1955	35	182	1.04	14.08	159	12.30	
1956	1437	648	Apr. 12, 1956	53	150	.857	11.69	143	11.13	
1957	1507	1,540	Apr. 21, 1957	35	132	.754	10.25	137	10.60	
1958	1557	762	July 3, 1958	45	138	.789	10.66	136	10.53	
1959	1627	559	Sept. 23, 1959	40	124	.709	9.61	148	11.44	
1960	1707	3,520	Apr. 25, 1960	40	233	1.33	18.12	-	-	

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 320. Presque Isle River near Tula, Mich.

Location.--Lat 46°33', long 89°46', in sec.23, T.48 N., R.44 W., on downstream handrail of bridge on State Highway 28, 2 miles east of Tula, 5 miles downstream from Little Presque Isle River, and 7 miles southwest of Merriweather.

Drainage area.--260 sq mi.

Records available.--February 1945 to September 1960.

Gage.--Wire-weight and crest-stage gages. Datum of gage is 1,299.66 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--15 years (1945-60), 276 cfs.

Extremes.--1945-60: Maximum discharge, 4,640 cfs Apr. 25, 1960 (gage height, 14.04 ft); minimum, 22 cfs Oct. 5, 6, 1948 (gage height, 4.22 ft).

Remarks.--Occasional regulation for lake or pond level control at several places above station at Arenisco.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	38.9	118	94.6	77.7	65.2	158	1,460	857	594	465	246	532	392
1952	638	582	547	147	125	126	1,200	430	440	795	404	137	448
1953	85.7	99.7	99.7	81.0	87.9	422	956	624	670	432	375	96.5	337
1954	61.8	115	158	91.3	106	158	1,283	1,062	790	181	93.1	223	358
1955	482	251	151	117	96.7	105	1,097	443	145	106	268	145	284
1956	181	239	140	112	86.6	80.1	845	484	231	146	172	109	235
1957	67.2	176	151	106	88.6	199	908	212	170	95.8	67.5	197	202
1958	94.6	209	152	111	110	143	841	189	134	379	136	176	223
1959	135	264	104	79.2	72.1	97.4	665	313	208	158	106	294	207
1960	394	242	139	140	121	107	1,430	665	218	161	133	213	329

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.17	0.51	0.42	0.34	0.26	0.70	6.27	3.80	2.54	2.06	1.09	2.29	20.45
1952	2.83	2.50	1.54	.65	.52	.56	5.15	1.91	1.89	3.52	1.79	.59	23.45
1953	.38	.43	.44	.36	.35	1.87	4.10	2.77	2.87	1.91	1.66	.41	17.55
1954	.27	.49	.70	.40	.42	.61	5.50	4.70	3.39	.80	.41	.96	18.65
1955	2.13	1.08	.67	.52	.39	.47	4.71	1.96	.62	.47	1.19	.62	14.83
1956	.80	1.03	.62	.50	.36	.36	3.63	2.14	.99	.65	.76	.47	12.31
1957	.30	.76	.67	.47	.36	.89	3.89	.94	.73	.42	.30	.85	10.57
1958	.42	.90	.67	.49	.44	.63	3.60	.84	.57	1.68	.60	.76	11.60
1959	.59	1.14	.46	.35	.29	.43	2.86	1.38	.89	.70	.47	1.26	10.82
1960	1.75	1.04	.62	.62	.50	.48	6.14	2.95	.94	.71	.59	.91	17.25

Yearly discharge, in cubic feet per second

Daily discharge, in cubic feet per second									
Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	266	13.85
1951	1207	4,200	Apr. 30, 1951	32	392	1.51	20.45	502	26.22
1952	1237	4,130	Apr. 22, 1952	81	448	1.72	23.45	341	17.83
1953	1277	1,700	June 22, 1953	67	337	1.30	17.55	341	17.76
1954	1337	2,870	Apr. 16, 1954	48	358	1.38	18.65	404	21.07
1955	1387	2,610	Apr. 11, 1955	44	284	1.09	14.83	256	13.40
1956	1437	1,600	Apr. 12, 1956	66	235	.908	12.31	221	11.59
1957	1507	3,430	Apr. 21, 1957	42	202	.777	10.57	208	10.83
1958	1557	1,660	Apr. 16, 1958	72	223	.858	11.60	226	11.80
1959	1627	1,200	Apr. 18, 1959	51	207	.796	10.82	231	12.04
1960	1707	4,640	Apr. 25, 1960	49	329	1.27	17.25	-	-

325. Iron River near White Pine, Mich.

Location.--Lat 46°46'25", long 89°34'55", in SE $\frac{1}{4}$ NW $\frac{1}{4}$  sec.36, T.51 N., R.42 W., on right bank 30 ft downstream from logging bridge,  $\frac{1}{4}$  miles north of White Pine, 3 miles downstream from West Branch Iron River, and  $\frac{4}{5}$  miles upstream from mouth.

Drainage area.--100 sq mi.

Records available.--April 1952 to September 1957.

Gage.--Water-stage recorder. Datum of gage is 730.52 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--5 years (1952-57), 144 cfs.

Extremes.--1952-57: Maximum discharge, 7,900 Apr. 19, 1952 (gage height, 7.27 ft), from rating curve extended above 3,900 cfs by logarithmic plotting; minimum, 2.7 cfs Nov. 7, 1953, Aug. 19-22, 1954 (gage height, 1.91 ft); minimum gage height, 1.79 ft Aug. 23, 1957.

Monthly and yearly mean discharge, in cubic feet per second

[illegible]

\* Not previously published; partly estimated on basis of records for nearby stations.

Monthly and yearly runoff, in inches

[illegible]

\* Not previously published; partly estimated on basis of records for nearby stations.

Yearly discharge, in cubic feet per second

[illegible]

## 330. Middle Branch Ontonagon River near Paulding, Mich.

Location--Lat 46°21'30", long 89°04'40", in sec.29, T.46 N., R.38 W., on right bank 25 ft downstream from highway bridge, 2½ miles upstream from Bond Falls Reservoir, and 5½ miles southeast of Paulding.

Drainage area--About 175 sq mi.

Records available---June 1942 to September 1960.

Gage---Water-stage recorder. Datum of gage is 1,485.66 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Sept. 28, 1942, reference point on downstream side of bridge at same datum.

Average discharge---18 years (1942-60), 175 cfs.

Extremes---1942-60: Maximum discharge, 2,050 cfs Apr. 30, 1951 (gage height, 10.0 ft, from high-water mark); minimum, 27 cfs Nov. 22, 1946 (result of freezeup); minimum gage height, 2.36 ft Nov. 26, 1942 (result of freezeup).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	86.1	115	105	90.0	77.6	114	541	463	326	283	165	308	223
1952	296	277	186	135	125	121	474	190	155	314	202	112	216
1953	105	112	115	107	105	161	382	267	298	414	211	161	204
1954	123	134	140	110	119	116	470	411	423	181	153	197	215
1955	377	202	140	130	121	130	506	210	156	124	140	105	195
1956	130	138	129	105	99.7	88.5	301	246	205	187	132	118	157
1957	97.5	147	117	97.7	92.9	121	348	148	115	97.9	86.9	122	132
1958	99.3	122	90.3	90.3	91.5	101	265	139	144	271	97.2	102	134
1959	109	136	95.4	82.6	74.2	87.6	244	187	124	106	88.5	235	129
1960	282	188	125	113	98.4	105	549	500	199	142	136	145	215

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.57	0.73	0.89	0.59	0.46	0.75	3.45	3.06	2.08	1.87	1.09	1.96	17.30
1952	1.95	1.76	1.22	.89	.77	.79	3.02	1.25	.99	2.07	1.33	.72	16.76
1953	.69	.71	.76	.71	.62	1.06	2.44	1.76	1.90	2.73	1.39	1.02	15.79
1954	.61	.85	.92	.73	.71	.76	3.00	2.71	2.70	1.19	1.01	1.26	16.65
1955	2.48	1.28	.92	.86	.72	.86	3.22	1.38	.99	.82	.92	.67	15.12
1956	.86	.88	.85	.69	.61	.58	1.92	1.63	1.30	1.23	.87	.75	12.17
1957	.64	.94	.77	.64	.55	.80	2.22	.98	.75	.64	.57	.78	10.26
1958	.65	.78	.59	.59	.54	.67	1.68	.92	.92	1.79	.64	.65	10.42
1959	.72	.87	.63	.54	.44	.58	1.55	1.10	.79	.70	.58	1.50	10.00
1960	1.86	1.19	.82	.74	.61	.69	3.50	3.30	1.27	.94	.90	.92	16.74

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	161	-	12.45
1951	1207	2,050	Apr. 30, 1951	66	223	1.27	17.30	261	20.24	
1952	1237	1,480	Apr. 21, 1952	102	216	1.23	16.76	180	13.99	
1953	1277	1,640	July 2, 1953	99	204	1.17	15.79	209	16.21	
1954	1337	1,120	Apr. 28, 1954	100	215	1.23	16.65	242	18.75	
1955	1387	1,120	Oct. 16, 1954	90	195	1.11	15.12	168	13.03	
1956	1437	572	May 31, 1956	87	157	.897	12.17	154	11.93	
1957	1507	1,080	Apr. 21, 1957	72	132	.754	10.26	128	9.93	
1958	1557	898	July 2, 1958	72	134	.766	10.42	137	10.62	
1959	1627	579	Apr. 18, 1959	61	129	.737	10.00	150	11.65	
1960	1707	1,700	Apr. 25, 1960	91	215	1.23	16.74	-	-	

## 335. Bond Falls Canal near Paulding, Mich.

Location.--Lat 46°24'10", long 89°09'00", in sec.11, T.46 N., R.39 W., on left bank 40 ft upstream from intake to pipeline No. 2, 1.4 miles southeast of Paulding, and 1.5 miles downstream from Bond Falls Reservoir on Middle Branch Ontonagon River.

Records available.-- July 1942 to September 1960.

Gage.--Staff gage and concrete control. Datum of gage is 1,444.59 ft above mean sea level, datum of 1929.

Average discharge.--18 years (1942-60), 132 cfs.

Extremes.--1942-60: Maximum discharge, 373 cfs Sept. 23, 1960 (gage height, 3.17 ft); minimum daily, 0.3 cfs Aug. 28 to Sept. 5, 1959; minimum gage height observed, -2.70 ft Sept. 1, 1959 (two drain holes in weir open and canal gate closed).

Remarks.--Canal diverts water from Bond Falls Reservoir to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	235	82.8	85.7	212	136	23.0	8.19	124	167	178	114	193	130
1952	209	181	145	142	177	187	115	151	119	197	184	260	172
1953	248	96.9	132	163	171	92.3	5.10	168	192	237	188	240	161
1954	180	124	177	212	192	123	10.3	96.7	245	247	291	83.9	166
1955	148	168	208	216	218	152	20.8	198	182	277	143	106	170
1956	50.2	101	169	210	273	134	13.2	6.05	127	217	220	248	147
1957	127	32.3	27.0	151	243	171	8.67	45.9	190	170	166	60.3	115
1958	108	103	105	147	196	141	5.93	67.2	44.9	23.7	26.5	158	93.2
1959	257	121	180	139	133	2.21	10.4	153	183	198	74.9	1.57	121
1960	48.7	194	200	270	250	217	49.7	177	283	256	182	201	194

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	135	-
1951	1207	296	Feb. 1, 2, 1951	5.5	130	-	-	141	-
1952	1237	304	Sept. 28-30, 1952	12	172	-	-	167	-
1953	1277	350	July 3-5, 1953	4.0	161	-	-	181	-
1954	1337	352	Aug. 12-14, 1954	7.8	166	-	-	169	-
1955	1387	333	Oct. 18-23, 1954	6.7	170	-	-	153	-
1956	1437	360	Sept. 13, 1956	3.4	147	-	-	136	-
1957	1507	319	Feb. 28, 1957	7.8	115	-	-	126	-
1958	1557	360	Sept. 20-26, 1958	3.4	93.2	-	-	114	-
1959	1627	358	Oct. 6, 7, 1958	.3	121	-	-	111	-
1960	1707	373	Sept. 23, 1960	2.5	194	-	-	-	-

## 340. Bond Falls Reservoir near Paulding, Mich.

Location.--Lat 46°24'29", long 89°07'42", in SW $\frac{1}{4}$  sec.1, T.46 N., R.39 W., at Bond Falls Dam on Middle Branch Ontonagon River, 2 $\frac{1}{4}$  miles east of Paulding.

Drainage area.--About 210 sq mi.

Records available.--June 1942 to September 1960. Prior to October 1950, monthly discharge only, published in WSP 1307.

Gage.--Staff gage. Datum of gage is 1,335.59 ft above mean sea level, datum of 1929.

Remarks.--Reservoir is formed by earthfill and concrete dam with one tainter gate; dam completed in 1937. Usable capacity, 1,730,000,000 cu ft between gage heights of 121 ft (maximum drawdown) and 141 ft (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal; water used for power production at Victoria Dam near Rockland.

Contents, in millions of cubic feet, on last day of month

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1951	576	667	700	302	151	412	1,760	1,830	1,780	1,800	1,830	1,830
1952	1,020	1,680	1,680	1,580	1,390	1,170	1,770	1,790	1,800	1,800	1,700	1,240
1953	791	808	750	576	396	609	1,650	1,800	1,790	1,790	1,690	1,380
1954	1,150	1,130	1,010	725	518	527	1,770	1,820	1,800	1,490	1,030	1,300
1955	1,800	1,800	1,570	1,300	1,020	945	1,770	1,720	1,530	1,020	963	884
1956	1,080	1,160	989	651	166	52	849	1,450	1,580	1,430	1,110	725
1957	601	884	1,080	910	510	349	1,310	1,490	1,200	919	618	767
1958	676	750	709	535	255	111	808	919	1,090	1,670	1,730	1,460
1959	1,020	1,020	750	551	373	626	1,210	1,180	954	643	618	1,180
1960	1,780	1,640	1,360	902	485	105	1,610	1,800	1,500	1,100	802	709

## 345. Middle Branch Ontonagon River near Trout Creek, Mich.

Location.--Lat 46°28'45", long 89°05'25", in sec.8, T.47 N., R.38 W., on right bank 0.1 mile upstream from State Highway 28, 3 $\frac{1}{2}$  miles west of village of Trout Creek, and 6 $\frac{1}{2}$  miles downstream from Bond Falls Reservoir.

Drainage area.--About 225 sq mi.

Records available.--June 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,132.03 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Nov. 4, 1942, staff gage at same site and datum.

Average discharge.--18 years (1942-60), 81.6 cfs.

Extremes.--1942-60: Maximum discharge, 1,750 cfs Nov. 7, 1951 (gage height, 5.05 ft); minimum, 14 cfs sometime during period Jan. 23 to Feb. 13, 1947 (gage height, 1.14 ft, from recorded range in stage), caused by ice jams upstream.

Remarks.--Flow regulated by Bond Falls Reservoir (see preceding page). Diversion to South Branch Ontonagon River by Bond Falls Canal (see p. 31).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	47.0	48.2	45.8	44.7	46.3	49.7	111	346	271	120	75.7	127	111
1952	115	193	53.1	50.4	49.2	52.0	235	56.7	62.1	190	105	50.7	101
1953	50.1	50.5	49.6	50.4	50.4	56.5	65.7	112	175	253	83.4	52.0	87.6
1954	51.2	52.5	52.2	49.7	50.3	52.6	84.7	352	276	64.4	59.4	51.9	99.9
1955	104	54.5	51.7	49.1	48.7	49.4	268	60.0	61.1	58.4	58.8	48.6	75.8
1956	49.3	51.9	50.1	49.4	48.1	49.0	57.8	54.3	59.8	62.0	59.2	49.1	53.3
1957	49.5	50.3	49.6	48.7	48.8	50.5	61.2	49.4	58.3	57.7	57.4	49.3	52.6
1958	50.4	49.9	48.7	49.9	49.7	47.4	58.4	49.1	59.8	61.5	60.8	54.5	53.3
1959	50.5	51.9	50.6	48.0	48.0	49.2	58.4	50.7	57.9	55.2	52.9	49.5	51.9
1960	57.5	60.8	49.6	48.9	48.7	48.7	70.0	368	57.3	55.0	55.3	48.0	81.0

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	66.9	-
1951	1207	1,590	May 2, 1951	42	111	-	-	130	-
1952	1237	1,750	Nov. 7, 1951	47	101	-	-	83.2	-
1953	1277	1,660	July 3-5, 1953	47	87.6	-	-	88.0	-
1954	1337	1,090	May 4; 5, 1954	46	99.9	-	-	104	-
1955	1387	638	Apr. 18, 1955	46	75.8	-	-	70.9	-
1956	1437	162	July 8, 1956	46	53.3	-	-	53.2	-
1957	1507	136	Apr. 19, 1957	45	52.6	-	-	52.5	-
1958	1557	198	July 10, 1958	45	53.3	-	-	53.7	-
1959	1627	205	June 26, 1959	43	51.9	-	-	53.2	-
1960	1707	782	May 11, 1960	44	81.0	-	-	-	-



## 350. East Branch Ontonagon River near Mass, Mich.

Location.--Lat 46°41'20", long 89°04'20", on line between secs. 32 and 33, T.50 N., R.38 W., on right bank 700 ft downstream from highway bridge, 1,000 ft downstream from Adventure Creek, 5 miles south of Mass, and 6½ miles upstream from mouth.

Drainage area.--265 sq mi.

Records available.--July 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 873.55 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Oct. 1, 1949, wire-weight gage at bridge 700 ft upstream at same datum.

Average discharge.--18 years (1942-60), 263 cfs.

Extremes.--1942-60: Maximum discharge, 4,590 cfs July 1, 1953 (gage height, 10.57 ft); maximum gage height, 10.65 ft Apr. 24, 1960; minimum discharge, 60 cfs Aug. 25, 1948 (gage height, 3.55 ft, from graph based on gage readings, site then in use).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	135	250	194	137	157	300	1,168	450	543	284	250	385	353
1952	313	411	264	175	171	181	933	260	255	360	285	147	312
1953	147	177	173	142	144	412	707	429	410	442	423	172	316
1954	153	190	192	139	157	187	1,025	548	466	190	151	228	301
1955	432	237	184	166	153	161	833	345	184	144	192	199	269
1956	230	213	191	162	136	126	615	357	190	229	159	164	232
1957	131	215	190	137	129	238	709	190	151	113	99.5	202	208
1958	153	226	134	125	123	159	569	228	286	328	127	155	218
1959	160	294	149	121	102	165	647	266	216	162	148	331	230
1960	366	236	188	136	144	140	1,038	580	238	159	182	162	297

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.59	1.05	0.84	0.60	0.62	1.30	4.92	1.96	2.29	1.23	1.09	1.62	18.11
1952	1.36	1.73	1.15	.76	.69	.79	3.93	1.13	1.07	1.57	1.24	.62	16.04
1953	.64	.74	.75	.62	.57	1.79	2.98	1.97	1.73	1.92	1.84	.72	16.17
1954	.67	.80	.84	.61	.62	.81	4.32	2.39	1.96	.83	.66	.96	15.47
1955	1.88	1.00	.80	.72	.60	.70	3.50	1.50	.77	.63	.84	.84	13.78
1956	1.00	.90	.83	.70	.55	.55	2.59	1.56	.80	1.00	.74	.69	11.91
1957	.57	.90	.83	.60	.51	1.04	2.99	.83	.64	.49	.43	.85	10.68
1958	.58	.95	.58	.54	.48	.82	2.40	.99	1.20	1.43	.55	.65	11.17
1959	.70	1.24	.65	.53	.40	.72	2.72	1.15	.91	.70	.64	1.40	11.76
1960	1.59	.99	.82	.59	.59	.61	4.37	2.52	1.00	.69	.79	.68	15.24

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	273	13.96
1951	1207	3,530	Apr. 28, 1951	123	353	1.33	18.11	388	19.87
1952	1237	4,280	Apr. 18, 1952	131	312	1.18	16.04	271	13.93
1953	1277	4,590	July 1, 1953	130	316	1.19	16.17	319	16.35
1954	1337	4,080	Apr. 26, 1954	130	301	1.14	15.47	328	16.84
1955	1387	2,880	Oct. 15, 1954	109	269	1.02	13.78	251	12.83
1956	1437	1,970	Apr. 4, 1956	107	232	.875	11.91	223	11.48
1957	1507	3,380	Apr. 20, 1957	82	208	.785	10.68	205	10.49
1958	1557	1,300	June 26, 1958	101	218	.823	11.17	228	11.65
1959	1627	1,890	Apr. 7, 1959	87	230	.868	11.76	246	12.57
1960	1707	4,410	Apr. 24, 1960	111	297	1.12	15.24	-	-

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 355. Middle Branch Ontonagon River near Rockland, Mich.

Location.--Lat 46°41'57", long 89°09'36", in SE $\frac{1}{4}$  sec.27, T.50 N., R.39 W., on downstream side of bridge on U.S. Highway 45, 700 ft downstream from East Branch and 2.8 miles southeast of Rockland.

Drainage area.--670 sq mi, approximately.

Records available.--July 1942 to September 1960.

Gage.--Wire-weight gage. Datum of gage is 661.1 ft above mean sea level, datum of 1929. Prior to Apr. 1, 1959, at site 400 ft upstream at same datum.

Average discharge.--18 years (1942-60), 543 cfs.

Extremes.--1942-60: Maximum discharge, 27,000 cfs Aug. 22, 1942 (gage height, 21.2 ft, from floodmarks), from rating curve extended above 7,500 cfs on basis of slope-area measurement of peak flow; minimum observed, 157 cfs Dec. 1, 1948.

Remarks.--Flow regulated by Bond Falls Reservoir. Diversion to South Branch Ontonagon River by Bond Falls Canal.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	226	407	357	234	256	562	2,507	1,006	1,358	501	423	747	713
1952	668	896	445	305	290	315	2,110	456	520	874	638	252	645
1953	243	289	282	239	239	812	1,421	872	933	1,132	1,091	303	857
1954	270	311	357	307	308	357	2,276	1,421	1,045	325	271	370	634
1955	984	434	334	307	291	304	1,820	750	320	273	372	458	552
1956	454	431	407	319	271	242	1,374	756	320	439	294	283	465
1957	226	391	360	256	247	508	1,539	312	272	235	217	376	410
1958	241	435	274	259	253	455	1,276	424	539	643	239	283	443
1959	274	484	262	216	193	315	1,347	459	451	301	260	705	438
1960	732	363	322	226	234	236	2,519	1,450	371	286	341	284	615

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	531	-
1951	1207	12,800	June 24, 1951	195	713	-	-	798	-
1952	1237	7,560	Apr. 18, 1952	220	645	-	-	545	-
1953	1277	13,700	Aug. 4, 1953	212	657	-	-	668	-
1954	1337	11,500	Apr. 26, 1954	234	634	-	-	702	-
1955	1367	8,720	Oct. 15, 1954	212	552	-	-	513	-
1956	1437	6,020	Apr. 4, 1956	196	465	-	-	439	-
1957	1507	8,270	Apr. 20, 1957	193	410	-	-	408	-
1958	1557	3,200	Apr. 5, 1958	190	443	-	-	449	-
1959	1627	5,050	Sept. 27, 1959	170	438	-	-	473	-
1960	1707	16,100	Apr. 24, 1960	200	615	-	-	-	-

## 360. West Branch Ontonagon River near Bergland, Mich.

Location.--Lat 46°35'30", long 89°32'20", in sec.3, T.48 N., R.42 W., on right bank a quarter of a mile downstream from dam at outlet of Gogebic Lake and 1 $\frac{1}{4}$  miles east of Bergland.

Drainage area.--160 sq mi.

Records available.--July 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,290.81 ft above mean sea level, datum of 1929. Prior to Nov. 5, 1942, staff gage a quarter of a mile upstream at different datum.

Average discharge.--18 years (1942-60), 176 cfs.

Extremes.--1942-60: Maximum discharge, 1,400 cfs Apr. 26, 1960 (gage height, 5.98 ft); minimum daily, 0.9 cfs Oct. 6-14, 1959; minimum gage height observed, 0.16 ft Oct. 6, 1959.

Remarks.--Flow regulated by Gogebic Lake (capacity, about 50,000 acre-ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	90.6	73.7	80.8	97.8	102	103	401	610	407	391	147	322	236
1952	379	378	238	144	140	193	490	221	257	578	289	158	288
1953	92.8	44.3	46.8	125	137	146	319	500	501	315	344	129	225
1954	70.4	50.9	56.0	117	131	127	538	737	550	202	106	76.0	233
1955	159	98.3	109	180	157	207	487	288	183	185	120	87.0	187
1956	84.9	126	204	220	178	100	152	392	234	165	124	82.8	172
1957	53.4	51.9	59.3	69.9	101	94.4	298	265	97.5	99.1	80.3	23.9	108
1958	50.5	49.8	124	134	194	161	169	99.5	99.9	157	104	35.8	115
1959	233	186	226	142	99.4	77.9	86.3	149	162	144	106	2.22	135
1960	29.0	122	249	255	199	116	382	700	131	67.8	114	136	209

Yearly discharge, in cubic feet per second, of West Branch Ontonagon River near Bergland, Mich.

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	177	15.04
1951	1207	1,270	May 2, 3, 1951	55	236	1.48	20.00	299	25.34
1952	1237	1,250	July 25, 1952	72	288	1.80	24.47	220	18.69
1953	1277	1,220	June 20, 1953	42	225	1.41	19.13	227	19.29
1954	1337	1,300	May 3, 1954	44	233	1.46	19.74	244	20.73
1955	1387	980	Apr. 20, 1955	34	187	1.17	15.82	192	16.29
1956	1437	700	May 18, 1956	43	172	1.08	14.70	151	12.85
1957	1507	968	Apr. 24, 1957	10	108	.675	9.16	113	9.58
1958	1557	436	Apr. 17, 1958	19	115	.719	9.76	150	12.73
1959	1627	628	July 23, 1959	1	135	.844	11.46	114	9.67
1960	1707	1,400	Apr. 26, 1960	.9	209	1.31	17.83	-	-

## 375. Cisco Branch Ontonagon River at Cisco Lake Outlet, Mich.

Location.--Lat 46°15', long 89°27', in sec.32, T.45 N., R.41 W., on right bank 80 ft downstream from Cisco Lake Dam, 2½ miles upstream from Langford Lake Outlet, 4¼ miles upstream from U.S. Highway 2, and 13 miles southwest of Watersmeet.

Drainage area.--50 sq mi, approximately.

Records available.--October 1944 to September 1960.

Gage.--Staff gage. Datum of gage is 1,676.69 ft above mean sea level, datum of 1929.

Average discharge.--16 years (1944-60), 46.6 cfs.

Extremes.--1944-60: Maximum discharge, 288 cfs May 1-4, 1951 (gage height, 2.10 ft); minimum daily, 0.2 cfs May 29 to June 17, 1948.

Remarks.--Flow regulated by Cisco Lake (usable capacity, 15,600 acre-ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	40.8	46.4	81.3	29.4	24.1	42.5	84.8	121	88.3	62.1	31.7	80.5	61.2
1952	82.7	97.1	84.4	61.1	51.7	35.2	85.9	51.8	53.6	95.8	61.3	27.8	64.1
1953	51.7	38.0	57.3	32.3	45.2	42.5	39.0	84.5	123	113	58.2	31.8	60.8
1954	48.8	44.8	72.3	40.6	34.3	47.0	58.7	132	88.7	26.4	25.5	58.2	56.5
1955	122	69.1	41.0	34.8	40.2	48.8	79.6	41.4	43.8	11.3	41.9	17.9	49.4
1956	48.7	88.0	51.1	29.4	29.3	24.1	52.2	27.1	70.0	44.6	23.5	23.8	42.6
1957	42.5	65.0	35.6	31.5	30.2	35.6	57.8	16.3	23.6	15.8	19.2	25.1	33.1
1958	13.1	86.1	33.4	28.0	28.0	28.1	33.0	13.1	25.7	65.5	6.16	21.4	31.7
1959	28.0	47.4	60.9	23.1	23.0	28.3	28.1	20.8	12.9	20.9	27.5	80.2	33.4
1960	86.7	91.2	68.4	43.9	37.0	31.6	91.1	137	52.4	39.9	30.3	63.2	64.4

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	44.3	12.04
1951	1207	288	May 1-4, 1951	14	61.2	1.22	16.62	67.5	18.33
1952	1237	260	July 20-23, 1952	5.8	64.1	1.28	17.45	56.0	15.25
1953	1277	220	July 7, 1953	6.6	60.8	1.22	16.49	62.3	16.97
1954	1337	245	May 4, 5, 1954	7.0	56.5	1.13	15.34	62.1	16.83
1955	1387	228	Oct. 16, 1954	5.0	49.4	.988	13.41	45.6	12.36
1956	1437	178	June 2, 1956	1.3	42.6	.852	11.57	38.8	10.56
1957	1507	118	Apr. 24, 1957	1.3	33.1	.662	8.99	32.1	8.72
1958	1557	150	July 5-7, 1958	1.7	31.7	.634	8.61	32.1	8.72
1959	1627	255	Sept. 27-30, 1959	1.7	33.4	.668	9.07	42.6	11.57
1960	1707	235	Apr. 27, 28, 1960	.9	64.4	1.29	17.56	-	-

## 395. South Branch Ontonagon River at Ewen, Mich.

Location.--Lat 46°32'05", long 89°16'30", in sec.26, T.48 N., R.40 W., on left bank on piers of old State Highway M28 bridge in Ewen.

Drainage area.--About 320 sq mi.

Records available.--April 1942 to September 1960.

Gage.--Staff and crest-stage gages. Datum of gage is 1,113.04 ft above mean sea level, datum of 1929. Prior to Jan. 16, 1943, reference mark or chain gage on upstream side of bridge at same site and datum.

Average discharge.--18 years (1942-60), 494 cfs.

Extremes.--1939-60: Maximum discharge, 13,500 cfs Apr. 24, 1960 (gage height, 22.07 ft, from floodmark), from rating curve extended above 6,400 cfs on basis of contracted-opening measurement of peak flow.

1942-60: Minimum discharge observed, 76 cfs Sept. 23, 1948, June 7, Aug. 9, 22, 1949 (gage height, 0.88 ft).

Remarks.--Some diversion from Middle Branch Ontonagon River by Bond Falls Canal (see p. 31). Some regulation at medium and low flows by Cisco Lake (usable capacity, 15,600 acre-ft).

Monthly and yearly mean discharge\*, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	354	297	292	332	287	331	2,053	1,023	1,150	623	328	778	652
1952	805	1,069	590	330	321	344	1,767	498	565	1,211	639	367	708
1953	383	240	248	272	292	765	1,176	956	1,112	966	657	356	620
1954	304	305	463	348	322	318	1,676	1,062	1,207	442	416	401	604
1955	946	508	368	354	374	303	1,480	717	381	365	387	322	542
1956	319	446	451	365	410	274	1,187	510	409	431	376	370	461
1957	255	322	232	284	374	551	1,196	238	342	243	233	219	373
1958	212	412	276	269	317	349	992	256	254	519	139	291	356
1959	399	435	308	228	214	160	900	460	389	385	208	593	389
1960	724	591	406	391	396	396	2,031	1,172	518	410	323	408	646

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	485	-
1951	1207	6,240	Apr. 29, 1951	190	652	-	-	779	-
1952	1237	6,710	Apr. 19, 1952	216	708	-	-	576	-
1953	1277	4,580	July 2, 1953	196	620	-	-	637	-
1954	1337	5,000	Apr. 27, 1954	232	604	-	-	666	-
1955	1387	4,090	Oct. 16, 1954	169	542	-	-	491	-
1956	1437	2,980	Apr. 5, 1956	141	461	-	-	427	-
1957	1507	4,480	Apr. 21, 1957	125	373	-	-	380	-
1958	1557	1,900	Apr. 6, 1958	100	356	-	-	377	-
1959	1627	2,250	Sept. 28, 1959	80	389	-	-	438	-
1960	1707	13,500	Apr. 24, 1960	125	646	-	-	-	-

## 400. Ontonagon River near Rockland, Mich.

Location.--Lat 46°43'15", long 89°12'25", in sec.20, T.50 N., R.39 W., in downstream side of left pier of bridge on highway between Rockland and Victoria,  $1\frac{1}{4}$  miles southwest of Rockland and 2.4 miles downstream from confluence of Middle and West Branches.

Drainage area.--1,290 sq mi, approximately.

Records available.--June 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 638.87 ft above mean sea level, datum of 1929. Prior to Nov. 23, 1943, wire-weight, chain, and staff gages on downstream side of bridge at same site and datum.

Average discharge.--18 years (1942-60), 1,421 cfs.

Extremes.--1942-60: Maximum discharge, 42,000 cfs Aug. 22, 1942 (gage height, 28.6 ft, from floodmark), from rating curve extended above 14,000 cfs on basis of slope-area measurement of peak flow; minimum daily, 260 cfs Sept. 6, 1948.

Remarks.--Flow regulated by Victoria powerplant on West Branch 5 miles above station, by Bond Falls Reservoir (see p. 31 ), and by Gogebic and Cisco Lakes (combined usable capacity, about 65,600 acre-ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	682	841	839	815	736	1,326	6,298	3,091	3,309	1,665	1,117	2,146	1,901
1952	2,073	2,590	1,379	909	921	986	5,467	1,237	1,562	2,879	1,657	801	1,869
1953	773	629	676	707	754	2,477	3,828	2,783	2,900	2,620	2,431	869	1,793
1954	649	731	1,007	805	955	1,059	5,758	3,794	3,172	1,020	844	949	1,725
1955	2,316	1,185	907	892	881	936	5,188	1,940	979	844	997	1,159	1,517
1956	1,131	1,118	1,108	967	882	667	3,938	1,904	1,061	1,151	882	757	1,295
1957	568	905	797	675	748	1,406	3,925	865	776	655	584	655	1,043
1958	551	1,143	783	699	792	1,032	3,443	931	990	1,551	554	761	1,100
1959	917	1,390	865	661	556	833	3,200	1,174	1,090	922	626	1,335	1,129
1960	1,624	1,161	1,087	986	870	783	5,930	3,657	1,131	845	847	888	1,648

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	16,500	June 24, 1951	556	1,901	1.47	20.01	1,411	14.85
1952	1237	18,400	Apr. 19, 1952	702	1,869	1.45	19.71	2,209	23.24
1953	1277	19,500	Aug. 4, 1953	480	1,793	1.39	18.85	1,539	16.22
1954	1337	16,300	Apr. 26, 1954	500	1,725	1.34	18.15	1,819	19.14
1955	1387	14,300	Sept. 17, 1955	488	1,517	1.18	16.02	1,895	19.95
1956	1437	212,000	Apr. 4, 1956	572	1,295	1.00	13.61	1,428	15.07
1957	1507	14,300	Apr. 20, 1957	365	1,043	.809	10.98	1,203	12.70
1958	1557	9,460	Apr. 14, 1958	316	1,100	.853	11.58	1,060	11.16
1959	1627	8,830	Apr. 8, 1959	310	1,129	.875	11.88	1,158	12.19
1960	1707	22,400	Apr. 24, 1960	480	1,648	1.28	17.42	1,189	12.52
								-	-

a Maximum daily.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

## 405. Sturgeon River near Sidnaw, Mich.

Location.--Lat 46°35', long 88°35'. in sec.5, T.48 N., R.34 W., on right bank 40 ft downstream from highway bridge, 2 miles downstream from Rock River, 3½ miles northwest of Covington, 4 miles upstream from Perch River, and 9 miles northeast of Sidnaw.

Drainage area.--171 sq mi (revised).

Records available.--October 1912 to September 1915, April 1943 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,214.40 ft above mean sea level, datum of 1929. October 1912 to September 1915, staff gage at site 200 ft upstream at different datum. Apr. 2, 1943, to Oct. 1, 1946, chain and staff gages at old timber bridge 20 ft upstream at present datum.

Average discharge.--20 years (1912-15, 1943-60), 209 cfs.

Extremes.--1912-15, 1943-60: Maximum discharge, 4,630 cfs Apr. 24, 1960 (gage height, 11.63 ft); minimum, 4.6 cfs Oct. 8, 1948 (gage height, 3.47 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	36.5	142	122	75.7	65.9	193	997	668	398	270	148	405	235
1952	317	299	180	75.7	61.3	51.3	685	247	160	207	165	28.6	223
1953	26.1	62.5	74.3	48.9	49.0	232	779	523	394	549	217	58.4	235
1954	48.9	78.9	125	51.6	66.4	85.0	1,095	569	302	56.6	51.4	132	221
1955	380	178	94.4	61.5	57.5	68.6	1,039	254	144	32.3	72.4	72.2	204
1956	202	155	107	81.7	55.2	39.8	653	595	186	171	85.1	92.3	202
1957	42.7	88.3	99.1	61.5	42.4	108	879	174	99.3	34.6	17.5	264	158
1958	91.0	228	121	79.0	65.5	83.1	671	209	297	514	59.1	97.0	192
1959	105	281	90.9	62.5	35.6	64.3	745	338	112	111	170	338	204
1960	458	298	139	107	88.7	70.8	1,321	855	155	62.6	58.1	81.3	307

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.25	0.93	0.82	0.51	0.40	1.30	6.50	4.48	2.60	1.82	1.00	2.64	23.25
1952	2.13	1.95	1.21	.50	.39	.35	5.78	1.73	1.04	1.40	1.11	.19	17.78
1953	.18	.41	.50	.33	.30	1.57	5.09	3.53	2.57	2.35	1.46	.38	18.67
1954	.33	.51	.84	.35	.40	.57	7.14	3.84	1.98	.38	.35	.86	17.55
1955	2.56	1.16	.64	.42	.35	.46	6.78	1.72	.94	.22	.49	.47	16.21
1956	1.36	1.01	.72	.55	.35	.27	4.26	4.01	1.22	1.15	.57	.60	16.07
1957	.29	.58	.67	.42	.26	.73	5.74	1.18	.65	.23	.12	1.72	12.59
1958	.61	1.48	.82	.53	.40	.56	4.37	1.41	1.94	2.12	.40	.63	15.27
1959	.69	1.83	.61	.42	.22	.43	4.86	2.28	.73	.75	1.15	2.21	16.18
1960	3.09	1.94	.94	.72	.56	.48	8.62	5.76	1.01	.42	.39	.53	24.46

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	219	17.40	
1951	1207	3,670	Apr. 30, 1951	29	293	1.71	23.25	335	26.54	
1952	1237	3,260	Apr. 20, 1952	18	223	1.30	17.78	170	13.58	
1953	1277	1,960	July 2, 1953	18	235	1.37	18.67	243	19.26	
1954	1337	2,960	Apr. 16, 1954	14	221	1.29	17.55	255	20.23	
1955	1387	2,500	Apr. 14, 1955	13	204	1.19	16.21	688	14.94	
1956	1437	1,170	Apr. 12, May 14	28	202	1.18	16.07	182	14.52	
1957	1507	3,670	Apr. 21, 1957	8.5	159	.924	12.59	176	13.96	
1958	1557	1,630	Apr. 17, 1958	28	192	1.12	15.27	195	15.49	
1959	1627	2,120	Apr. 18, 1959	26	204	1.19	16.18	240	19.02	
1960	1707	4,630	Apr. 24, 1960	16	307	1.80	24.46	-	-	

## 415. Sturgeon River near Alston, Mich.

Location.--Lat 46°44', long 88°40', in SE $\frac{1}{4}$  sec.15, T.50 N., R.35 W., on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 3 miles upstream from Clear Creek and 5 miles southeast of Alston.

Drainage area.--346 sq mi.

Records available.--February 1932 to June 1941, October 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 670.3 ft above mean tide at New York City (levels by Corps of Engineers).

Average discharge.--26 years (1932-40, 1942-60), 420 cfs.

Extremes.--1932-41, 1942-60: Maximum discharge, 7,360 cfs Apr. 24, 1960 (gage height, 53.09 ft); minimum daily, 1 cfs Aug. 14-19, 1960.

Remarks.--Flow regulated by powerplant at station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	160	342	288	203	185	399	1,744	1,085	723	550	344	726	562
1952	624	577	373	239	208	211	1,404	499	356	489	405	143	460
1953	130	193	214	181	176	496	1,228	825	763	722	478	193	467
1954	185	225	295	177	218	251	1,708	988	682	256	192	306	456
1955	718	377	244	204	204	231	1,574	506	363	140	218	170	412
1956	351	326	251	206	181	175	1,051	926	365	366	236	228	388
1957	174	247	252	192	149	286	1,513	373	235	141	106	430	324
1958	202	430	257	206	182	215	1,031	386	506	588	198	210	367
1959	228	508	257	182	144	215	1,159	601	264	280	301	591	392
1960	604	602	336	257	220	210	2,098	*1,443	365	224	208	228	*582

\* Revised.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.53	1.10	0.96	0.68	0.56	1.33	5.62	3.62	2.33	1.83	1.15	2.34	22.05
1952	2.08	1.86	1.24	.79	.65	.70	4.53	1.66	1.15	1.63	1.35	.46	18.10
1953	.43	.59	.71	.60	.53	1.65	3.96	2.75	2.46	2.41	1.59	.62	18.30
1954	.62	.73	.98	.59	.66	.84	5.51	3.30	2.20	.85	.64	.99	17.91
1955	2.40	1.22	.81	.68	.61	.77	5.08	1.68	1.17	.47	.73	.55	16.17
1956	1.16	1.05	.84	.69	.56	.58	3.39	3.09	1.17	1.22	.79	.74	15.28
1957	.58	.80	.84	.64	.45	.95	4.23	1.24	.76	.47	.35	1.38	12.69
1958	.67	1.38	.86	.69	.55	.72	3.32	1.29	1.63	1.96	.66	.68	14.41
1959	.76	1.64	.79	.61	.43	.72	3.74	2.01	.85	.93	1.00	1.91	15.39
1960	2.68	1.94	1.12	.86	.69	.70	6.75	*4.81	1.17	.75	.69	.74	*22.90

\* Revised.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	443	17.37		
1951	1207	5,000	Apr. 29, 1951	54	562	1.62	22.05	628	24.64		
1952	1237	4,460	Apr. 20, 1952	14	460	1.33	18.10	373	14.65		
1953	1277	4,100	Aug. 4, 1953	12	467	1.35	18.30	482	18.90		
1954	1337	4,480	Apr. 26, 1954	112	456	1.32	17.91	509	20.01		
1955	1387	3,600	Apr. 14, 1955	98	412	1.19	16.17	377	14.79		
1956	1437	2,330	May 14, 1956	129	388	1.12	15.28	367	14.45		
1957	1507	4,750	Apr. 22, 1957	13	324	.966	12.69	342	13.38		
1958	1557	2,650	Apr. 19, 1958	13	367	1.06	14.41	374	14.69		
1959	1627	3,560	Apr. 18, 1959	13	392	1.13	15.39	457	17.94		
1960	1707	7,360	Apr. 24, 1960	1	*582	*1.68	*22.90	-	-		

\* Revised.

## 425. Otter River near Elo, Mich.

Location.--Lat 46°52', long 88°37', in sec.34, T.52 N., R.34 W., on downstream side of highway bridge, 1½ miles southeast of old Elo school and 3 miles upstream from Otter Lake.

Drainage area.--165 sq mi (revised).

Records available.--October 1942 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight and crest-stage gages. Datum of gage is 617.88 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--18 years (1942-60), 219 cfs.

Extremes.--1942-60: Maximum discharge, 4,540 cfs Apr. 19, 1952 (gage height, 13.52 ft); minimum observed, 68 cfs Nov. 18, 1947 (discharge measurement); minimum gage height, 2.85 ft Aug. 16, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	+93.7	200	133	120	110	231	1,211	453	481	137	125	178	288
1952	198	354	171	125	106	97.4	1,094	196	166	169	161	96.3	243
1953	99.4	129	126	103	108	286	706	463	309	308	213	106	247
1954	102	142	175	123	127	151	1,127	482	277	106	102	117	252
1955	226	147	125	108	105	119	852	235	144	94.5	248	153	215
1956	226	201	169	137	109	107	621	412	148	132	112	110	207
1957	100	158	152	118	114	174	860	162	121	86.0	80.5	104	185
1958	93.4	147	110	106	104	129	535	177	202	249	107	182	178
1959	138	279	129	111	96.9	146	783	236	154	103	97.9	170	203
1960	219	178	153	116	111	118	975	365	145	93.1	89.3	89.8	220

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	+0.65	1.35	0.93	0.84	0.69	1.61	8.19	3.17	3.26	0.96	0.87	1.20	+23.72
1952	1.38	2.40	1.20	.87	.69	.68	7.40	1.37	1.13	1.18	1.13	.65	20.08
1953	.69	.87	.68	.72	.68	1.99	4.78	3.24	2.09	2.16	1.49	.72	20.31
1954	.71	.96	1.21	.86	.80	1.05	7.62	3.37	1.87	.74	.71	.79	20.69
1955	1.58	.99	.87	.76	.66	.83	5.76	1.63	.97	.66	1.73	1.03	17.47
1956	1.58	1.36	1.18	.96	.71	.75	4.20	2.88	1.00	.92	.78	.74	17.06
1957	.70	1.07	1.06	.82	.72	1.21	5.81	1.13	.82	.60	.56	.70	15.20
1958	.65	.99	.77	.74	.66	.90	3.62	1.23	1.36	1.74	.75	1.23	14.64
1959	.96	1.89	.90	.78	.61	1.02	5.30	1.65	1.04	.72	.68	1.15	16.70
1960	1.53	1.20	1.07	.81	.73	.82	6.59	2.55	.98	.65	.62	.61	18.16

† Corrected.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	266	+21.87
1951	1207	4,040	Apr. 29, 1951	86	288	1.75	+23.72	313	25.77
1952	1237	4,540	Apr. 19, 1952	88	243	1.47	20.08	213	17.54
1953	1277	4,040	July 1, 1953	90	247	1.50	20.31	252	20.75
1954	1337	4,340	Apr. 27, 1954	88	252	1.53	20.69	258	21.25
1955	1387	2,480	Aug. 3, 1955	74	213	1.29	17.47	221	18.15
1956	1437	1,320	Apr. 12, 1956	83	207	1.25	17.06	191	15.77
1957	1507	4,030	Apr. 21, 1957	72	185	1.12	15.20	180	14.78
1958	1557	1,520	Apr. 16, 1958	82	178	1.08	14.64	194	15.98
1959	1627	1,920	Apr. 18, 1959	75	203	1.23	16.70	204	16.75
1960	1707	3,160	Apr. 24, 1960	78	220	1.33	18.16	-	-

† Corrected.



## 430. Sturgeon River near Arnheim, Mich.

Location.--Lat 46°56', long 88°33', in SE $\frac{1}{4}$  sec.1, T.52 N., R.34 W., on right bank a quarter of a mile downstream from Otter Lake, 3 miles northwest of Arnheim, and  $8\frac{1}{2}$  miles northeast of Pelkie.

Drainage area.--703 sq mi (revised).

Records available.--October 1942 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Staff gage. Datum of gage is 605.98 ft above mean tide at New York City (Corps of Engineers bench mark).

Average discharge.--18 years (1942-60), 821 cfs.

Extremes.--1942-60: Maximum discharge, 15,500 cfs Apr. 20, 1952 (gage height, 14.57 ft, from graph based on gage readings); minimum, 164 cfs Aug. 27, 1960 (gage height, 0.60 ft).

Remarks.--Occasional slight regulation caused by Prickett Dam.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	346	662	574	451	359	751	3,581	2,205	1,432	955	489	1,065	1,072
1952	1,093	1,199	729	486	422	448	3,498	989	708	901	796	328	964
1953	296	398	434	371	366	994	2,449	1,645	1,405	1,263	897	391	911
1954	362	452	547	355	465	582	3,556	2,037	1,171	441	354	483	882
1955	1,159	689	475	391	391	468	3,010	899	737	505	654	440	800
1956	687	802	579	474	396	388	2,199	1,602	683	647	451	406	776
1957	335	464	507	393	325	523	2,641	757	451	296	234	550	621
1958	389	683	508	422	347	433	1,992	800	829	1,091	390	486	697
1959	416	945	476	374	295	401	2,570	1,087	513	488	425	846	735
1960	1,236	980	572	508	416	385	3,927	2,609	696	418	363	339	1,036

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.57	1.05	0.94	0.74	0.53	1.23	5.68	3.62	2.28	1.57	0.80	1.68	20.69
1952	1.79	1.91	1.20	.80	.65	.73	5.56	1.63	1.13	1.48	1.30	.52	18.70
1953	.49	.63	.71	.61	.54	1.63	3.88	2.70	2.23	2.08	1.48	.62	17.60
1954	.59	.72	.90	.58	.69	.95	5.32	3.34	1.86	.72	.58	.77	17.02
1955	1.90	1.09	.78	.64	.58	.77	4.78	1.48	1.17	.50	1.07	.70	15.46
1956	1.13	1.27	.95	.78	.61	.64	3.49	2.63	1.08	1.06	.74	.64	15.02
1957	.55	.74	.83	.64	.49	.86	4.20	1.24	.72	.49	.58	.87	12.00
1958	.64	1.08	.83	.69	.51	.71	3.16	1.31	1.32	1.79	.64	.77	13.45
1959	.68	1.50	.78	.61	.44	.66	4.08	1.79	.81	.80	.70	1.34	14.19
1960	2.03	1.55	.94	.83	.64	.63	6.24	4.28	1.10	.69	.59	.54	20.06

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	932	18.02
1951	1207	-	-	-	-	-	-	1,192	23.03
1952	1237	9,520	Apr. 30, 1951	320	1,072	1.52	20.69	1,192	23.03
1953	1277	15,500	Apr. 20, 1952	256	964	1.37	18.70	906	15.63
1954	1337	3,880	July 3, 1953	260	811	1.30	17.60	930	17.98
1955	1387	10,800	Apr. 16, 1954	264	882	1.25	17.02	963	18.58
1956	1437	5,160	Apr. 12, 1955	274	800	1.14	15.46	778	15.04
1957	1507	3,600	Apr. 13, 1956	351	776	1.10	15.02	712	13.79
1958	1557	8,900	Apr. 22, 1957	226	621	.883	12.00	644	12.43
1959	1627	3,460	Apr. 17, 1958	285	697	.991	13.45	718	13.86
1960	1707	a4,380	Apr. 19, 1959	222	735	1.05	14.19	615	15.75
		12,200	Apr. 25, 1960	164	1,036	1.47	20.06	-	-

a Maximum daily.

## 455. Tahquamenon River near Tahquamenon Paradise, Mich.

Location.--Lat 46°34'30", long 85°16'10", in NE $\frac{1}{4}$  sec.11, T.48 N., R.8 W., on left bank 0.7 miles upstream from Tahquamenon (Big) Falls, 11.5 miles west of Tahquamenon Paradise, and 19 miles northeast of Newberry.

Drainage area.--790 sq mi.

Records available.--August 1953 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 697 ft (from river-profile map).

Average discharge.--7 years (1953-60), 884 cfs.

Extremes.--1953-60: Maximum discharge, 6,990 cfs May 10, 1960 (gage height, 10.26 ft); minimum, 157 cfs July 26, 1955 (gage height, 2.88 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	519	364	-
1954	398	436	800	365	491	666	2,925	2,354	712	286	373	621	869
1955	1,662	878	539	361	338	431	3,031	727	396	224	225	249	754
1956	448	768	480	381	361	335	2,176	1,568	727	1,081	338	447	758
1957	350	725	552	399	349	649	2,837	2,293	681	916	331	497	883
1958	474	1,517	984	589	389	510	2,146	930	388	590	253	595	779
1959	475	913	516	372	304	372	2,719	2,462	379	736	310	820	866
1960	1,723	1,565	636	545	437	373	2,886	4,511	1,067	482	315	817	1,281

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	0.76	0.51	-
1954	0.58	0.62	1.16	0.53	0.65	0.97	4.13	3.44	1.01	0.42	.54	.88	14.93
1955	2.42	1.24	.79	.53	.45	.63	4.28	1.06	.56	.33	.33	.35	12.97
1956	.65	1.08	.70	.56	.49	.49	3.07	2.28	1.03	1.58	.49	.63	13.05
1957	.51	1.02	.81	.58	.46	.95	4.00	3.34	.96	1.34	.48	.70	15.15
1958	.69	2.14	1.44	.86	.51	.74	3.04	1.36	.55	.86	.37	.84	13.40
1959	.69	1.29	.75	.54	.40	.54	3.84	3.60	.54	1.07	.45	1.16	14.87
1960	2.51	2.21	.93	.80	.60	.54	4.07	6.58	1.51	.70	.46	1.15	22.06

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	1337	-	-	-	-	-	-	-	-
1954	1337	4,850	Apr. 29, 1954	179	869	1.10	14.93	990	17.02
1955	1387	4,850	Apr. 15-17, 1955	185	754	.954	12.97	637	10.95
1956	1437	3,340	Apr. 14-18, 1956	234	758	.959	13.05	753	12.96
1957	1507	5,740	Apr. 26, 1957	213	883	1.12	15.15	995	17.08
1958	1557	2,770	Nov. 21, 22, 1957	174	779	.986	13.40	690	11.86
1959	1627	4,520	Apr. 22, 23, 1959	204	866	1.10	14.87	1,035	17.79
1960	1707	6,990	May 10, 1960	222	1,281	1.62	22.06	-	-

## 460. Black River near Garnet, Mich.

Location.--Lat 46°07'05", long 85°21'55", in SE $\frac{1}{4}$  sec.13, T.43 N., R.9 W., on right bank 10 ft upstream from highway bridge, 15 ft downstream from unnamed tributary entering from right,  $3\frac{1}{2}$  miles upstream from Lake Michigan, and 4 miles southwest of Garnet.

Drainage area.--28 sq mi, approximately.

Records available.--September 1951 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 629.7 ft above mean sea level, datum of 1929.

Average discharge.--9 years (1951-60), 27.6 cfs.

Extremes.--1951-60: Maximum discharge, 860 cfs May 7, 1960 (gage height, 8.55 ft), from rating curve extended above 350 cfs by logarithmic plotting; minimum, 4.9 cfs Mar. 11, 1956 (gage height, 2.10 ft).

Remarks.--Records of water temperatures for the period October 1951 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	53.2	42.4	24.8	20.1	14.7	13.3	94.1	26.4	20.5	38.6	34.2	18.7	33.4
1953	14.3	23.1	34.3	21.9	21.8	61.7	83.6	32.7	21.1	19.5	13.7	11.8	30.0
1954	9.24	9.47	15.1	8.56	10.5	13.8	92.8	61.1	20.0	11.0	9.27	16.2	23.1
1955	37.3	24.1	16.5	11.0	9.61	11.2	78.5	19.4	12.7	7.65	6.59	6.44	20.1
1956	9.96	22.4	11.2	8.84	7.89	7.43	65.4	36.8	17.3	25.3	11.5	15.8	19.9
1957	9.66	23.2	17.7	12.7	10.5	19.9	105	41.8	25.2	29.3	12.7	17.3	27.1
1958	19.6	55.5	33.5	19.1	14.5	15.7	58.7	25.6	13.6	14.9	9.47	16.1	24.7
1959	11.8	22.9	14.5	8.91	7.50	9.33	88.1	59.4	15.6	17.7	9.91	28.0	24.5
1960	68.0	42.1	23.3	18.7	14.1	11.8	127	141	39.1	20.3	19.0	27.1	46.0

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	2.19	1.69	1.02	0.83	0.57	0.55	3.75	1.09	0.82	1.59	1.41	0.75	16.26
1953	.59	.92	1.41	.90	.81	2.54	3.33	1.35	.84	.80	.56	.47	14.52
1954	.38	.38	.62	.35	.39	.57	3.69	2.51	.80	.45	.38	.65	11.17
1955	1.53	.96	.68	.45	.36	.46	3.12	.80	.51	.31	.27	.26	9.71
1956	.41	.89	.46	.36	.30	.31	2.61	1.51	.69	1.04	.47	.63	9.68
1957	.40	.92	.73	.52	.39	.82	4.18	1.72	1.00	1.21	.52	.69	13.10
1958	.81	2.21	1.38	.79	.54	.65	2.34	1.05	.54	.61	.39	.64	11.95
1959	.49	.91	.60	.37	.28	.38	3.51	2.44	.62	.73	.41	1.12	11.86
1960	2.80	1.67	.96	.77	.54	.49	5.06	5.81	1.56	.84	.78	1.08	22.36

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1237	-	-	-	-	-	-	-	-
1952	1237	171	Apr. 18, 1952	12	33.4	1.19	16.26	29.3	14.28
1953	1277	234	Mar. 24, 1953	11	30.0	1.07	14.52	26.8	12.98
1954	1337	252	Apr. 16, 1954	8.2	23.1	.825	11.17	26.8	12.96
1955	1387	203	Apr. 14, 1955	5.7	20.1	.718	9.71	17.1	8.30
1956	1437	250	Apr. 9, 1956	7.0	19.9	.711	9.68	20.5	9.97
1957	1507	690	Apr. 20, 1957	8.9	27.1	.968	13.10	31.9	15.45
1958	1557	148	Nov. 15, 1957	7.8	24.7	.882	11.95	19.7	9.55
1959	1627	239	Apr. 16, 1959	7	24.5	.875	11.86	31.6	15.29
1960	1707	860	May 7, 1960	10	46.0	1.64	22.36	-	-

## 495. Manistique River at Germfask, Mich.

Location.--Lat 46°14'00", long 85°55'40", in SE $\frac{1}{4}$  sec.4, T.44 N., R.13 W., on left bank 600 ft upstream from bridge on State Highway 77, 1 mile south of Germfask,  $\frac{1}{2}$  miles upstream from Grays Creek, and at mile 62.5.

Drainage area.--341 sq mi.

Records available.--March 1938 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 662.40 ft above mean sea level (levels by Michigan Department of Conservation). Prior to Dec. 29, 1938, staff gage at site 600 ft downstream at different datum.

Average discharge.--22 years (1938-60), 442 cfs.

Extremes.--1938-60: Maximum discharge, 2,250 cfs May 10, 1960 (gage height, 8.64 ft); minimum, 135 cfs July 25, 26, 1955 (gage height, 0.77 ft).

Remarks.--Since July 1948, slight regulation during summer low flow by dam on outlet of Manistique Lake.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	367	430	416	350	322	468	1,043	646	433	502	273	419	473
1952	668	595	460	475	462	356	849	503	386	332	435	374	491
1953	321	385	462	399	348	590	913	587	391	429	237	262	444
1954	422	372	401	364	382	379	869	811	454	228	222	356	438
1955	591	492	402	330	316	331	835	441	233	170	193	167	375
1956	294	362	298	271	271	265	693	454	292	438	201	304	345
1957	336	378	353	301	286	389	847	733	431	244	199	287	399
1958	361	585	509	425	366	363	692	390	234	335	195	343	401
1959	336	446	417	316	280	314	843	762	303	328	249	415	418
1960	694	679	480	421	395	347	960	1,381	839	545	281	559	632

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.24	1.41	1.41	1.19	0.98	1.58	3.41	2.18	1.42	1.70	0.92	1.37	18.81
1952	2.26	1.95	1.56	1.61	1.46	1.20	2.78	1.70	1.26	1.12	1.47	1.22	19.59
1953	1.09	1.26	1.56	1.35	1.06	1.99	2.99	1.98	1.28	1.45	.80	.86	17.67
1954	1.43	1.22	1.36	1.23	1.17	1.28	2.84	2.74	1.48	.77	.75	1.16	17.43
1955	1.99	1.61	1.36	1.12	.96	1.12	2.73	1.49	.76	.58	.65	.55	14.92
1956	.99	1.18	1.01	.92	.86	.90	2.26	1.53	.96	1.48	.68	.99	13.76
1957	1.14	1.24	1.20	1.02	.87	1.31	2.77	2.49	1.41	.83	.67	.94	15.88
1958	1.29	1.92	1.72	1.44	1.11	1.22	2.26	1.31	.77	1.13	.66	1.13	15.96
1959	1.14	1.46	1.41	1.07	.85	1.06	2.76	2.57	.99	1.11	.84	1.36	16.62
1960	2.35	2.22	1.63	1.42	1.25	1.18	3.15	4.67	2.74	1.84	.95	1.83	25.23

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	488	19.43
1951	1207	1,560	Apr. 11, 1951	213	473	1.39	18.81	515	20.52
1952	1237	1,170	Apr. 19, 1952	222	491	1.44	19.59	444	17.73
1953	1277	1,110	Apr. 13, 14, 1953	188	444	1.30	17.67	446	17.77
1954	1337	1,310	Apr. 29, 1954	189	438	1.28	17.43	462	18.38
1955	1387	1,110	Apr. 13-15, 1955	136	375	1.10	14.92	330	13.14
1956	1437	1,020	Apr. 11-13, 1956	170	345	1.01	13.76	354	14.16
1957	1507	1,740	Apr. 22, 1957	165	399	1.17	15.88	433	17.23
1958	1557	861	Nov. 20, 1957	164	401	1.18	15.96	378	15.04
1959	1627	1,240	Apr. 18, 19, 1959	190	418	1.23	16.62	473	18.81
1960	1707	2,250	May 10, 1960	209	632	1.85	25.23	-	-

## 545. Duck Creek near Blaney, Mich.

Location.--Lat 46°06'40", long 86°04'35", in NE $\frac{1}{4}$  sec.20, T.43 N., R.14 W., on right bank 3 miles upstream from mouth and 7 miles west of Blaney.

Drainage area.--92 sq mi, approximately, including area from which flow is diverted to Duck Creek from Walsh and Marsh Creeks (watershed indeterminate because of swamps).

Records available.--March 1938 to September 1954.

Gage.--Water-stage recorder. Datum of gage is 630.83 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to May 9, 1939, staff gage at site  $2\frac{1}{2}$  miles downstream at different datum.

Average discharge.--16 years (1938-54), 93.8 cfs.

Extremes.--1938-54: Maximum discharge, 1,740 cfs Apr. 26, 1939 (gage height, 11.70 ft, site and datum then in use); minimum, 2.5 cfs Sept. 3, 4, 1954 (gage height, 1.30 ft).

Remarks.--Records include flow from Walsh and Marsh Creeks which originates upstream from line between R.14 W. and R.15 W. and is diverted to Duck Creek through drainage canal about 3 miles upstream from station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	12.4	27.1	30.0	21.0	22.3	87.7	506	73.8	33.9	70.0	40.3	68.9	82.4
1952	212	164	91.3	67.4	49.1	36.9	348	59.1	55.1	49.3	54.4	24.8	101
1953	13.2	42.3	104	71.3	57.0	263	371	112	55.3	65.3	19.8	11.2	98.9
1954	22.0	17.9	59.5	25.8	46.8	80.1	432	211	35.3	10.8	8.14	12.6	79.9

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	88.3	-
1951	1207	970	Apr. 9, 1951	8.5	82.4	-	-	116	-
1952	1237	692	Apr. 10, 1952	15	101	-	-	74.8	-
1953	1277	746	Mar. 26, 1953	8.5	98.9	-	-	93.8	-
1954	1337	922	Apr. 16, 1954	2.7	79.9	-	-	-	-

## 550. Manistique River near Blaney, Mich.

Location.--Lat 46°05'05", long 86°03'35", in SE $\frac{1}{4}$  sec.28, T.43 N., R.14 W., on left bank 40 ft downstream from logging bridge, half a mile downstream from Duck Creek, 7 miles southwest of Blaney, and at mile 34.5.

Drainage area.--704 sq mi.

Records available.--March 1938 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 612.55 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to July 24, 1939, chain gage on downstream side of bridge 40 ft upstream at same datum.

Average discharge.--22 years (1938-60), 826 cfs.

Extremes.--1938-60: Maximum discharge, 9,300 cfs Apr. 1, 1938 (gage height, 19.42 ft, from graph based on gage readings), from rating curve extended above 6,100 cfs by logarithmic plotting; minimum, 182 cfs July 26, 1955.

Remarks.--Since July 1949, slight regulation during summer low flow by dam on outlet of Manistique Lake.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	488	673	703	519	495	893	3,146	1,161	728	953	550	688	916
1952	1,487	1,330	967	785	714	582	2,231	783	659	583	694	516	943
1953	426	582	939	708	618	1,479	2,210	1,133	666	760	381	344	856
1954	572	521	674	524	590	701	2,486	1,804	734	358	340	476	812
1955	964	777	590	465	447	531	2,044	710	398	245	236	227	635
1956	435	609	509	459	431	428	1,627	874	527	783	350	527	645
1957	505	576	549	464	431	731	2,229	1,360	744	368	251	400	717
1958	519	1,146	825	685	596	663	1,659	751	396	651	273	483	719
1959	469	788	754	506	432	477	2,312	1,377	458	528	375	718	766
1960	1,539	1,407	782	725	663	573	2,736	3,582	1,228	793	444	802	1,273

## STREAMS TRIBUTARY TO LAKE MICHIGAN

Monthly and yearly runoff, in inches, of Manistique River near Blaney, Mich.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.80	1.07	1.15	0.85	0.73	1.46	4.99	1.90	1.15	1.56	0.90	1.09	17.65
1952	2.44	2.11	1.58	1.29	1.09	.95	3.54	1.28	1.04	.95	1.14	.82	18.23
1953	.70	.92	1.54	1.16	.91	2.42	3.50	1.85	1.09	1.24	.62	.54	16.49
1954	.94	.83	1.10	.86	.87	1.15	3.94	2.95	1.16	.55	.56	.75	15.66
1955	1.58	1.23	.97	.76	.66	.87	3.24	1.16	.61	.40	.39	.36	12.23
1956	.71	.97	.83	.75	.66	.70	2.90	1.43	.84	1.28	.57	.84	12.48
1957	.83	.91	.90	.76	.64	1.20	3.54	2.22	1.18	.60	.41	.63	13.82
1958	.85	1.82	1.35	1.12	.88	1.09	2.63	1.23	.63	1.07	.45	.77	13.89
1959	.77	1.25	1.23	.83	.64	.78	3.66	2.26	.73	.86	.61	1.14	14.76
1960	2.52	2.23	1.28	1.19	1.02	.94	4.34	5.87	1.94	1.30	.73	1.27	24.63

Yearly discharge, in cubic feet per second

Yearly discharge, in cubic feet per second									
Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	888	17.13
1951	1207	4,890	Apr. 12, 1951	429	916	1.30	17.65	1,077	20.76
1952	1237	3,100	Apr.10,11,17,18	374	943	1.34	18.23	789	15.26
1953	1277	3,600	Mar.26,27,1953	282	856	1.22	16.49	841	16.20
1954	1337	4,200	Apr. 17, 1954	256	812	1.15	15.66	860	16.57
1955	1387	2,830	Apr.15,16,1955	188	635	.901	12.23	569	10.96
1956	1437	23,240	Apr. 10, 1956	243	645	.916	12.48	652	12.61
1957	1507	3,690	Apr. 24, 1957	205	717	1.02	13.82	788	15.20
1958	1557	1,980	Nov. 21, 1957	230	719	1.02	13.89	680	13.12
1959	1627	3,480	Apr. 20, 1959	270	766	1.09	14.76	910	17.54
1960	1707	8,610	May 10,11, 1960	312	1,273	1.81	24.63	-	-

a Maximum daily.

560. West Branch Manistique River near Manistique, Mich.

Location.--Lat 46°05'20", long 86°09'40", in SE<sup>1</sup> sec.27, T.43 N., R.15 W., on left bank 300 ft downstream from Stutts Creek and 10 miles northeast of Manistique.

Drainage area.--322 sq mi.

Records available.--April 1938 to September 1956.

Gage.--Water-stage recorder. Altitude of gage is 628 ft (from river-profile map). Prior to Apr. 14, 1939, chain gage at site 300 ft upstream at different datum.

Average discharge.--18 years (1938-56), 411 cfs.

Extremes.--1938-56: Maximum discharge, 5,300 cfs Apr. 29, 1939 (gage height, 12.9 ft); minimum, 71 cfs Oct. 3, 1948.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	149	251	247	201	183	401	1,983	702	414	460	261	291	461
1952	565	618	493	290	264	248	1,319	444	346	282	263	172	441
1953	158	240	423	329	244	644	1,631	708	445	414	199	150	486
1954	178	194	346	185	238	323	1,591	941	379	191	151	187	408
1955	400	370	261	192	170	215	1,377	420	203	116	162	116	333
1956	209	310	232	194	175	152	1,135	585	278	379	216	229	340

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.53	0.87	0.88	0.72	0.59	1.44	6.87	2.51	1.44	1.65	0.94	1.01	19.45
1952	2.02	2.14	1.76	1.04	.88	1.89	4.57	1.59	1.20	1.01	.94	.60	18.64
1953	.57	.83	1.52	1.18	.79	2.30	5.65	2.54	1.54	1.48	.71	.52	19.63
1954	.64	.67	1.23	.66	.77	1.15	5.51	3.37	1.32	.68	.54	.65	17.19
1955	1.43	1.28	.94	.69	.55	.77	4.78	1.50	.70	.42	.58	.40	14.04
1956	.75	1.07	.83	.69	.59	.54	3.93	2.10	.96	1.36	.77	.79	14.38

Yearly discharge, in cubic feet per second

Yearly discharge, in cubic feet per second									
Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	433	18.25
1951	1207	4,130	Apr. 14, 1951	126	461	1.43	19.45	548	23.09
1952	1237	2,390	Apr.21,22,1952	150	441	1.37	18.64	370	15.64
1953	1277	2,640	Apr. 13, 1953	132	466	1.45	19.63	457	19.25
1954	1337	3,180	Apr. 29, 1954	117	408	1.27	17.19	434	18.30
1955	1387	2,350	Apr. 16, 1955	102	333	1.03	14.04	309	13.04
1956	1437	2,250	Apr. 12, 1956	116	340	1.06	14.38	-	-

## 565. Manistique River near Manistique, Mich.

Location.--Lat 46°01'50", long 86°09'40", in SE $\frac{1}{4}$  sec.15, T.42 N., R.15 W., on left bank 1 mile downstream from West Branch, 6 miles northeast of Manistique, and at mile 19.5.

Drainage area.--1,100 sq mi, approximately.

Records available.--March 1938 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 608 ft (from river-profile map). Prior to July 15, 1939, chain gage at site 1,600 ft upstream at different datum.

Average discharge.--22 years (1938-60), 1,360 cfs.

Extremes.--1938-60: Maximum discharge, 16,900 cfs May 11, 1960 (gage height, 12.85 ft); minimum, 288 cfs Oct. 4, 1948; minimum gage height, 1.01 ft Aug. 23, 1941.

Remarks.--Since July 1948, slight regulation during summer low flow by dam on outlet of Manistique Lake.

Revisions.--Some periods for the water years 1938 and 1939 were revised in WSP 1627, the resulting revised records as summarized herewith supersede those published in WSP 1307.

Month	Mean	Per square mile	Runoff in inches	Momentary maximum		Minimum day
				Discharge	Date	
April 1938.....	5,269	-	5.34	-	-	-
Water year 1937-38.....	-	-	-	15,000	Apr. 1,2, 1938	-
April 1939.....	5,143	-	5.22	-	-	-
Water year 1938-39.....	1,577	1.43	19.47	15,400	Apr. 27, 1939	530
Calendar year 1939.....	1,550	-	19.12	-	-	-

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	677	965	956	766	669	1,370	5,856	2,094	1,219	1,472	808	1,065	1,491
1952	2,322	2,129	1,573	1,151	1,038	832	4,075	1,284	1,081	970	1,073	760	1,520
1953	610	862	1,582	1,182	858	2,445	4,440	1,974	1,225	1,305	624	515	1,470
1954	813	761	1,111	744	842	1,264	4,507	3,281	1,193	569	508	683	1,356
1955	1,497	1,169	925	721	642	792	3,840	1,201	654	402	424	358	1,050
1956	669	980	837	738	649	574	3,384	1,642	883	1,281	615	791	1,085
1957	732	890	905	717	629	1,145	4,032	2,393	1,184	607	408	636	1,189
1958	764	1,874	1,277	1,024	880	973	5,094	1,425	697	1,185	465	738	1,198
1959	681	1,209	1,139	735	536	582	4,006	2,590	765	982	681	1,215	1,252
1960	2,635	2,455	1,276	1,116	954	805	5,183	6,963	1,983	1,273	817	1,272	2,229

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.71	0.98	1.00	0.81	0.64	1.44	5.94	2.19	1.24	1.54	0.84	1.08	18.41
1952	2.43	2.16	1.65	1.21	1.02	.87	4.13	1.35	1.08	1.02	1.12	.77	18.81
1953	.64	.87	1.66	1.24	.81	2.56	4.50	2.07	1.24	1.37	.65	.52	18.13
1954	.85	.77	1.16	.78	.80	1.33	4.57	3.44	1.20	.60	.53	.69	16.72
1955	1.56	1.17	.97	.76	.61	.83	3.89	1.26	.66	.42	.44	.36	12.93
1956	.70	.99	.88	.77	.64	.60	3.44	1.72	.90	1.34	.64	.80	13.42
1957	.77	.90	.95	.75	.60	1.20	4.10	2.51	1.20	.64	.43	.64	14.69
1958	.80	1.90	1.34	1.07	.83	1.02	3.14	1.50	.71	1.24	.49	.75	14.79
1959	.71	1.23	1.20	.77	.51	.61	4.06	2.71	.78	.92	.71	1.23	15.44
1960	2.77	2.49	1.34	1.16	.94	.84	5.26	7.30	2.01	1.34	.86	1.29	27.60

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year				
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	1,440	17.75		
1951	1207	9,980	Apr. 14, 1951	590	1,491	1.36	18.41	1,779	21.96		
1952	1237	5,890	Apr. 20-22, 1952	584	1,520	1.38	18.81	1,271	15.74		
1953	1277	6,520	Mar. 28, 1953	427	1,470	1.34	18.13	1,439	17.74		
1954	1337	8,120	Apr. 18, 1954	370	1,356	1.23	16.72	1,432	17.64		
1955	1397	5,720	Apr. 16, 17, 1955	308	1,050	.955	12.93	957	11.80		
1956	1437	6,080	Apr. 10-13, 1956	361	1,085	.986	13.42	1,088	13.47		
1957	1507	7,350	Apr. 24, 1957	331	1,189	1.08	14.69	1,304	16.11		
1958	1557	3,700	Apr. 25-26, 1958	389	1,198	1.09	14.79	1,124	13.89		
1959	1627	6,820	Apr. 20, 1959	490	1,252	1.14	15.44	1,526	18.83		
1960	1707	16,900	May 11, 1960	566	2,229	2.03	27.60	-	-		

## STREAMS TRIBUTARY TO LAKE MICHIGAN

570. Indian River near Manistique, Mich.

Location.--Lat 45°59'30", long 86°17'15", in NE $\frac{1}{4}$  sec.34, T.42 N., R.16 W., on shore of Indian Lake just upstream from highway bridge over outlet of Indian Lake, 2 miles northwest of Manistique.

Drainage area.--302 sq mi.

Records available.--March 1938 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 608.66 ft above mean sea level (levels by Michigan Department of Conservation). Prior to July 9, 1942, chain gage at highway bridge 30 ft downstream at same datum. Since Jan. 18, 1944, auxiliary staff gage on right bank  $1\frac{1}{2}$  miles downstream at same datum.

Average discharge.--22 years (1938-60), 377 cfs.

Extremes---1938-60: Maximum daily discharge, 2,030 cfs May 12, 1960; maximum gage height, 7.79 ft June 24, 1943; minimum daily discharge, about 20 cfs Nov. 23, 1946 (caused by ice jams at outlet of Indian Lake); minimum gage height, 2.22 ft Nov. 17, 1955 (ice jam at outlet of Indian Lake); almost no flow occasionally when ice jams form at lake outlet.

Remarks.--Indian Lake regulated by needles in gate section of concrete dam  $1\frac{1}{2}$  miles below gage.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	277	287	325	299	292	374	808	644	444	473	446	388	422
1952	533	581	502	405	365	326	596	518	410	364	427	355	449
1953	298	232	418	355	328	383	725	653	465	526	336	258	410
1954	277	318	370	328	315	336	569	743	438	260	244	290	374
1955	404	377	353	257	237	333	511	358	241	180	164	260	306
1956	292	253	273	272	249	272	519	436	194	427	316	308	318
1957	566	274	348	294	247	299	539	558	446	240	354	380	558
1958	319	436	468	368	298	294	430	386	464	545	177	414	358
1959	254	342	396	298	261	256	472	614	211	287	226	328	329
1960	513	567	387	355	317	286	646	1,435	703	471	388	469	546

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	370	16.70
1951	1207	996	Apr. 17, 1951	100	422	1.40	19.00	485	21.70
1952	1237	796	Apr. 22-24, 1952	287	449	1.49	20.22	368	17.43
1953	1277	939	May 6, 1953	193	410	1.36	18.45	377	17.73
1954	1337	a886	May 5, 1954	215	374	1.24	16.83	388	17.38
1955	1387	a611	Apr. 21-23, 25	121	306	1.01	13.71	280	12.58
1956	1437	a633	Apr. 16-19, 1956	60	318	1.05	14.29	323	14.56
1957	1507	a691	Apr. 27, 1957	31	328	1.09	14.80	356	16.02
1958	1557	a623	Nov. 27, 1957	86	358	1.19	16.15	339	15.20
1959	1627	a746	May 13, 1959	76	329	1.09	14.80	369	16.56
1960	1707	a2,030	May 12, 1960	148	546	1.81	24.64	-	-

a Maximum daily.

575. Sturgeon River near St. Jacques, Mich.

Location.--Lat 45°59'15", long 86°40'40", in SW<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub> sec.34,T.42 N., R.19 W., on right bank 3 miles downstream from Eighteenmile Creek and 7 miles northeast of St. Jacques.

Drainage area.--167 sq mi.

Records available.--September 1950 to November 1951.

Gage.--Water-stage recorder. Altitude of gage is 670 ft (by barometer).

Extremes.--1950-51: Maximum discharge, 1,900 cfs Apr. 13, 1951 (gage height, 7.20 ft); minimum, 40 cfs Sept. 7, 1950 (gage height, 2.14 ft).

Monthly and yearly mean discharge, in cubic feet per second

[illegible]



Monthly and yearly runoff, in inches, of Sturgeon River near St. Jacques, Mich.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1950	-	-	-	-	-	-	-	-	-	-	-	0.35	-
1951	0.52	0.73	0.71	0.54	0.50	0.82	5.37	1.68	1.37	1.95	0.86	1.43	16.48
1952	2.28	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	1207	-	-	-	-	-	-	-	-	-
1951	1207	1,900	Apr. 13, 1951	64	203	1.22	16.48	-	-	-
1952	1207	-	-	-	-	-	-	-	-	-

578. Middle Branch Escanaba River at Humboldt, Mich.

Location.--Lat 46°29'57", long 87°53'11", in SW $\frac{1}{4}$  sec. 1, T.47 N., R.29 W., on left bank 15 ft upstream from county highway bridge, a quarter of a mile north of Humboldt, and 1 $\frac{1}{2}$  miles downstream from Halfway Creek.

Drainage area.--46.7 sq mi.

Records available.--June 1959 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,521.20 ft above mean sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Sept. 1, 1960, wire-weight gage on upstream side of bridge at same datum.

Extremes.--1959-60: Maximum discharge, 1,640 cfs Apr. 24, 1960 (gage height, 8.30 ft, from floodmark); minimum, 11 cfs Aug. 24, 1960 (gage height, 1.07 ft).

Remarks.--Since July 1960, some diversion above station for industrial use; figures of runoff adjusted since.

Cooperation.--Records of diversion furnished by Cleveland-Cliffs Iron Co.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	-	-	-	-	-	-	-	-	25.7	57.2	83.0	-
1960	106	88.7	39.7	32.7	25.3	21.4	352	288	83.8	50.0	29.8	32.3	95.7

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	-	-	-	-	-	-	-	-	0.63	1.41	1.99	-
1960	2.62	2.12	0.98	0.81	0.58	0.53	8.41	7.11	2.00	1.23	.74	.77	27.90

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1959	1707	-	-	-	-	-	-	-	-	-	-
1960	1707	1,640	Apr. 24, 1960	11	95.3	95.7	2.05	27.90	-	-	-

## 580. Middle Branch Escanaba River near Ishpeming, Mich.

Location.--Lat 46°23'40", long 87°45'30", in NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.12, T.46 N., R.28 W., on left bank half a mile downstream from County Highway 581, 6 miles southwest of Ishpeming, and 10 miles east of Republic.

Drainage area.--128 sq mi.

Records available.--June 1954 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,389.02 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--6 years (1954-60), 142 cfs.

Extremes.--1954-60: Maximum discharge, 2,680 cfs Apr. 25, 1960 (gage height, 12.55 ft); minimum, 12 cfs Aug. 21-23, 1957; minimum gage height, 1.17 ft Aug. 22, 23, 1957.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	76.6	55.7	134	-
1955	228	121	72.3	56.0	53.6	62.0	612	205	144	55.7	105	41.7	146
1956	99.3	86.4	66.2	50.5	44.0	43.0	392	382	113	195	69.2	42.9	132
1957	32.1	51.1	56.7	40.1	26.8	67.9	402	133	68.7	28.2	16.1	169	90.6
1958	63.7	138	90.1	59.8	46.0	54.7	337	113	221	213	50.1	69.4	121
1959	77.9	121	57.8	39.7	24.8	40.0	391	229	88.0	80.1	148	212	126
1960	287	228	116	82.3	68.2	55.2	745	702	203	158	109	115	239

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	0.69	0.50	1.17	-
1955	2.05	1.05	0.65	0.50	0.44	0.56	5.33	1.84	1.25	.50	.95	.36	15.48
1956	.89	.75	.60	.46	.37	.39	3.41	3.44	.99	1.75	.62	.37	14.04
1957	.29	.45	.51	.36	.22	.61	3.50	1.20	.60	.25	.15	1.47	9.61
1958	.57	1.20	.81	.54	.37	.49	2.93	1.02	1.93	1.91	.45	.60	12.82
1959	.70	1.05	.52	.36	.20	.38	3.40	2.06	.77	.72	1.34	1.85	13.33
1960	2.58	1.99	1.04	.74	.57	.50	6.49	6.32	1.77	1.42	.98	1.00	25.40

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	1387	-	-	-	-	-	-	-	-
1955	1387	1,510	Apr. 15, 1955	23	146	1.14	15.48	132	13.97
1956	1437	673	July 11, 1956	31	132	1.03	14.04	123	13.05
1957	1507	1,440	Apr. 22, 1957	12	90.6	.708	9.61	103	10.94
1958	1557	714	Apr. 18, 1958	30	121	.945	12.82	118	12.51
1959	1627	1,030	Apr. 19, 1959	21	126	.984	13.33	157	16.67
1960	1707	2,680	Apr. 25, 1960	34	239	1.87	25.40	-	-

## 585. East Branch Escanaba River at Gwinn, Mich.

Location.--Lat 46°17'10", long 87°26'00", in NE $\frac{1}{4}$  sec.21, T.45 N., R.25 W., on right bank in county park at Gwinn, 1 mile upstream from mouth.

Drainage area.--125 sq mi.

Records available.--October 1954 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,079.2 ft above mean sea level, datum of 1929.

Average discharge.--6 years (1954-60), 107 cfs.

Extremes.--1954-60: Maximum discharge, 1,920 cfs Apr. 25, 1960 (gage height, 14.44 ft); minimum, 23 cfs Aug. 22, 23, 1957 (gage height, 6.54 ft).

Remarks.--Records of water temperatures for the period November 1954 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	177	108	64.5	50.9	46.9	46.5	420	140	80.0	44.5	55.5	31.6	105
1956	59.6	55.5	45.3	41.7	34.4	35.2	308	227	84.0	132	59.4	45.1	93.8
1957	32.2	46.0	49.9	37.5	35.3	66.5	278	124	72.2	35.8	25.9	69.6	72.4
1958	43.6	109	64.8	42.8	37.4	51.2	318	102	105	174	50.4	58.2	96.2
1959	44.5	67.2	35.7	32.3	25.0	33.6	271	124	60.4	53.0	68.5	105	76.5
1960	228	191	97.1	74.7	62.0	50.9	592	584	213	115	82.1	94.4	199

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	1.64	0.96	0.59	0.47	0.39	0.43	3.75	1.29	0.71	0.41	0.51	0.28	11.43
1956	.55	.48	.42	.39	.30	.33	2.74	2.10	.75	1.22	.55	.40	10.23
1957	.30	.41	.46	.35	.28	.61	2.48	1.14	.64	.33	.24	.62	7.86
1958	.40	.97	.60	.39	.31	.47	2.83	.94	.94	1.60	.46	.52	10.43
1959	.41	.60	.33	.30	.21	.31	2.42	1.14	.54	.49	.63	.94	8.32
1960	2.10	1.71	.90	.69	.53	.47	5.29	5.38	1.90	1.06	.76	.84	21.63

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-
1955	1387	1,030	Apr. 15, 1955	27	105	0.840	11.43	89.2	9.69
1956	1437	560	Apr. 12, 1956	31	93.8	.750	10.23	91.2	9.95
1957	1507	848	Apr. 21, 1957	24	72.4	.579	7.86	79.8	8.66
1958	1557	761	Apr. 17, 1958	31	96.2	.770	10.43	90.4	9.80
1959	1627	734	Apr. 19, 1959	24	76.5	.612	8.32	108	11.69
1960	1707	1,920	Apr. 25, 1960	46	199	1.59	21.63	-	-

a Maximum daily.

## 590. Escanaba River at Cornell, Mich.

Location.--Lat 45°54'40", long 87°12'50", in sec.32, T.41 N., R.24 W., on right bank 50 ft downstream from highway bridge, half a mile downstream from Bobs' Creek, three-quarters of a mile northeast of Cornell, and 15 miles upstream from mouth.

Drainage area.--870 sq mi.

Records available.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

Gage.--Water-stage recorder. Datum of gage is 749.26 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). August 1903 to November 1915, chain gage at site 11 miles downstream at different datum.

Average discharge.--19 years (1903-12, 1950-60), 951 cfs.

Extremes.--1903-12, 1950-60: Maximum discharge, 10,500 cfs May 7, 1960 (gage height, 4.90 ft); maximum gage height, 5.72 ft Apr. 7, 1956 (ice jam); minimum discharge observed, 90 cfs July 5, 1910 (gage height, 1.5 ft), but may have been less during extended periods of no gage-height record during winter seasons of 1903-12, or during period of ice effect in 1959.

Remarks.--Diurnal fluctuation and occasional slight regulation caused by Boney Falls powerplant 8 miles above station, since 1950.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	365	486	487	373	369	526	4,329	2,074	1,849	1,858	803	1,211	1,226
1952	1,428	1,386	768	497	435	377	3,598	1,105	846	1,397	861	324	1,083
1953	298	363	318	323	322	986	3,086	1,729	1,552	1,626	613	352	965
1954	383	462	544	374	352	393	3,042	1,914	1,087	460	468	957	868
1955	1,231	717	449	340	284	320	3,473	1,061	715	320	384	237	793
1956	419	436	349	307	284	285	2,155	1,505	598	1,039	457	402	686
1957	248	344	343	257	226	400	2,086	960	512	292	207	640	542
1958	404	928	483	364	319	363	2,168	839	705	1,108	281	503	705
1959	340	659	287	200	185	249	2,075	1,220	459	474	762	1,072	665
1960	1,617	1,104	613	512	432	363	3,744	4,087	1,288	917	729	1,206	1,385

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.48	0.62	0.65	0.49	0.44	0.70	5.56	2.74	2.38	2.47	1.06	1.55	19.14
1952	1.89	1.75	1.04	.65	.54	.60	4.61	1.46	1.08	1.85	1.14	.42	16.93
1953	.39	.47	.42	.43	.39	1.31	3.96	2.29	1.99	2.15	.81	.45	15.06
1954	.51	.59	.72	.50	.42	.52	3.90	2.54	1.40	.61	.62	1.23	13.56
1955	1.63	.92	.60	.45	.34	.42	4.45	1.41	.92	.42	.51	.30	12.37
1956	.56	.56	.46	.41	.35	.38	2.77	1.99	.77	1.37	.61	.52	10.75
1957	.33	.44	.45	.34	.27	.53	2.68	1.27	.66	.39	.27	.82	8.45
1958	.53	1.19	.64	.48	.38	.48	2.78	1.11	.90	1.46	.37	.64	10.96
1959	.45	.84	.38	.27	.22	.33	2.67	1.61	.59	.63	1.01	1.37	10.37
1960	2.14	1.42	.81	.68	.54	.48	4.80	5.42	1.65	1.21	.97	1.55	21.67

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	9,250	Apr. 13, 1951	250	1,226	1.41	19.14	1,414	22.07
1952	1237	10,000	Apr. 19, 1952	191	1,083	1.24	16.93	865	13.53
1953	1277	6,770	July 3, 1953	188	965	1.11	15.06	1,000	15.60
1954	1337	6,770	Apr. 28, 1954	172	868	.998	13.56	953	14.89
1955	1387	7,520	Apr. 14, 1955	190	793	.911	12.37	693	10.80
1956	1437	4,560	Apr. 15, 1956	200	686	.789	10.75	664	10.39
1957	1507	5,780	Apr. 22, 1957	144	542	.623	8.45	615	9.59
1958	1557	4,510	Apr. 18, 1958	155	705	.810	10.96	660	10.27
1959	1627	4,840	Apr. 19, 1959	100	665	.764	10.37	837	13.07
1960	1707	10,500	May 7, 1960	230	1,385	1.59	21.67	-	-

## 595. Ford River near Hyde, Mich.

Location.--Lat 45°45'20", long 87°12'05", in SW $\frac{1}{4}$  sec.19, T.39 N., R.23 W., on right bank 40 ft downstream from county highway bridge, 1.4 miles downstream from Termile Creek, and 1½ miles north of Hyde.

Drainage area.--450 sq mi.

Records available.--October 1954 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 677.9 ft above mean sea level, datum of 1929.

Average discharge.--6 years (1954-60), 342 cfs.

Extremes.--1954-60: Maximum discharge, 7,590 cfs May 7, 1960 (gage height, 8.27 ft); minimum, 23 cfs Aug. 22, 23, 1957 (gage height, 1.39 ft).

Remarks.--Records of water temperatures for the period July 1956 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	557	277	122	87.1	86.7	126	1,755	414	246	56.6	62.5	38.8	318
1956	99.2	117	91.2	78.5	71.7	68.6	1,022	513	311	415	180	174	261
1957	78.5	118	94.7	50.5	44.4	206	1,116	609	226	78.7	42.2	130	235
1958	128	413	135	87.8	70.4	129	1,011	433	226	607	54.2	267	297
1959	123	312	100	61.0	44.4	74.9	984	666	172	178	334	621	306
1960	819	433	210	253	158	115	1,712	2,483	535	283	231	436	640

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	1.43	0.69	0.31	0.22	0.21	0.32	4.35	1.06	0.61	0.15	0.16	0.10	9.61
1956	.25	.29	.23	.20	.17	.18	2.53	1.31	.77	1.06	.46	.43	7.88
1957	.20	.29	.24	.13	.10	.53	2.77	1.56	.56	.20	.11	.32	7.01
1958	.33	1.02	.35	.22	.16	.33	2.51	1.11	.56	1.56	.14	.66	8.95
1959	.31	.77	.26	.16	.10	.19	2.44	1.71	.43	.46	.86	1.54	9.23
1960	2.10	1.07	.54	.65	.38	.30	4.24	6.36	1.33	.73	.59	1.08	19.37

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-
1955	1387	3,120	Apr. 14-16, 1955	28	318	0.707	9.61	264	7.95
1956	1437	2,330	Apr. 10, 1956	58	261	.580	7.88	260	7.84
1957	1507	2,860	Apr. 21, 1957	24	233	.518	7.01	265	7.98
1958	1557	2,150	July 5, 1958	36	297	.660	8.95	285	8.59
1959	1627	1,800	Apr. 19, 20, 1959	42	306	.680	9.23	384	11.60
1960	1707	7,590	May 7, 1960	90	640	1.42	19.37	-	-

## 605. Iron River at Caspian, Mich.

Location.--Lat 46°03'31", long 88°37'38", on line between SE $\frac{1}{4}$  and SW $\frac{1}{4}$  sec.1, T.42 N., R.35 W., on downstream side of highway bridge in Caspian, 5 $\frac{1}{2}$  miles upstream from mouth.

Drainage area.--84 sq mi, approximately.

Records available.--March 1948 to September 1960.

Gage.--Wire-weight and crest-stage gages. Datum of gage is 1,438.78 ft above mean sea level, datum of 1929.

Average discharge.--12 years (1948-60), 83.9 cfs.

Extremes.--1948-60: Maximum discharge, 1,430 cfs July 2, 1953 (gage height, 10.20 ft); minimum observed, 29 cfs Mar. 13, 1954 (gage height, 3.41 ft).

Remarks.--Flow regulated by ground water pumped from mines into river above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	50.7	67.5	60.2	58.9	55.7	66.5	299	108	133	132	85.0	101	101
1952	111	104	83.9	76.3	75.4	75.9	232	95.1	88.4	171	93.5	65.3	106
1953	59.5	63.1	67.6	69.2	68.2	89.8	140	104	173	242	102	81.8	105
1954	66.1	72.6	76.5	67.2	67.9	69.0	229	149	124	65.2	72.2	77.5	98.3
1955	94.3	79.5	72.7	68.7	66.4	69.4	215	99.9	75.4	67.4	69.1	55.3	86.0
1956	68.5	67.7	65.2	62.0	59.0	57.8	122	85.0	74.2	110	73.5	63.6	75.7
1957	55.8	66.4	61.3	58.7	52.9	64.2	99.5	62.8	73.7	58.6	54.8	58.9	63.9
1958	50.6	55.4	51.7	53.9	54.0	53.7	84.3	64.7	63.6	85.1	47.8	44.0	59.1
1959	41.8	47.3	43.8	43.9	45.9	48.6	78.8	83.1	57.5	56.4	81.2	140	64.0
1960	128	85.5	72.6	64.0	52.3	46.3	311	220	99.0	82.4	81.8	78.2	110

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	84.1	-
1951	1207	695	Apr. 8, 1951	48	101	-	-	112	-
1952	1237	695	July 23, 1952	56	106	-	-	96.8	-
1953	1277	1,430	July 2, 1953	50	105	-	-	107	-
1954	1337	845	Apr. 27, 1954	52	96.3	-	-	98.9	-
1955	1387	478	Apr. 10, 1955	45	86.0	-	-	82.2	-
1956	1437	238	July 13, 1956	51	75.7	-	-	74.2	-
1957	1507	212	June 18, 1957	43	63.9	-	-	62.2	-
1958	1557	294	July 1, 1958	38	59.1	-	-	57.0	-
1959	1627	410	Sept. 28, 1959	38	64.0	-	-	76.8	-
1960	1707	1,040	Apr. 24, 1960	38	110	-	-	-	-

## 610. Brule River near Florence, Wis.

Location.--Lat 45°57'30", long 88°15'55", in SE $\frac{1}{4}$  sec.11, T.41 N., R.32 W., Michigan meridian, on left bank 40 ft upstream from highway bridge, 1 mile upstream from Paint River,  $\frac{3}{2}$  miles north of Florence, and 6 miles upstream from confluence with Michigamme River.

Drainage area.--380 sq mi.

Records available.--January 1914 to February 1916, June 1944 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,210 ft (from topographic map). Prior to Aug. 29, 1944, wire-weight or chain gages at bridge 40 ft downstream at same datum.

Average discharge.--17 years (1914-15, 1944-60), 351 cfs.

Extremes.--1914-16, 1944-60: Maximum discharge, 4,700 cfs July 2, 1953 (gage height, 6.57 ft); maximum gage height, 8.01 ft Jan. 8, 1960 (ice jam); minimum discharge, 155 cfs Aug. 16, 22, 1949; minimum gage height, 1.86 ft Aug. 27, Sept. 13, 1948.

Remarks.--Flow not adjusted for ground water pumped from mines into Iron River above station at Caspian, Mich.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	223	263	249	209	195	378	1,110	573	593	559	356	453	430
1952	529	458	341	317	296	317	869	412	413	703	442	271	448
1953	258	285	289	274	274	391	598	466	705	983	449	419	450
1954	322	340	345	282	251	258	984	696	529	351	327	413	425
1955	468	354	328	297	274	285	907	480	361	317	295	253	385
1956	331	281	252	247	229	212	549	384	458	557	356	288	345
1957	259	311	266	225	221	291	473	322	309	229	220	250	281
1958	231	269	218	209	198	217	459	302	286	441	214	234	273
1959	213	240	195	176	174	221	383	352	236	236	332	582	278
1960	525	382	288	252	249	223	978	942	509	367	341	342	450

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.68	0.77	0.76	0.63	0.53	1.15	3.26	1.74	1.74	1.70	1.08	1.33	15.37
1952	1.61	1.34	1.03	.96	.84	.98	2.55	1.25	1.21	2.13	1.34	.79	16.01
1953	.78	.84	.88	.83	.75	1.19	1.76	1.41	2.07	2.98	1.36	1.23	16.08
1954	.98	1.00	1.05	.86	.69	.78	2.89	2.11	1.55	1.07	.99	1.22	15.19
1955	1.42	1.04	.99	.90	.75	.86	2.67	1.45	1.06	.96	.89	.74	13.73
1956	1.00	.82	.76	.75	.65	.64	1.61	1.16	1.35	1.70	1.08	.85	12.37
1957	.79	.91	.81	.68	.61	.88	1.38	.98	.91	.70	.67	.73	10.05
1958	.70	.79	.66	.63	.54	.66	1.35	.92	.84	1.34	.65	.69	9.77
1959	.65	.71	.59	.53	.48	.67	1.13	1.07	.69	.72	1.01	1.71	9.98
1960	1.59	1.13	.87	.76	.71	.68	2.87	2.86	1.50	1.11	1.03	1.00	16.11

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	339	12.11
1951	1207	2,290	Apr. 13, 1951	160	430	1.13	15.37	480	17.14
1952	1237	2,110	July 24, 1952	247	448	1.18	16.01	406	14.53
1953	1277	4,700	July 2, 1953	247	450	1.18	16.08	465	16.61
1954	1337	2,510	Apr. 28, 1954	220	425	1.12	15.19	437	15.61
1955	1387	1,490	Apr. 11, 1955	221	385	1.01	13.73	361	12.86
1956	1437	1,150	July 9, 1956	205	345	.908	12.37	343	12.30
1957	1507	881	Apr. 21, 1957	189	281	.739	10.05	271	9.69
1958	1557	1,360	July 2, 1958	180	273	.718	9.77	267	9.57
1959	1627	1,580	Sept. 29, 1959	165	278	.752	9.96	325	11.60
1960	1707	2,470	Apr. 26, 1960	210	450	1.18	16.11	-	-

## 615. Paint River at Crystal Falls, Mich.

Location.--Lat 46°06'20", long 88°20'05", in SE $\frac{1}{4}$  sec.20, T.43 N., R.32 W., on right bank 150 ft downstream from municipal powerplant at Crystal Falls and 13 miles upstream from mouth.

Drainage area.--616 sq mi.

Records available.--August 1944 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,306.1 ft above mean sea level (Wisconsin-Michigan Power Co. bench mark).

Average discharge.--16 years (1944-60), 578 cfs.

Extremes.--1944-60: Maximum discharge, 10,900 cfs Apr. 25, 1960 (gage height, 9.82 ft); minimum, 7.7 cfs Sept. 17, 1950 (gage height, 0.89 ft); minimum daily, 81 cfs Nov. 1, 1947.

Remarks.--Diurnal fluctuation caused by powerplant immediately above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	251	386	354	284	286	451	2,570	1,196	1,188	993	521	1,022	790
1952	994	824	543	403	374	344	1,913	568	513	861	518	274	677
1953	258	311	327	287	298	503	1,563	898	1,391	1,657	626	400	711
1954	307	372	426	314	325	338	2,256	1,317	1,264	551	377	606	703
1955	964	567	407	355	330	363	2,345	788	587	339	393	275	642
1956	454	445	345	294	270	267	1,313	924	493	707	432	410	529
1957	283	404	349	289	264	379	1,307	508	387	234	205	302	409
1958	268	463	317	269	270	279	943	467	607	957	283	317	453
1959	290	498	292	250	218	253	1,111	792	349	364	437	1,211	505
1960	941	590	397	376	324	304	2,627	1,972	744	445	370	421	792

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.47	0.70	0.66	0.53	0.48	0.84	4.65	2.24	2.15	1.86	0.97	1.85	17.40
1952	1.86	1.49	1.02	.75	.65	.64	3.46	1.06	.93	1.61	.97	.50	14.94
1953	.48	.56	.61	.54	.50	.94	2.83	1.68	2.52	3.10	1.17	.72	15.65
1954	.57	.67	.80	.59	.55	.63	4.08	2.47	2.29	1.03	.71	1.10	15.49
1955	1.80	1.03	.76	.66	.56	.68	4.25	1.48	1.06	.63	.74	.50	14.15
1956	.85	.81	.65	.55	.47	.50	2.38	1.73	.89	1.33	.81	.74	11.71
1957	.53	.73	.65	.54	.45	.71	2.36	.95	.70	.44	.38	.55	8.99
1958	.50	.84	.59	.50	.46	.52	1.71	.87	1.10	1.79	.55	.57	9.98
1959	.54	.90	.55	.47	.37	.47	2.01	1.49	.63	.68	.82	2.20	11.13
1960	1.76	1.07	.74	.70	.57	.57	4.75	3.69	1.35	.83	.69	.76	17.48

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	608	13.41
1951	1207	6,900	Apr. 11, 1951	154	790	1.28	17.40	906	19.94
1952	1237	5,960	Apr. 20, 1952	234	677	1.10	14.94	554	12.22
1953	1277	10,700	July 2, 1953	218	711	1.15	15.65	729	16.04
1954	1337	6,260	Apr. 28, 1954	114	703	1.14	15.49	773	17.04
1955	1387	5,420	Apr. 15, 1955	224	642	1.04	14.15	583	12.87
1956	1437	2,650	May 4, 1956	245	529	.859	11.71	512	11.31
1957	1507	4,060	Apr. 22, 1957	164	409	.664	8.99	409	9.01
1958	1557	2,860	July 2, 1948	210	453	.735	9.98	456	10.04
1959	1627	3,390	Apr. 19, 1959	190	505	.820	11.13	577	12.71
1960	1707	10,900	Apr. 25, 1960	262	792	1.29	17.48	-	-



## 620. Paint River near Alpha, Mich.

Location.--Lat 46°00'40", long 88°15'30", in NW $\frac{1}{4}$  sec. 25, T.42 N., R.32 W., on right bank 0.6 mile downstream from Paint River diversion dam, 5 $\frac{1}{2}$  miles upstream from confluence with Brule River, and 6 miles southeast of Alpha.

Drainage area.--631 sq mi (revised).

Records available.--June 1952 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,260 ft (from topographic map).

Average discharge.--8 years (1952-60), 187 cfs.

Extremes.--1952-60: Maximum discharge, 8,050 cfs July 2, 1953 (gage height, 10.50 ft); minimum daily, 65 cfs Jan. 9 to Feb. 1, 1955.

Remarks.--Flow completely regulated by powerplant and reservoir upstream. Records not adjusted for diversion to Michigamme River by Paint River diversion canal. Records of water temperatures for the period October 1952 to September 1957 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	\$549	637	98.3	91.7	-
1953	92.0	92.0	90.9	89.3	90.8	92.3	423	227	860	969	124	108	272
1954	101	99.5	101	95.1	95.6	91.8	1,389	866	624	96.1	98.9	210	321
1955	249	95.3	100	71.4	89.6	90.0	931	161	224	94.2	97.2	91.4	190
1956	90.5	89.1	91.2	89.7	85.6	84.0	103	169	87.9	225	90.0	86.9	108
1957	88.0	86.3	91.5	88.4	87.8	87.2	217	84.0	86.8	87.6	88.1	86.2	98.1
1958	90.8	93.4	90.1	89.6	85.8	84.9	87.8	85.5	90.9	259	87.0	87.1	103
1959	89.7	89.6	92.4	86.8	85.7	89.6	126	90.5	90.2	91.5	91.7	267	107
1960	242	145	91.3	88.0	88.1	90.0	1,344	1,104	86.4	86.3	92.1	90.6	296

\* Not previously published; partly estimated on basis of records for station at Crystal Falls.

Note.--Records for period October 1953 to September 1960, not previously published.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1277	-	-	-	-	-	-	-	-
1953	1277	8,050	July 2, 1953	88	272	-	-	274	-
1954	-	6,590	Apr. 28, 1954	90	321	-	-	333	-
1955	-	3,190	Apr. 15, 1955	65	190	-	-	176	-
1956	-	1,060	May 19, 1956	81	108	-	-	108	-
1957	-	1,270	Apr. 22, 1957	83	98.1	-	-	98.8	-
1958	-	2,080	July 2, 1958	82	103	-	-	103	-
1959	-	1,800	Sept. 28, 1959	82	107	-	-	125	-
1960	-	8,010	Apr. 25, 1960	84	296	-	-	-	-

Note.--Records for period October 1953 to September 1960, not previously published.

## 625. Michigamme River near Crystal Falls, Mich.

Location.--Lat 46°06'50", long 88°12'55", in NW $\frac{1}{4}$  sec.20, T.43 N., R.31 W., on right bank 400 ft upstream from highway bridge,  $4\frac{1}{2}$  miles downstream from Michigamme Reservoir, 6 miles east of Crystal Falls, and 16 miles upstream from confluence with Brule River.

Drainage area.--670 sq mi.

Records available.--August 1944 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,300 ft (from topographic map).

Average discharge.--16 years (1944-60), 700 cfs.

Extremes.--1944-60: Maximum discharge, 7,260 cfs Apr. 28, 1960 (gage height, 10.73 ft); minimum daily, 71 cfs Nov. 26, 1950.

Remarks.--Flow regulated by powerplants and by Michigamme Reservoir (capacity, 119,950 acre-ft) 4.5 miles above station.

Monthly and yearly mean discharge, in cubic feet per second													
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	260	363	709	705	583	636	1,124	1,933	1,250	1,213	687	1,091	881
1952	1,220	1,034	1,033	1,142	865	740	675	777	671	810	678	561	852
1953	344	256	363	689	712	502	454	1,244	1,427	1,461	778	665	742
1954	581	357	601	760	755	759	686	1,834	1,208	675	579	329	762
1955	938	795	899	1,013	697	643	927	934	854	540	565	333	762
1956	401	598	714	942	657	481	462	924	653	877	683	522	661
1957	486	163	612	703	652	622	530	403	587	459	350	318	490
1958	554	332	759	766	718	689	301	287	432	1,098	733	529	601
1959	233	534	749	719	680	624	335	649	577	261	451	1,018	568
1960	1,179	1,243	901	821	925	711	1,307	2,865	939	753	556	379	1,050

Yearly discharge, in cubic feet per second									
Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	798	-
1951	1207	5,590	May 5, 1951	71	881	-	-	1,045	-
1952	1237	2,230	Oct. 3, 1951	119	852	-	-	657	-
1953	1277	5,440	July 4, 1953	86	742	-	-	791	-
1954	1337	6,340	May 3, 1954	92	762	-	-	853	-
1955	1387	4,380	May 4, 1955	109	762	-	-	685	-
1956	1437	1,850	July 13, 1956	117	661	-	-	624	-
1957	1507	1,180	June 10, 1957	73	490	-	-	522	-
1958	1557	5,300	July 2, 1958	72	601	-	-	590	-
1959	1627	2,030	Sept. 24, 1959	72	568	-	-	719	-
1960	1707	7,260	Apr. 28, 1960	152	1,050	-	-	-	-

## 630. Menominee River near Florence, Wis.

Location.--Lat 45°57'04", long 88°11'13", in NE $\frac{1}{4}$  sec.16, T.41 N., R.31 W., on left bank half a mile downstream from confluence of Brule and Michigamme Rivers and  $3\frac{1}{2}$  miles northeast of Florence.

Records available.--July 1950 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,120 ft (from topographic map).

Average discharge.--10 years (1950-60), 1,879 cfs.

Extremes.--1950-60: Maximum discharge, 19,500 cfs Apr. 26, 1960 (gage height, 14.15 ft); minimum, 40 cfs Jan. 14, 29, 1959, Sept. 13, 1960 (gage height, 1.19 ft); minimum daily, 220 cfs Feb. 4, 1951.

Remarks.--Flow regulated by powerplants, and by Michigamme Reservoir (capacity, 119,950 acre-ft) and Peavy Pond (capacity, 33,860 acre-ft) on Michigamme River, and by many other smaller reservoirs on tributaries above station.

Monthly and yearly mean discharge, in cubic feet per second													
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	.966	1,013	1,326	1,452	1,175	1,719	4,988	3,968	3,355	3,170	1,859	2,799	2,317
1952	2,982	2,510	2,049	2,063	1,949	1,666	3,700	1,582	1,700	2,826	1,890	1,137	2,171
1953	937	958	1,074	1,395	1,598	1,490	2,494	2,664	3,887	4,253	2,069	1,518	2,030
1954	1,346	1,177	1,503	1,568	1,785	1,591	3,908	4,147	3,347	1,671	1,440	1,527	2,082
1955	2,579	1,842	1,782	1,734	1,620	1,619	4,121	2,286	2,114	1,241	1,392	933	1,938
1956	1,331	1,372	1,501	1,605	1,542	1,352	2,110	2,332	1,746	2,433	1,562	1,333	1,686
1957	1,115	1,035	1,251	1,403	1,308	1,762	2,035	1,291	1,358	998	854	956	1,279
1958	1,132	1,136	1,317	1,380	1,388	1,475	1,643	985	1,386	2,702	1,239	1,185	1,415
1959	795	1,272	1,265	1,299	1,243	1,499	1,569	1,733	1,243	917	1,237	2,963	1,417
1960	2,791	2,333	1,703	1,656	1,637	1,490	4,822	6,319	2,322	1,688	1,320	1,330	2,453

Yearly discharge, in cubic feet per second, of Menominee River near Florence, Wis.

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	12,100	Apr. 13, 1951	220	2,317	-	-	2,673	-
1952	1237	10,400	Apr. 21, 1952	394	2,171	-	-	1,788	-
1953	1277	18,800	July 2 or 3, 1953	294	2,030	-	-	2,119	-
1954	1337	12,900	Apr. 28, 1954	422	2,082	-	-	2,265	-
1955	1387	9,520	Apr. 16, 1955	472	1,938	-	-	1,769	-
1956	1437	6,350	July 11, 1956	510	1,686	-	-	1,619	-
1957	1507	4,240	Apr. 22, 1957	506	1,279	-	-	1,295	-
1958	1557	11,100	July 1, 1958	614	1,415	-	-	1,393	-
1959	1627	7,860	Sept. 29, 1959	488	1,417	-	-	1,711	-
1960	1707	19,500	Apr. 26, 1960	782	2,453	-	-	-	-

635. Menominee River at Twin Falls, near Iron Mountain, Mich.

Location.--Lat 45°52'20", long 88°04'10", in sec. 12, T.40 N., R.31 W., Michigan meridian, at powerplant of Wisconsin-Michigan Power Co., 3½ miles north of city of Iron Mountain, 4 miles upstream from Pine River, and at mile 106.6.

Drainage area.--1,790 sq mi, approximately.

Records available.--January 1914 to September 1957.

Gage.--Headwater and tailwater gages and generation data entered hourly in daily log sheet by company employees.

Average discharge.--43 years (1914-57), 1,810 cfs.

Extremes.--1914-57: Maximum daily discharge, 16,700 cfs Apr. 23, 24, 1916; minimum daily, 154 cfs Aug. 9, 1925.

Remarks.--Flow regulated by powerplants, and by Michigamme Reservoir (capacity, 119,950 acre-ft) and Peavy Pond (capacity, 33,860 acre-ft) on Michigamme River, and by many smaller reservoirs above station.

Cooperation.--Records of daily discharge furnished by Wisconsin-Michigan Power Co.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,006	1,081	1,393	1,445	1,167	1,845	4,901	3,925	3,390	3,209	1,978	3,021	2,365
1952	2,950	2,647	2,154	2,133	2,015	1,715	3,899	1,659	1,847	3,095	2,070	1,235	2,285
1953	987	1,035	1,130	1,547	1,730	1,617	2,755	2,841	4,123	4,309	2,212	1,634	2,161
1954	1,385	1,251	1,585	1,624	1,909	1,688	3,935	4,195	3,497	1,728	1,501	1,614	2,157
1955	2,649	2,001	1,877	1,851	1,686	1,768	4,380	2,369	2,240	1,277	1,417	974	2,040
1956	1,485	1,516	1,580	1,748	1,611	1,435	2,276	2,411	1,864	2,554	1,692	1,407	1,800
1957	1,124	1,077	1,318	1,533	1,384	1,902	2,253	1,423	1,471	1,033	897	994	1,366
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,971	-
1951	1207	10,800	Apr. 13, 1951	754	2,365	-	-	2,724	-
1952	1237	10,300	Apr. 21, 1952	966	2,285	-	-	1,900	-
1953	1277	15,300	July 3, 1953	754	2,161	-	-	2,251	-
1954	1337	11,200	Apr. 28, 1954	826	2,157	-	-	2,351	-
1955	1387	9,310	Apr. 16, 1955	733	2,040	-	-	1,876	-
1956	1437	4,560	July 11, 1956	942	1,800	-	-	1,711	-
1957	1507	4,120	Apr. 23, 1957	756	1,366	-	-	-	-
1958	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-

Note.--Monthly and yearly figures of discharge per square mile and runoff in inches, previously published in some water-supply papers, may not represent natural flow because of uncertainty in the adjustments for effect of regulation, diversion and evaporation. Those figures are not published herein.

## 645. Pine River at Pine River powerplant, near Florence, Wis.

Location.--Lat 45°49'40", long 88°14'55", in sec.28, T.39 N., R.18 E., at powerplant of Wisconsin-Michigan Power Co., 5.0 miles downstream from Popple River and 6.5 miles south of Florence.

Drainage area.--528 sq mi.

Records available.--October 1923 to September 1960.

Average discharge.--37 years (1923-60), 422 cfs.

Extremes.--1923-60: Maximum daily discharge, 4,380 cfs Apr. 9, 1929; no flow at times in 1924, 1926-27, 1930-31, 1933, 1940.

Remarks.--Daily discharge determined from powerplant records. Flow regulated by powerplant at station, but pondage is small and monthly discharge is very nearly natural flow.

Cooperation.--Records furnished by Wisconsin-Michigan Power Co.

Correction.--In WSP 1307, the date of maximum day for 1935 was listed in error. It should be June 21, 22, 1935.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	171	237	187	158	152	248	1,652	980	726	704	427	577	518
1952	669	451	313	236	225	214	1,164	590	569	734	459	216	487
1953	183	222	217	192	174	423	886	576	810	785	444	367	441
1954	215	280	309	195	214	235	1,339	950	581	299	290	612	459
1955	645	365	250	211	194	252	1,362	555	472	234	318	166	417
1956	324	334	215	188	170	162	722	499	586	630	434	282	379
1957	186	292	215	160	151	254	730	472	311	152	137	294	279
1958	195	329	206	157	141	177	766	341	324	571	147	319	306
1959	220	306	152	129	116	160	552	520	237	357	601	695	†338
1960	983	504	322	343	257	226	1,277	1,726	760	527	421	535	658

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.37	0.50	0.41	0.35	0.30	0.54	3.49	2.14	1.53	1.54	0.93	1.22	13.32
1952	1.46	.95	.68	.51	.46	.47	2.46	1.29	1.20	1.60	1.00	.46	12.54
1953	.40	.47	.47	.42	.34	.92	1.87	1.26	1.71	1.74	.97	.78	11.35
1954	.47	.59	.68	.42	.42	.51	2.83	2.07	1.23	.65	.63	1.29	11.79
1955	1.41	.77	.55	.46	.38	.55	2.88	1.16	1.00	.51	.69	0.35	10.71
1956	.71	.70	.47	.41	.35	.35	1.53	1.09	1.24	1.38	.95	.59	9.77
1957	.41	.62	.47	.35	.30	.55	1.54	1.03	.66	.33	.30	.62	7.18
1958	.42	.69	.45	.34	.28	.39	1.62	.74	.68	1.25	.32	.67	7.85
1959	.48	.65	.33	.28	.23	.35	1.17	1.14	.50	.78	1.51	1.47	8.69
1960	2.15	1.07	.70	.75	.53	.49	2.70	3.77	1.61	1.15	.92	1.13	16.97

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	377	9.71
1951	1207	3,440	Apr. 13, 1951	49	518	0.981	13.32	589	15.13
1952	1237	2,440	Apr. 21, 1952	123	487	.922	12.54	419	10.79
1953	1277	2,090	July 2, 1953	95	441	.835	11.35	457	11.75
1954	1337	2,420	Apr. 28, 29, 1954	65	459	.869	11.79	498	12.78
1955	1387	2,340	Apr. 14, 1955	104	417	.790	10.71	384	9.86
1956	1437	1,340	July 9, 1956	123	379	.718	9.77	364	9.39
1957	1507	1,440	Apr. 21, 25, 1957	52	279	.528	7.18	282	7.24
1958	1557	1,600	July 5, 1958	52	306	.580	7.85	302	7.75
1959	1627	1,760	Sept. 30, 1959	80	†338	.640	8.69	433	11.15
1960	1707	3,220	May 7, 1960	156	658	1.25	16.97	-	-

† Corrected.

## 653. West Branch Sturgeon River near Randville, Mich.

Location.--Lat 46°00'45", long 87°58'41", in NE $\frac{1}{4}$  sec.30, T.42 N., R.29 W., on right bank 500 ft downstream from county highway bridge, 3 miles downstream from Tom Kings Creek, and 4 miles northeast of Randville.

Drainage area.--57.3 sq mi.

Records available.--August 1958 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,170 ft (from topographic map).

Extremes.--1958-60: Maximum discharge, 570 cfs May 7, 1960 (gage height, 6.40 ft); minimum, 2.6 cfs Apr. 10, 1960 (gage height, 1.43 ft, result of freezeup).

Remarks.--Since December 1958, some diversion above station for industrial use; figures of runoff adjusted since.

Cooperation.--Records of diversion furnished by M. A. Hanna Coal and Ore Corp.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	13.6	20.8	-
1959	24.6	35.9	16.2	14.3	12.3	16.8	68.1	47.9	19.0	21.2	26.5	68.4	30.9
1960	59.6	33.4	25.6	25.0	20.9	22.4	137	162	62.2	38.5	36.0	37.5	55.1

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	0.27	0.40	-
1959	0.49	0.70	0.33	0.29	0.22	0.34	1.33	0.96	0.37	0.43	.53	1.33	7.32
1960	1.20	.65	.52	.50	.39	.45	2.67	3.26	1.22	.77	.72	.73	13.08

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed	Adjusted	
		Momentary maximum	Minimum	Mean	Mean	Per square mile	Runoff in inches		Mean	Mean	Runoff in inches
		Discharge	Date	day							
1958	1627	-	-	-	-	-	-	-	-	-	-
1959	1627	231	Sept. 23, 1959	6	28.5	30.9	0.539	7.32	31.6	34.5	8.17
1960	1707	570	May 7, 1960	14	51.7	55.1	.962	13.08	-	-	-

## 655. Sturgeon River near Foster City, Mich.

Location.--Lat 45°54'30", long 87°45'15", in NW $\frac{1}{4}$  sec.36, T.41 N., R.28 W., on left bank 30 ft downstream from bridge on County Highway 569,  $1\frac{1}{2}$  miles downstream from confluence of East and West Branches, and 4 miles south of Foster City.

Drainage area.--244 sq mi.

Records available.--October 1954 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 966.6 ft above mean sea level, datum of 1929.

Average discharge.--6 years (1954-60), 172 cfs (adjusted for industrial diversion).

Extremes.--1954-60: Maximum discharge, 2,570 cfs May 8, 1960 (gage height, 10.35 ft); minimum, 20 cfs Aug. 23, 1957 (gage height, 2.17 ft).

Remarks.--Small diversions for irrigation. Since December 1958, some diversion above station for industrial use; figures of runoff adjusted since. Records of water temperatures for the period July 1956 to September 1960 are published in reports of the Geological Survey.

Cooperation.--Records of diversion furnished by M. A. Hanna Coal and Ore Corp.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	285	161	97.8	77.3	86.3	106	823	246	187	67.0	61.2	38.4	186
1956	84.6	88.8	69.4	62.6	55.5	55.1	360	207	184	267	130	115	140
1957	67.4	90.7	72.3	48.7	41.5	87.6	431	240	120	74.1	48.1	98.5	118
1958	65.2	172	77.6	61.2	55.7	79.6	413	200	162	299	44.0	119	147
1959	97.9	177	58.6	51.3	40.7	65.5	368	262	82.4	111	203	381	159
1960	382	204	128	127	104	88.3	655	923	289	160	152	170	282

## STREAMS TRIBUTARY TO LAKE MICHIGAN

Monthly and yearly runoff, in inches (adjusted), of Sturgeon River near Foster City, Mich.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	1.35	0.74	0.46	0.37	0.37	0.50	3.76	1.16	0.85	0.32	0.29	0.18	10.35
1956	.40	.41	.33	.30	.24	.26	1.65	.98	.84	1.26	.61	.53	7.81
1957	.32	.42	.34	.23	.18	.41	1.98	1.13	.55	.35	.23	.45	6.59
1958	.40	.79	.37	.49	.24	.38	1.89	.95	.74	1.42	.21	.54	8.22
1959	.46	.81	.28	.24	.17	.31	1.76	1.23	.38	.52	.96	1.74	8.86
1960	1.81	.93	.61	.60	.46	.42	2.99	4.36	1.32	.76	.72	.78	15.76

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted a/			Observed	Adjusted a/	
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-
1955	1387	bl,400	Apr.14,15,1955	32	186	-	0.762	10.35	161	-	8.94
1956	1437	b690	Apr. 10, 1956	49	140	-	.574	7.81	139	-	7.75
1957	1507	1,020	Apr. 22, 1957	22	118	-	.484	6.59	127	-	7.07
1958	1557	927	July 5 or 6, 1958	27	147	-	.602	8.22	147	147	8.21
1959	1627	877	Sept.24,25,1959	26	157	159	.652	8.86	189	192	10.66
1960	1707	2,570	May 8, 1960	64	279	282	1.16	15.76	-	-	-

a Adjusted for diversion.

b Maximum daily.

660. Menominee River near Pembine, Wis.

Location.--Lat 45°35'25", long 87°46'35", in sec.21, T.37 N., R.28 W., Michigan meridian, on left bank 700 ft upstream from Pemene Creek, 4 miles west of Nathan, Mich., 15 miles southeast of Pembine, and at mile 65.3.

Drainage area.--3,240 sq mi, approximately.

Records available.--October 1949 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Altitude of gage is 745 ft (from river-profile map).

Average discharge.--11 years (1949-60), 3,076 cfs.

Extremes.--1949-60: Maximum discharge, 26,900 cfs May 8, 1960 (gage height, 13.90 ft); minimum, 794 cfs Oct. 15, 1958 (gage height, 1.88 ft).

Remarks.--Flow regulated by powerplants and by Michigamme Reservoir (capacity, 119,950 acre-ft) and Peavy Pond (capacity, 33,860 acre-ft) on the Michigamme River, and by many smaller reservoirs above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,483	1,715	1,848	1,877	1,650	2,508	9,609	6,326	5,308	5,761	3,228	4,468	3,817
1952	5,024	4,121	3,014	2,708	2,635	2,291	7,559	3,026	3,059	5,859	3,505	1,944	3,730
1953	1,543	1,668	1,763	2,017	2,138	3,277	5,349	4,375	6,118	6,523	3,096	2,275	3,349
1954	1,947	1,892	2,157	1,956	2,229	2,309	7,019	6,683	5,131	2,595	2,151	2,944	3,249
1955	4,128	†2,859	2,379	2,229	2,029	2,352	8,076	3,583	3,329	1,700	1,917	1,287	2,987
1956	1,994	2,184	1,987	2,100	1,950	1,758	3,884	3,435	3,024	4,053	2,678	2,090	2,596
1957	1,645	1,705	1,724	1,719	1,577	2,345	4,322	2,935	2,314	1,446	1,214	1,711	2,054
1958	1,747	2,227	1,921	1,887	1,789	2,024	3,612	2,033	2,150	4,295	1,554	1,898	2,263
1959	1,412	2,225	1,577	1,577	1,512	1,957	3,643	3,441	1,966	1,656	2,764	4,779	2,374
1960	5,079	3,737	2,697	2,765	2,419	2,187	8,345	12,100	4,407	2,999	2,383	2,635	4,318

† Corrected.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	3,051	-
1951	1207	21,100	Apr. 14, 1951	1,200	3,817	-	-	4,414	-
1952	1237,1277	17,100	Apr. 22, 1952	1,510	3,730	-	-	3,128	-
1953	1277	25,500	July 3, 1953	1,070	3,349	-	-	3,436	-
1954	1337	19,800	Apr. 29, 1954	1,320	3,249	-	-	3,532	-
1955	1387	15,100	Apr. 17, 1955	1,200	2,987	-	-	2,717	-
1956	1437	7,840	July 12, 1956	1,320	2,596	-	-	2,505	-
1957	1507	9,110	Apr. 23, 1957	1,020	2,054	-	-	2,122	-
1958	1557	13,200	July 2, 1958	1,090	2,263	-	-	2,205	-
1959	1627	9,720	Sept. 30, 1959	1,050	2,374	-	-	2,905	-
1960	1707	26,900	May 8, 1960	1,730	4,318	-	-	-	-

Note.--Monthly and yearly figures of discharge per square mile and runoff in inches, previously published in water-supply papers, may not represent natural flow because of uncertainty in the adjustments for effect of regulation, diversion, and evaporation. These figures are not published herein.

665. Pike River at Amberg, Wis.

Location.--Lat 45°29'50", long 87°59'40", in SW<sup>1</sup>/<sub>4</sub> sec.15, T.35 N., R.20 E., on left bank 500 ft upstream from Chicago, Milwaukee, St. Paul and Pacific Railroad bridge, 0.2 mile south of Amberg, and 1.2 miles downstream from confluence of North and South Branches.

Drainage area.--253 sq mi.

Records available.--February 1914 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 865 ft above mean sea level (from survey level line along railroad). Prior to May 23, 1931, chain gage at railway bridge at datum 1 ft higher. May 23, 1931, to Aug. 4, 1934, chain gage at highway bridge three-quarters of a mile downstream at different datum. Aug. 5, 1934, to Oct. 6, 1946, staff gage at present site and datum.

Average discharge.--46 years (1914-60), 219 cfs.

Extremes.--1914-60: Maximum discharge, 2,800 cfs Apr. 10, 1922 (gage height, 7.8 ft, from graph based on gage readings, site and datum then in use), from rating curve extended above 1,100 cfs; minimum observed, 26 cfs Dec. 27, 1925 (gage height, 1.30 ft, site and datum then in use).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	117	143	126	109	104	179	786	512	287	323	195	221	242
1952	270	308	186	155	146	147	602	243	190	270	166	115	233
1953	110	129	129	118	110	277	455	286	244	215	153	109	195
1954	109	119	129	103	113	137	430	319	264	141	121	235	185
1955	248	172	124	105	103	146	584	232	205	104	136	100	188
1956	124	137	124	105	99.4	102	327	184	176	188	243	153	163
1957	114	139	122	93.8	85.3	160	408	303	158	103	97.8	174	163
1958	139	217	134	108	110	132	332	201	130	246	104	151	167
1959	174	191	113	95.0	90.3	126	555	267	132	107	159	257	172
1960	315	227	166	178	135	123	542	820	357	245	203	219	294

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.53	0.63	0.57	0.50	0.43	0.82	3.47	1.42	1.26	1.48	0.89	0.98	12.96
1952	1.23	1.36	.85	.71	.62	.67	2.65	1.11	.84	1.23	.76	.51	12.54
1953	.50	.57	.59	.54	.45	1.26	2.00	1.31	1.08	.98	.70	.48	10.46
1954	.50	.52	.59	.47	.46	.63	1.89	1.45	1.17	.64	.55	1.04	9.91
1955	1.13	.76	.57	.48	.43	.66	2.57	1.06	.90	.48	.62	.44	10.10
1956													
1957	.56	.61	.56	.48	.42	.46	1.44	.84	.78	.86	1.11	.67	8.79
1958	.52	.61	.55	.43	.45	.73	1.31	.90	1.36	.47	.45	.77	8.77
1959	.65	.69	.61	.49	.45	.60	1.46	.91	.57	1.12	.48	.67	8.94
1959	.79	.84	.51	.43	.37	.57	1.57	1.21	.58	.49	.73	1.13	9.22
1960	1.43	1.00	.76	.81	.58	.56	2.39	3.74	1.57	1.11	.92	.97	15.84

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	211	11.32
1951	1207	1,980	Apr. 9, 1951	93	242	0.957	12.98	273	14.69
1952	1237	1,080	July 22, 1952	99	233	.921	12.54	270	10.76
1953	1277	860	Mar. 25, 1953	84	195	.771	10.46	284	9.34
1954	1337	1,120	Apr. 28, 1954	93	185	.731	9.91	201	10.76
1955	1387	852	Aug. 15, 1955	84	188	.743	10.10	175	9.37
1956	1437	856	Aug. 5, 1956	86	163	.644	8.79	163	8.75
1957	1507	1,080	Apr. 21, 1957	78	163	.644	8.77	173	9.27
1958	1557	788	July 6, 1958	89	167	.660	8.94	166	8.89
1959	1627	664	Sept. 23, 1959	74	172	.680	9.22	192	10.27
1960	1707	2,290	May 7, 1960	105	294	1.16	15.84	-	-

## 670. Menominee River below Koss, Mich.

Location.--Lat 45°21'50", long 87°39'20", in sec.9, T.34 N., R.27 W., Michigan meridian, on left bank at powerplant of Wisconsin Public Service Corp., 0.5 mile upstream from Little Cedar River, 3.6 miles southeast of Koss, and at mile 24.7.

Drainage area.--3,790 sq mi, approximately.

Records available.--July 1907 to March 1909 (published as "at Koss"), July 1913 to September 1960.

Gage.--Headwater and tailwater gages and generation data entered hourly in daily log sheet by company employees. Prior to June 1913, chain gage on railroad bridge 4 miles upstream.

Average discharge.--48 years (1907-8, 1913-60), 3,146 cfs.

Extremes.--1908, 1913-60: Maximum daily discharge, 33,000 cfs May 10, 1960; minimum daily, 162 cfs Sept. 15, 1931.

Remarks.--Daily discharge computed on basis of average daily load and load-discharge rating of combined hydroelectric units. Flow regulated by powerplants, and by Michigamme Reservoir (capacity, 119,950 acre-ft) since 1940 and Peavy Pond (capacity, 33,860 acre-ft) since 1943 to Michigamme River, and by many smaller reservoirs above station.

Cooperation.--Records of daily discharge furnished by Wisconsin Public Service Corp. since 1913.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,532	1,727	1,709	1,784	1,570	2,400	9,422	6,026	5,032	5,613	3,295	4,305	3,703
1952	5,199	4,137	3,070	2,715	2,668	2,346	7,744	3,319	3,166	5,415	3,424	2,070	3,773
1953	1,608	4,772	1,833	2,096	2,205	3,620	5,903	4,685	5,876	6,159	3,089	2,367	3,439
1954	1,979	1,885	2,247	2,013	2,355	2,414	6,407	6,500	4,857	2,584	2,155	3,216	3,235
1955	4,344	2,988	2,417	2,337	2,154	2,488	8,972	3,812	3,738	1,718	1,979	1,342	3,188
1956	2,108	2,274	2,028	2,084	1,934	1,753	4,543	3,798	3,121	4,093	2,943	2,172	2,739
1957	1,723	1,876	1,891	1,743	1,626	2,459	4,580	3,281	2,296	1,463	1,281	1,845	2,171
1958	1,861	2,588	2,111	1,908	1,810	2,181	4,352	2,326	2,184	4,665	1,658	2,065	2,478
1959	1,685	2,433	1,707	1,648	1,521	1,942	3,888	3,712	2,000	1,704	2,752	5,002	2,498
1960	5,462	4,298	2,760	2,906	2,507	2,204	8,545	13,180	4,767	2,943	2,545	2,851	4,586

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	3,077	-
1951	1207	19,000	Apr. 15, 1951	1,240	3,703	-	-	4,329	-
1952	1237	14,700	Apr. 21, 1952	1,600	3,773	-	-	3,170	-
1953	1277	19,300	July 5, 1953	1,040	3,439	-	-	3,515	-
1954	1337	16,700	Apr. 30, 1954	1,200	3,215	-	-	3,521	-
1955	1387	14,800	Apr. 18, 1955	1,200	3,188	-	-	2,906	-
1956	1437	7,360	Apr. 10, 1956	1,280	2,739	-	-	2,662	-
1957	1507	8,370	Apr. 24, 1957	864	2,171	-	-	2,260	-
1958	1557	10,700	July 3, 1958	1,170	2,478	-	-	2,416	-
1959	1627	9,650	Sept. 30, 1959	1,190	2,498	-	-	3,062	-
1960	1707	33,000	May 10, 1960	1,580	4,586	-	-	-	-

Note.--Monthly and yearly figures of discharge per square mile and runoff in inches, previously published in some water-supply papers, may not represent natural flow because of uncertainty in the adjustments for effect of regulation, diversion and evaporation. Those figures are not published herein.

## 675. Menominee River near McAllister, Wis.

Location.--Lat 45°19'20", long 87°39'40", in sec.17, T.33 N., R.23 E., on right bank 400 ft upstream from highway bridge, 2½ miles downstream from Little Cedar River, 2.9 miles east of McAllister, 14.5 miles east of Wausaukee, and at mile 22.3.

Drainage area.--4,020 sq mi, approximately.

Records available.--March 1945 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 630 ft (from river-profile map). Prior to May 15, 1945, wire-weight gage.

Average discharge.--15 years (1945-60) 3,380 cfs.

Extremes.--1945-60: Maximum discharge, 32,500 cfs May 9, 1960 (gage height, 20.0 ft, from graph based on gage readings); minimum observed, 538 cfs Oct. 6, 1946 (gage height, 7.29 ft).

Remarks.--Flow regulated by powerplants, by Michigamme Reservoir (capacity, 119,950 acre-ft) and Peavy Pond (capacity, 33,860 acre-ft) on the Michigamme River, and by many smaller reservoirs above station.



Monthly and yearly mean discharge, in cubic feet per second, of Menominee River near McAllister, Wis.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,546	1,827	1,897	1,984	1,736	2,671	12,800	7,713	5,928	7,127	3,773	5,023	4,504
1952	6,097	4,793	3,430	3,036	2,971	2,655	9,892	3,680	3,423	6,848	4,056	2,065	4,413
1953	1,667	1,781	1,858	2,089	2,228	3,861	6,957	5,224	6,900	7,104	3,581	2,321	3,786
1954	2,051	2,048	2,401	2,160	2,528	2,604	8,029	8,277	5,798	3,024	2,425	3,547	3,759
1955	4,971	3,353	2,755	2,547	2,404	2,779	9,905	4,082	4,055	1,878	2,133	1,421	3,520
1956	2,125	2,409	2,192	2,235	2,093	1,897	5,073	4,079	3,550	4,619	3,340	2,245	2,973
1957	1,767	1,950	1,984	1,860	1,705	2,618	5,526	3,848	2,575	1,622	1,377	1,939	2,397
1958	2,016	2,961	2,306	2,074	1,964	2,422	4,744	2,609	2,349	4,996	1,760	2,213	2,703
1959	1,766	2,604	1,855	1,723	1,600	2,048	4,534	4,144	2,274	1,859	3,149	5,952	2,790
1960	6,485	4,967	3,327	3,510	2,990	2,619	10,680	15,930	5,548	3,635	2,910	3,263	5,496

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	3,388	-
1951	1207	25,700	Apr. 15, 1951	1,280	4,504	-	-	5,265	-
1952	1237	19,300	Apr. 23, July 25	1,580	4,413	-	-	3,658	-
1953	1277	24,200	July 5, 1953	1,170	3,786	-	-	3,887	-
1954	1337	21,900	Apr. 30, 1954	1,390	3,739	-	-	4,124	-
1955	1387	16,700	Apr. 18, 1955	1,280	3,520	-	-	3,153	-
1956	1437	10,800	Apr. 10, 1956	1,500	2,973	-	-	2,887	-
1957	1507	11,000	Apr. 24, 1957	1,020	2,397	-	-	2,528	-
1958	1557	12,300	July 4, 1958	1,410	2,703	-	-	2,613	-
1959	1627	11,800	Sept. 27, 1959	1,290	2,790	-	-	3,511	-
1960	1707	32,500	May 9, 1960	1,650	5,496	-	-	-	-

Note.--Monthly and yearly figures of discharge per square mile and runoff in inches, previously published in water-supply papers, may not represent natural flow because of uncertainty in the adjustments for effect of regulation, diversion, and evaporation. These figures are not published herein.

680. Peshtigo River at High Falls, near Crivitz, Wis.

Location--Lat 45°16'50", long 88°12'00", in sec.1, T.32 N., R.18 E., at High Falls power-plant of Wisconsin Public Service Corp., 1 mile above Thunder River and 10 miles west of Crivitz.

Drainage area--554 sq mi.

Records available--August 1912 to January 1957.

Gage--Headwater and tailwater gages and generation data entered hourly in daily log sheet by company employees. Altitude of tailwater gage is 810 ft (from river-profile map). Prior to Sept. 30, 1922, water-stage recorder at site half a mile downstream at different datum.

Average discharge--44 years (1912-56), 475 cfs.

Extremes--1912-56: Maximum daily discharge, 3,670 cfs Apr. 11, 1922; no flow for several days during 1925, 1928, 1929, 1932, 1933.

Remarks--Flow regulated by storage in High Falls service pond, which has an area of 1,750 acres, and by Caldron Falls service pond, which has an area of 1,212 acres.

Cooperation--Since 1923, records furnished by Wisconsin Public Service Corp.; those for period 1951-57 not previously published by the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	185	225	198	179	150	371	1,719	763	605	738	386	423	495
1952	631	499	317	257	318	396	1,207	652	495	595	322	184	489
1953	170	221	255	202	191	552	1,075	581	551	567	371	192	410
1954	178	221	259	175	206	459	1,008	821	625	279	224	583	419
1955	561	356	251	223	222	476	1,349	487	529	191	316	215	431
1956	275	319	222	205	296	383	667	454	554	565	447	296	390
1957	207	304	259	157	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	405	-
1951	(a)	3,280	Apr. 14, 1951	7	495	-	-	566	-
1952	(a)	2,120	Apr. 23, 1952	7	489	-	-	422	-
1953	(a)	1,610	Mar. 28, 1953	7	410	-	-	411	-
1954	(a)	1,610	Apr. 30, Sept. 21	7	419	-	-	462	-
1955	(a)	1,720	Apr. 22, 1955	7	431	-	-	401	-
1956	(a)	1,470	Apr. 8, 1956	7	390	-	-	384	-
1957	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-

a From files of Wisconsin Public Service Corp.

## 695. Peshtigo River at Peshtigo, Wis.

Location.--Lat 45°02'50", long 87°44'40", in NE $\frac{1}{4}$  sec.30, T.30 N., R.22 E., on left bank 75 ft downstream from Chicago and North Western Railway bridge, half a mile downstream from Wisconsin Public Service Corp. powerplant in Peshtigo, and 11 $\frac{1}{2}$  miles upstream from mouth.

Drainage area.--1,124 sq mi.

Records available.--June 1953 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 584.64 ft above mean sea level, datum of 1929.

Average discharge.--7 years (1953-60), 839 cfs.

Extremes.--1953-60: Maximum discharge, 9,790 cfs May 9, 1960 (gage height, 11.59 ft), from rating curve extended above 5,000 cfs on basis of computation of peak flow through dam gates; minimum, 32 cfs Aug. 28, 1953 (gage height, 1.46 ft); minimum daily, 84 cfs Aug. 5, 1957.

Remarks.--Diurnal fluctuation caused by powerplant half a mile upstream.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	842	985	707	402	-
1954	399	445	510	391	436	721	1,730	1,507	1,446	615	417	830	787
1955	1,080	771	564	469	476	802	2,385	783	858	355	484	309	777
1956	461	521	420	393	435	693	1,471	797	824	982	803	536	695
1957	382	527	460	330	298	773	1,462	1,030	653	349	285	543	591
1958	417	963	564	403	358	730	1,452	861	562	956	374	699	695
1959	609	711	455	391	406	768	1,472	1,216	562	501	944	1,706	812
1960	1,415	1,095	913	1,219	717	784	2,887	4,639	1,519	971	1,035	965	1,518

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	0.84	1.01	0.73	0.40	-
1954	0.41	0.44	0.52	0.40	0.40	0.74	1.72	1.55	1.44	.63	.43	.82	9.50
1955	1.11	.77	.58	.48	.44	.82	2.37	0.80	.85	.36	.50	.31	9.39
1956	.47	.52	.43	.40	.42	.71	1.46	0.82	.82	1.01	.62	.53	8.41
1957	.39	.52	.47	.34	.28	.79	1.45	1.06	.65	.36	.29	.54	7.14
1958	.43	.96	.58	.41	.33	.75	1.44	.88	.56	.98	.38	.69	8.39
1959	.62	.71	.47	.40	.38	.79	1.46	1.25	.56	.51	.97	1.69	9.81
1960	1.45	1.09	.94	1.25	.69	.80	2.87	4.76	1.51	1.00	1.06	.98	18.40

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	1277	-	-	-	-	-	-	-	-
1954	1337	4,380	May 3, 1954	122	787	0.700	9.50	876	10.59
1955	1387	3,360	Apr. 1, 1955	120	777	.691	9.39	692	8.35
1956	1437	3,920	Apr. 8, 1956	170	695	.618	8.41	692	8.37
1957	1507	3,680	Apr. 20, 1957	84	591	.526	7.14	639	7.73
1958	1557	3,290	Apr. 8, 1958	147	695	.618	8.39	682	8.22
1959	1627	4,400	Sept. 24, 1959	175	812	.722	9.81	951	11.49
1960	1707	9,790	May 9, 1960	409	1,518	1.35	18.40	-	-

## 710. Oconto River near Gillett, Wis.

Location--Lat 44°51'55", long 88°18'00", in NW<sup>1</sup> sec.34, T.28 N., R.18 E., on left bank just upstream from highway bridge, 2 miles upstream from Christy Brook, 2 miles south of Gillett, and at mile 29.

Drainage area--678 sq mi.

Records available--June 1906 to March 1909, October 1913 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage--Water-stage recorder. Altitude of gage is 735 ft (from river-profile map). Prior to March 1909, chain gage on bridge at datum 4.0 ft lower. Jan. 6, 1914, to Aug. 24, 1938, chain gage on bridge at present datum.

Average discharge--49 years (1906-8, 1913-60), 574 cfs.

Extremes--1906-9, 1913-60: Maximum discharge, 8,400 cfs Apr. 10, 1922 (gage height, 11.2 ft, from floodmarks), caused by failure of dam at Pulcifer 4 miles above station; minimum, 93 cfs Nov. 26, 1941 (gage height, 0.13 ft), flow retarded by anchor ice above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	325	324	280	274	284	556	2,362	658	558	669	451	500	600
1952	908	833	548	416	388	449	1,672	827	570	826	417	289	644
1953	273	324	387	313	255	960	1,194	761	480	512	471	265	518
1954	272	299	367	266	308	437	794	794	784	459	278	439	458
1955	669	484	342	296	271	521	1,313	555	491	246	245	211	468
1956	276	347	290	239	227	255	904	564	470	572	363	265	398
1957	240	301	258	206	218	355	754	603	373	285	270	428	358
1958	346	608	408	289	259	361	940	564	364	563	300	392	451
1959	374	421	249	235	234	467	1,071	885	411	297	325	532	450
1960	737	632	472	605	395	376	1,482	2,185	859	650	742	618	814

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.55	0.53	0.48	0.47	0.44	0.91	3.68	1.12	0.91	1.14	0.77	0.82	12.02
1952	1.54	1.37	.93	.71	.62	.76	2.76	1.07	.94	1.06	.71	.48	12.95
1953	.46	.53	.66	.53	.39	1.63	1.98	1.29	.79	.87	.80	.44	10.35
1954	.46	.49	.62	.45	.47	.74	1.31	1.35	1.29	.78	.47	.72	9.15
1955	1.14	.80	.58	.50	.42	.89	2.16	.91	.81	.42	.42	.35	9.40
1956	.47	.57	.49	.41	.36	.43	1.49	.96	.77	.97	.62	.44	7.98
1957	.41	.49	.44	.35	.33	.60	1.24	1.03	.61	.49	.46	.70	7.15
1958	.59	1.00	.69	.49	.40	.61	1.55	.96	.63	.96	.51	.65	9.04
1959	.64	.69	.42	.40	.36	.62	1.76	1.50	.68	.51	.55	.68	9.01
1960	1.25	1.04	.80	1.03	.63	.64	2.44	3.72	1.41	1.10	1.26	1.02	16.34

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	485	9.71		
1951	1207	4,050	Apr. 14, 1951	227	600	0.885	12.02	714	14.50		
1952	1237	2,500	Apr. 3, 1952	268	644	.950	12.95	555	10.76		
1953	1277	5,650	Mar. 23, 1953	245	518	.764	10.35	514	10.27		
1954	1337	1,520	May 1, 1954	231	458	.676	9.15	505	10.10		
1955	1387	1,570	Apr. 15, 1955	185	468	.690	9.40	419	8.41		
1956	1437	3,000	Apr. 8, 1956	210	398	.587	7.98	388	7.79		
1957	1507	1,480	Apr. 23, 1957	170	358	.528	7.15	405	8.09		
1958	1557	1,500	Apr. 10, 1958	225	451	.685	9.04	425	8.51		
1959	1627	3,400	Apr. 7, 1959	198	450	.664	9.01	517	10.35		
1960	1707	4,340	May 10, 1960	300	814	1.20	16.34	-	-		

## 720. Suamico River at Suamico, Wis.

Location (revised).--Lat 44°37'55", long 88°04'00", in NW¼ sec.22, T.25 N., R.20 E., at highway bridge, 0.6 mile west of Suamico, 3.5 miles upstream from mouth, and 6.3 miles north of Green Bay city limits.

Drainage area.--57.0 sq mi (revised).

Records available.--June 1951 to July 1952.

Gage.--Staff gage. Altitude of gage is 585 ft (from Lake Michigan stage).

Extremes.--1951-52: Maximum discharge, 2,340 cfs Mar. 31, 1952 (gage height, 6.10 ft), from rating curve extended above 600 cfs; maximum gage height, 7.10 ft Mar. 22, 1952 (backwater from ice); minimum discharge observed, 1.4 cfs Aug. 2-5, 1951, and July 29-31, 1952.

Maximum stage known since at least 1920, 12 ft (discharge not determined), from road flooding as indicated by local resident.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	3.55	5.98	7.12	-
1952	68.8	41.7	28.7	10.3	8.69	69.7	170	7.09	6.13	8.69	-	-	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	0.07	0.12	0.14	-
1952	1.39	0.82	0.58	0.21	0.16	1.41	3.32	0.14	0.12	.18	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1951	1207	-	-	-	-	-	-	-	-
1952	1237	2,340	Mar. 31, 1952	-	-	-	-	-	-

## 735. Fox River at Berlin, Wis.

Location.--Lat 43°57'15", long 88°57'10", in NE¼ sec.16, T.17 N., R.13 E., on left bank 0.3 mile downstream from government lock, 1 mile south of Huron Street Bridge in Berlin, 2.5 miles upstream from Barnes Creek, and at mile 89.0.

Drainage area.--1,430 sq mi, approximately.

Records available.--January 1898 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 744.52 ft above mean tide at New York City (by Corps of Engineers). Prior to Oct. 27, 1954, staff gage at site 0.3 mile upstream at same datum.

Average discharge.--62 years (1898-1960), 1,096 cfs.

Extremes.--1898-1960: Maximum discharge observed, 6,900 cfs Mar. 17, 18, 1946 (gage height, 15.5 ft); minimum observed, 248 cfs Sept. 16, 1948 (gage height, 6.1 ft).

Remarks.--About 20 cfs diverted into basin from the Wisconsin River at Portage Canal throughout most of recent years.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	583	563	588	555	577	1,918	3,652	1,983	1,240	996	905	845	1,201
1952	1,188	1,583	1,187	868	820	1,664	3,960	1,242	943	813	791	595	1,302
1953	558	689	756	627	584	2,254	2,569	1,974	868	689	1,654	630	1,159
1954	561	634	693	497	592	750	1,090	1,293	1,073	1,074	626	902	816
1955	2,465	1,297	956	716	659	1,255	1,848	1,265	1,248	737	608	484	1,131
1956	605	778	491	409	398	574	2,796	2,351	1,035	845	951	787	1,001
1957	576	952	718	514	597	911	1,287	1,209	1,330	675	469	485	810
1958	487	787	649	484	468	796	1,009	873	531	490	346	364	590
1959	347	477	378	311	318	529	2,918	1,566	780	563	444	443	755
1960	966	1,803	1,267	1,549	809	714	2,578	3,153	1,402	1,184	1,528	1,186	1,513

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.47	0.44	0.47	0.45	0.42	1.54	2.84	1.60	0.97	0.80	0.73	0.66	11.39
1952	.96	1.24	.96	.70	.62	1.34	3.09	1.00	.74	.66	.64	.46	12.41
1953	.45	.54	.61	.51	.43	1.82	2.00	1.59	.68	.56	1.33	.49	11.01
1954	.45	.49	.56	.40	.43	.60	.85	1.04	.84	.87	.50	.70	7.73
1955	1.99	1.01	.77	.58	.48	1.01	1.44	1.02	.97	.59	.49	.38	10.73
1956	.49	.61	.40	.33	.30	.46	2.18	1.90	.81	.68	.77	.61	9.54
1957	.46	.74	.58	.41	.43	.73	1.00	.97	1.04	.54	.38	.38	7.66
1958	.39	.61	.52	.39	.34	.64	.79	.54	.41	.40	.28	.28	5.59
1959	.28	.37	.30	.25	.23	.43	2.28	1.26	.61	.45	.36	.35	7.17
1960	.78	1.41	1.02	1.25	.61	.58	2.01	2.54	1.09	.95	1.23	.93	14.40

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	910	8.62
1951	1207	a4,020	Apr. 10, 11, 13-16	447	1,201	0.840	11.39	1,387	13.17
1952	1237	a4,900	Apr. 4, 6, 1952	512	1,502	.910	12.41	1,139	10.85
1953	1277	a4,100	Mar. 20, 1953	500	1,159	.810	11.01	1,149	10.91
1954	1337	a1,870	May 3-7, 1954	450	616	.571	7.73	1,055	10.00
1955	1387	a3,020	Oct. 10-12, 1954	367	1,131	.791	10.73	891	8.46
1956	1437	4,000	Apr. 4, 1956	360	1,001	.700	9.54	1,032	9.82
1957	1507	1,690	June 18, 19, 1957	409	810	.566	7.66	783	7.40
1958	1557	1,380	Apr. 10, 1958	290	590	.413	5.59	530	5.02
1959	1627	3,670	Apr. 12, 1959	298	755	.528	7.17	993	9.43
1960	1707	4,100	May 10, 11, 1960	540	1,513	1.06	14.40	-	-

a Maximum daily.

## 755. Wolf River above West Branch Wolf River, Wis.

Location.--Lat 44°56'10", long 88°39'15", in E½ sec.3, T.28 N., R.15 E., near center of span on downstream side of highway bridge, half a mile upstream from West Branch Wolf River, 4 miles north of Keshena, and at mile 140.1.

Drainage area.--633 sq mi.

Records available.--October 1927 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight gage. Datum of gage is 856.57 ft above mean sea level (levels by Wisconsin Power and Light Co.). Prior to Sept. 21, 1956, chain gage at same site and datum.

Average discharge.--33 years (1927-60), 565 cfs.

Extremes.--1927-60: Maximum discharge, 3,120 cfs May 8, 1960 (gage height, 6.60 ft, from graph based on gage readings); minimum observed, 199 cfs Feb. 20, 1936.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	351	365	343	337	358	402	1,533	850	643	768	537	618	592
1952	775	729	534	431	412	427	1,159	723	612	776	548	407	628
1953	355	343	399	326	276	801	1,065	657	570	619	601	318	529
1954	304	300	419	319	312	413	885	908	664	428	329	576	488
1955	634	483	383	372	345	409	1,156	555	630	312	415	311	500
1956	396	463	350	333	305	320	974	562	482	644	463	408	475
1957	319	381	376	289	280	383	768	604	438	338	329	487	416
1958	362	462	319	333	364	427	929	525	412	621	336	422	459
1959	504	513	435	329	306	379	804	665	364	405	559	854	510
1960	1,150	779	542	635	464	412	1,190	1,890	946	594	659	658	828

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.64	0.64	0.62	0.61	0.59	0.73	2.70	1.54	1.14	1.40	0.98	1.09	12.68
1952	1.41	1.28	.97	.78	.70	.78	2.04	1.32	1.08	1.41	1.00	.72	13.49
1953	.65	.60	.73	.59	.45	1.46	1.86	1.20	1.00	1.13	1.10	.56	11.35
1954	.55	.53	.76	.58	.51	.75	1.56	1.65	1.17	.78	.60	1.01	10.45
1955	1.15	.85	.70	.68	.57	.74	2.04	1.01	1.11	.57	.76	.55	10.73
1956	.72	.82	.64	.61	.52	.58	1.72	1.02	.85	1.17	.84	.72	10.21
1957	.58	.67	.68	.52	.46	.70	1.35	1.10	.77	.61	.60	.86	8.90
1958	.66	.81	.58	.61	.60	.78	1.64	.96	.73	1.13	.61	.74	9.85
1959	.92	.90	.79	.60	.50	.69	1.42	1.21	.64	.74	1.02	1.50	10.93
1960	2.10	1.37	.99	1.16	.79	.75	2.10	3.44	1.67	1.08	1.20	1.16	17.81

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	*2,440	Apr. 13, 1951	220	592	0.935	12.68	529	11.31
1952	1237	*1,590	Apr. 21, 1952	363	628	.992	13.49	549	11.81
1953	1277	*2,540	Mar. 24, 1953	237	529	.836	11.35	523	11.21
1954	1337	1,580	Apr. 28, 1954	267	488	.771	10.45	528	11.31
1955	1387	1,450	Apr. 15, 1955	260	500	.790	10.73	476	10.21
1956	1437	1,680	Apr. 7, 1956	270	475	.750	10.21	463	9.96
1957	1507	1,520	Apr. 21, 1957	230	416	.657	8.90	421	9.02
1958	1557	1,300	July 6, 1958	274	459	.725	9.85	485	10.41
1959	1627	1,760	Sept. 30, 1959	246	510	.806	10.93	596	12.78
1960	1707	3,120	May 8, 1960	370	828	1.31	17.81	-	-

\* Revised.

## 770. Wolf River at Keshena Falls, Wis.

Location.--Lat 44°53'30", long 88°39'20", in E½ sec.22, T.28 N., R.15 E., on right bank 500 ft downstream from Keshena Falls, 1.7 miles upstream from Keshena, 3.1 miles downstream from West Branch Wolf River, and at mile 136.4.

Drainage area.--812 sq mi.

Records available.--May 1907 to March 1909, October 1910 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Published as "at Keshena" prior to April 1928.

Gage.--Water-stage recorder. Datum of gage is 820.0 ft above mean sea level (levels by Wisconsin Power and Light Co.). Prior to March 1909, staff gage and February 1911 to March 1928, chain gage, at bridge in Keshena 1.7 miles downstream at datum 4.03 ft lower.

Average discharge.--51 years (1907-8, 1910-60), 757 cfs.

Extremes.--1907-9, 1910-60: Maximum discharge, 4,830 cfs May 7, 1960 (gage height, 9.67 ft), from rating curve extended above 2,500 cfs, instantaneous peak caused when earthfill wall near powerplant was dynamited to relieve pressure on dam; maximum discharge after flow stabilized, 4,430 cfs May 8, 1960 (gage height, 9.36 ft), from rating curve extended above 2,500 cfs; maximum gage height, 13.83 ft Nov. 17, 1943 (backwater from ice); minimum discharge, 91 cfs Dec. 22, 1939 (gage height, 4.67 ft), result of ice storage.

Remarks.--Diurnal fluctuation caused by powerplant upstream.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	495	510	446	442	464	518	1,961	1,066	836	946	661	759	758
1952	946	887	660	528	499	543	1,392	896	804	979	710	500	779
1953	440	481	518	453	360	867	1,295	844	719	736	665	405	650
1954	408	435	564	426	414	533	1,099	1,078	891	586	418	717	631
1955	881	684	528	490	468	564	1,473	726	807	400	516	407	659
1956	525	576	463	423	381	385	1,144	771	610	806	589	503	598
1957	402	535	516	365	390	504	967	799	575	449	391	637	544
1958	465	596	394	454	540	602	1,145	689	531	747	423	534	593
1959	608	640	544	407	376	438	1,011	838	475	488	644	977	621
1960	1,339	957	704	835	611	536	1,476	2,265	1,179	761	917	891	1,041

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.70	0.70	0.63	0.63	0.59	0.74	2.70	1.51	1.15	1.35	0.94	1.04	12.68
1952	1.34	1.22	.94	.75	.66	.77	1.91	1.27	1.10	1.39	1.01	.69	13.05
1953	.62	.66	.74	.64	.46	1.23	1.78	1.20	.99	1.05	.94	.56	10.87
1954	.58	.60	.80	.61	.53	.76	1.51	1.53	1.22	.83	.59	.99	10.55
1955	1.25	.89	.75	.69	.60	.80	2.02	1.03	1.11	.57	.73	.56	11.00
1956	.75	.79	.66	.60	.51	.55	1.57	1.10	.84	1.14	.84	.69	10.04
1957	.57	.73	.73	.52	.50	.72	1.33	1.13	.79	.64	.56	.88	9.10
1958	.66	.82	.56	.65	.69	.85	1.57	.98	.73	1.06	.60	.73	9.90
1959	.86	.68	.77	.58	.48	.62	1.39	1.19	.65	.69	.91	1.34	10.36
1960	1.90	1.31	1.00	1.18	.81	.76	2.03	3.22	1.62	1.08	1.30	1.22	17.43

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	882	11.41
1951	1207	3,590	Apr. 13, 1951	377	758	0.933	12.68	846	14.15
1952	1237	2,080	Apr. 20, 1952	413	779	.959	13.05	691	11.57
1953	1277	2,500	Mar. 24, 1953	331	650	.800	10.87	648	10.83
1954	1337	1,890	Apr. 29, 1954	331	631	.777	10.55	685	11.46
1955	1387	1,920	Apr. 7, 1955	321	659	.812	11.00	617	10.31
1956	1437	1,730	Apr. 10, 1956	310	598	.736	10.04	589	9.87
1957	1507	2,070	Apr. 21, 1957	280	544	.670	9.10	544	9.11
1958	1557	1,600	Apr. 6, 1958	302	593	.730	9.90	621	10.37
1959	1627	1,990	Sept. 30, 1959	293	621	.765	10.36	723	12.06
1960	1707	4,830	May 7, 1960	470	1,041	1.28	17.43	-	-

a Result of release when part of earthfill dam above was removed to relieve pressure on powerplant and dam.

## 785. Embarrass River near Embarrass, Wis.

Location.--Lat 44°43'30", long 88°44'10", in SW $\frac{1}{4}$  sec.18, T.26 N., R.15 E., on left bank 10 ft downstream from highway bridge,  $1\frac{1}{4}$  miles downstream from Mill Creek, and 4 miles northwest of Embarrass.

Drainage area.--395 sq mi.

Records available.--June 1919 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 800 ft (from survey level line in vicinity). Prior to Aug. 23, 1938, chain gage on downstream side of bridge at same datum.

Average discharge.--41 years (1919-60), 283 cfs.

Extremes.--1919-60: Maximum discharge, 6,920 cfs Apr. 10, 1922 (gage height, 11.6 ft, from graph based on gage readings), from rating curve extended above 2,800 cfs; minimum observed, 23 cfs Aug. 3, 6, 7, 1931.

Remarks.--Slight diurnal fluctuation caused by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	112	114	105	98.9	86.2	255	1,308	340	265	290	174	226	281
1952	433	387	217	151	149	209	1,164	265	292	592	178	124	346
1953	116	138	133	122	96.5	669	638	274	189	293	330	116	261
1954	110	126	128	89.4	133	220	494	351	415	159	103	213	211
1955	402	224	145	104	93.4	253	767	302	356	118	120	85.4	247
1956	137	154	106	87.0	79.8	102	803	377	211	269	145	110	215
1957	100	164	131	79.6	73.1	193	432	309	195	92.9	78.3	110	163
1958	97.9	214	129	91.8	77.5	151	412	200	142	115	78.1	170	156
1959	115	153	68.1	52.8	57.8	180	684	421	147	99.2	127	226	194
1960	389	289	295	345	168	200	748	1,140	351	221	284	327	397

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.33	0.32	0.31	0.29	0.23	0.74	3.69	0.99	0.75	0.85	0.51	0.64	9.65
1952	1.26	1.09	.63	.44	.41	.61	3.29	.77	.82	1.73	.52	.35	11.92
1953	.34	.39	.39	.36	.25	1.95	1.80	.80	.53	.85	.96	.33	8.95
1954	.32	.35	.37	.26	.35	.64	1.40	1.03	1.17	.46	.30	.60	7.25
1955	1.17	.63	.42	.30	.25	.74	2.17	.88	1.01	.34	.35	.24	8.50
1956	.40	.44	.31	.25	.22	.30	2.27	1.10	.60	.79	.42	.31	7.41
1957	.29	.46	.38	.23	.19	.56	1.22	.90	.55	.27	.23	.31	5.59
1958	.29	.60	.38	.27	.20	.44	1.16	.58	.40	.33	.23	.48	5.36
1959	.34	.43	.20	.15	.15	.52	1.93	1.23	.42	.29	.37	.64	6.67
1960	1.13	.82	.86	1.01	.46	.58	2.11	3.33	.99	.65	.83	.92	13.69

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	241	8.29
1951	1207	3,070	Apr. 9, 1951	60	281	0.711	9.65	340	11.67	
1952	1237	4,170	Apr. 2, 1952	92	345	.876	11.92	292	10.06	
1953	1277	3,970	Mar. 23, 1953	74	261	.661	8.95	259	8.87	
1954	1337	1,120	Apr. 28, 1954	67	211	.534	7.25	246	8.43	
1955	1387	1,340	Apr. 1, 1955	48	247	.625	8.50	216	7.43	
1956	1437	3,000	Apr. 5, 1956	68	215	.544	7.41	215	7.39	
1957	1507	1,310	Apr. 21, 1957	44	163	.413	5.59	167	5.73	
1958	1557	1,160	Apr. 8, 1958	45	156	.395	5.36	147	5.06	
1959	1627	2,320	Apr. 5, 1959	35	194	.491	6.67	248	8.51	
1960	1707	4,890	May 7, 1960	110	397	1.01	13.69	-	-	



## 790. Wolf River at New London, Wis.

Location.--Lat 44°23'30", long 88°44'25", in SE<sup>1</sup> sec.12, T.22 N., R.14 E., on right bank 100 ft downstream from Pearl Street Bridge in New London, 0.2 mile downstream from Embarrass River, and at mile 56.3.

Drainage area.--2,240 sq mi, approximately.

Records available.--March 1896 to September 1960. Prior to October 1913 monthly discharge only, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 749.37 ft above mean sea level (levels by Corps of Engineers). Prior to Oct. 4, 1951, staff gage at same site and datum.

Average discharge.--64 years (1896-1960) 1,706 cfs.

Extremes.--1896-1960: Maximum daily discharge, 15,500 cfs Apr. 13, 1922; minimum daily, 150 cfs Mar. 1, 1900.  
Maximum stage known, 11.6 ft Apr. 16, 1888, from information by Corps of Engineers.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	798	762	722	720	696	1,029	7,099	2,796	1,682	1,799	1,141	1,317	1,711
1952	2,181	2,212	1,718	1,087	1,019	1,369	7,443	2,130	1,528	2,555	1,291	831	2,110
1953	708	781	853	753	558	3,217	4,560	2,503	1,158	1,208	1,577	698	1,553
1954	661	689	838	632	753	1,195	2,133	2,715	2,223	1,336	778	1,219	1,265
1955	2,831	1,523	1,085	836	750	1,759	4,684	1,864	1,695	769	759	595	1,597
1956	749	957	754	679	664	713	4,478	2,057	1,256	1,648	1,104	835	1,322
1957	692	851	771	649	626	960	2,011	2,098	1,286	683	510	944	1,007
1958	759	1,263	942	736	752	1,357	2,459	1,467	921	1,129	575	1,025	1,115
1959	937	1,033	711	523	547	878	4,649	2,400	1,186	897	913	1,292	1,329
1960	2,309	2,609	1,616	2,149	1,107	1,084	4,700	7,452	2,684	1,709	1,593	1,901	2,580

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.41	0.38	0.37	0.37	0.32	0.53	3.54	1.44	0.84	0.93	0.59	0.66	10.38
1952	1.12	1.10	.88	.56	.49	.70	3.71	1.10	.76	1.31	.65	.41	12.80
1953	.36	.39	.44	.39	.26	1.66	2.27	1.29	.58	.62	.81	.35	9.42
1954	.34	.34	.43	.33	.35	.62	1.06	1.40	1.11	.69	.40	.61	7.68
1955	1.46	.76	.56	.43	.35	.91	2.33	.96	.84	.40	.39	.30	9.69
1956	.39	.48	.39	.35	.32	.37	2.23	1.06	.63	.85	.57	.42	8.06
1957	.36	.42	.40	.33	.29	.49	1.00	1.08	.64	.35	.26	.47	6.09
1958	.39	.63	.48	.38	.35	.70	1.22	.76	.46	.58	.30	.51	6.76
1959	.48	.51	.37	.27	.25	.45	2.32	1.24	.59	.46	.47	.64	8.05
1960	1.19	1.30	.83	1.11	.53	.56	2.34	3.84	1.34	.88	.82	.95	15.69

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean
		Discharge	Date					
1950	-	-	-	-	-	-	-	1,454
1951	1207	*10,500	Apr. 14, 1951*	580	1,711	0.764	10.38	2,032
1952	1237	15,200	Apr. 5, 1952	688	2,110	.942	12.80	1,795
1953	1277	10,400	Mar. 26, 1953	530	1,553	.693	9.42	1,340
1954	1337	3,980	May 6, 1954	562	1,265	.565	7.68	1,339
1955	1387	5,830	Apr. 9, 1955	481	1,597	.713	9.69	1,346
1956	1437	7,470	Apr. 9, 1956	620	1,322	.590	8.06	1,310
1957	1507	3,320	Apr. 28, 1957	416	1,007	.450	6.09	1,061
1958	1557	3,210	Apr. 14, 1958	380	1,115	.498	6.76	1,092
1959	1627	7,840	Apr. 8, 1959	500	1,329	.594	8.05	1,652
1960	1707	13,300	May 12, 1960	820	2,580	1.15	15.69	-

\* Revised.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 800. Little Wolf River at Royalton, Wis.

Location.--Lat 44°24'45", long 88°51'55", in NE $\frac{1}{4}$  (revised) sec.1, T.22 N., R.13 E., on right bank 50 ft upstream from highway bridge in Royalton and 6 miles upstream from mouth.

Drainage area.--514 sq mi (revised).

Records available.--January 1914 to September 1960.

Gage.-- Water-stage recorder. Datum of gage is 774.00 ft above mean sea level, datum of 1929. Prior to Aug. 20, 1915, chain gage at highway bridge at datum 0.75 ft lower. Aug. 20, 1915, to Apr. 23, 1934, staff gage at present site and datum.

Average discharge.--46 years (1914-60), 398 cfs.

Extremes.--1914-60: Maximum discharge, 6,950 cfs Mar. 30, 1943 (gage height, 8.00 ft), from rating curve extended above 3,500 cfs; maximum gage height, 11.95 ft Mar. 28, 1950 (backwater from ice); minimum discharge, 52 cfs Nov. 26, 1958 (gage height, 0.75 ft), result of freezeup.

Remarks.--Frequent fluctuation caused by powerplant 6 miles above station.

Correction.--In WSP 384 and 1307 the April and calendar year mean and runoff data are listed in error; they should be:

Month	Mean	Per square mile	Runoff in inches
April 1914.....	536	1.04	1.16
Calendar year.....	413	.803	10.91

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	171	179	156	150	159	318	1,386	424	348	357	241	214	342
1952	434	452	291	250	239	386	1,571	344	278	345	201	171	412
1953	169	195	173	172	161	925	748	406	214	219	294	169	322
1954	167	185	203	151	203	279	465	406	470	239	187	304	271
1955	799	355	240	178	163	334	872	343	386	164	154	131	344
1956	192	224	163	150	152	184	1,080	469	275	303	205	178	297
1957	163	231	197	138	152	266	509	415	235	153	153	168	230
1958	155	264	180	134	195	231	367	232	184	144	120	216	201
1959	158	161	95.8	98.4	111	166	905	482	215	171	195	234	249
1960	419	344	370	402	185	272	778	1,216	386	290	245	386	442

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.38	0.39	0.35	0.34	0.32	0.71	3.01	0.95	0.76	0.80	0.54	0.46	9.01
1952	.97	.98	.65	.56	.50	.87	3.41	.77	.60	.77	.45	.37	10.90
1953	.38	.42	.39	.38	.35	2.07	1.62	.91	.46	.49	.66	.37	8.48
1954	.38	.40	.46	.34	.41	.63	1.01	.91	1.02	.54	.42	.66	7.18
1955	1.79	.77	.54	.40	.33	.75	1.89	.77	.84	.37	.35	.28	9.08
1956	.43	.49	.37	.34	.32	.41	2.35	1.05	.60	.68	.46	.39	7.89
1957	.36	.50	.44	.31	.31	.60	1.10	.93	.51	.34	.30	.36	6.06
1958	.35	.57	.40	.30	.39	.52	.80	.52	.40	.32	.27	.47	5.31
1959	.35	.35	.21	.22	.23	.37	1.96	1.08	.47	.38	.44	.51	6.57
1960	.94	.75	.83	.90	.39	.61	1.69	2.73	.84	.65	.55	.84	11.72

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	325	8.58
1951	1207	2,860	Apr. 9, 1951	116	342	0.665	9.01	398	10.49
1952	1237	5,690	Apr. 2, 1952	140	412	.802	10.90	359	9.49
1953	1277	4,840	Mar. 23, 1953	127	321	.626	8.48	323	8.53
1954	1337	1,010	Mar. 15, 1954	100	271	.527	7.18	342	9.04
1955	1387	2,890	Oct. 3, 1954	88	344	.669	9.08	275	7.27
1956	1437	6,000	Apr. 5, 1956	97	297	.578	7.89	298	7.90
1957	1507	1,080	Apr. 21, 1957	94	230	.447	6.06	231	6.08
1958	1557	1,150	Sept. 6, 1958	77	201	.391	5.31	186	4.90
1959	1627	4,000	Apr. 5, 1959	55	249	.484	6.57	309	8.18
1960	1707	4,260	May 8, 1960	110	442	.860	11.72	-	-

## 810. Waupaca River near Waupaca, Wis.

Location.--Lat 44°19'50", long 88°59'45", on north line of sec.1, T.21 N., R.12 E., on right bank 10 ft downstream from highway bridge, 4 miles upstream from Weyauwega Lake dam, 4½ miles southeast of Waupaca, and about 5 miles downstream from Crystal River.

Drainage area.--305 sq mi.

Records available.--June 1916 to September 1960. Published as "near Weyauwega" June 1916 to October 1917.

Gage.--Water-stage recorder. Altitude of gage is 780 ft (from survey level line along railroad). Prior to Oct. 19, 1917, chain gage at site 1 mile downstream at different datum. Oct. 19, 1917, to Nov. 23, 1938, chain gage on bridge at present site and datum.

Average discharge.--44 years (1916-60), 238 cfs.

Extremes.--1916-60: Maximum discharge, 2,520 cfs Mar. 20, 1948 (gage height, 6.90 ft); maximum gage height, 8.06 ft Mar. 28, 1950 (backwater from ice); minimum discharge, 38 cfs July 7, 1947; minimum daily, 50 cfs Jan. 22, 28, 1926.

Remarks.--Considerable diurnal fluctuation caused by powerplants above station.

Correction.--In WSP 1084 and 1307, the monthly and yearly totals and runoff data are listed in error; they should be:

Month	Cfs-days	Mean	Per square mile	Runoff in inches
March 1938.....	14,492	467	1.53	1.77
September.....	18,300	610	2.00	2.23
Water year 1937-38.....	104,501	286	.938	12.74
Calendar year 1938.....	113,753	312	1.02	13.87

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	175	172	165	151	166	263	425	240	223	221	204	198	217
1952	240	249	196	209	204	240	465	230	217	209	182	155	233
1953	166	184	189	178	164	412	303	241	197	177	179	154	212
1954	158	167	168	146	222	191	221	202	220	170	162	208	186
1955	301	216	193	173	180	273	283	208	205	156	157	144	208
1956	165	192	157	138	140	190	425	233	198	191	185	173	199
1957	162	187	170	139	159	205	217	200	169	158	142	156	172
1958	157	188	180	145	150	188	198	156	143	138	124	150	160
1959	141	147	130	112	111	177	356	208	147	142	142	145	163
1960	192	189	233	221	142	191	262	355	206	183	183	221	215

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.66	0.63	0.62	0.57	0.57	0.99	1.55	0.91	0.82	0.84	0.77	0.72	9.65
1952	.91	.91	.74	.79	.72	.91	1.70	.87	.79	.79	.69	.57	10.39
1953	.65	.67	.71	.67	.56	1.56	1.11	.91	.72	.67	.68	.56	9.45
1954	.60	.61	.63	.55	.76	.72	.81	.76	.81	.64	.61	.76	8.26
1955	1.14	.79	.73	.65	.61	1.03	1.03	.78	.75	.59	.59	.53	9.22
1956	.62	.70	.59	.52	.50	.72	1.55	.88	.72	.72	.70	.63	8.85
1957	.61	.68	.64	.52	.54	.77	.79	.76	.62	.60	.54	.57	7.64
1958	.59	.69	.68	.54	.51	.71	.72	.59	.52	.52	.47	.55	7.09
1959	.53	.54	.49	.42	.38	.67	1.30	.79	.54	.54	.54	.53	7.27
1960	.73	.69	.88	.85	.50	.72	.96	1.34	.75	.69	.69	.81	9.59

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	225	10.00
1951	1207	740	Apr. 8, 1951	130	217	0.711	9.65	232	10.30
1952	1237	1,440	Apr. 2, 1952	141	233	.764	10.39	221	9.84
1953	1277	1,680	Mar. 23, 1953	140	212	.695	9.45	209	9.28
1954	1337	455	June 1, 1954	103	186	.610	8.26	204	9.13
1955	1387	950	Oct. 4, 1954	128	208	.682	9.22	191	8.47
1956	1437	1,650	Apr. 5, 1956	125	199	.652	8.85	199	8.87
1957	1507	353	Apr. 21, 1957	120	172	.564	7.64	172	7.67
1958	1557	375	Apr. 6, 1958	101	160	.525	7.09	150	6.69
1959	1627	1,250	Apr. 1, 1959	102	163	.534	7.27	180	8.01
1960	1707	1,180	Dec. 28, 1959	120	215	.705	9.59	-	-

## 830. West Branch Fond du Lac River at Fond du Lac, Wis.

Location.--Lat 43°45'45", long 88°29'00", on line between secs. 17 and 20, T.15 N., R.17 E., on left bank 25 ft upstream from highway bridge, 0.7 mile west of Fond du Lac, and 2.5 miles upstream from confluence with East Branch.

Drainage area.--84.5 sq mi (revised).

Records available.--March 1939 to October 1954. May 20 to July 31, 1903, gage heights and discharge measurements only.

Gage.--Water-stage recorder. Datum of gage is 766.78 ft above mean sea level (Corps of Engineers bench mark).

Average discharge.--15 years (1939-54), 32.3 cfs.

Extremes.--1939-54: Maximum daily discharge, 1,390 cfs Mar. 27, 1943; no flow for many days in most years.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.96	0.43	0.56	0.41	9.08	172	284	80.4	13.5	3.47	0.51	1.27	47.2
1952	31.2	32.2	17.6	29.7	13.9	273	262	17.1	6.21	29.7	54.4	.57	64.1
1953	0	.56	1.44	1.57	36.5	256	73.1	76.1	2.63	.29	3.20	.07	37.9
1954	0	0	0	0	.82	2.79	12.4	11.1	8.74	7.08	.08	1.23	3.69
1955	117	-	-	-	-	-	-	-	-	-	-	-	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.01	0.006	0.008	0.006	0.11	2.54	3.75	1.10	0.18	0.05	0.007	0.02	7.59
1952	.45	.45	.24	.41	.18	3.73	3.46	.23	.08	.41	.74	.008	10.55
1953	0	.007	.02	.02	.45	3.50	.96	1.04	.03	.004	.04	.009	6.07
1954	0	0	0	0	.01	.04	.16	.15	.12	.10	.001	.02	.60
1955	1.59	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	19.9	3.19
1951	1207	741	May 3, 1951	0	47.2	0.559	7.59	53.9	8.66
1952	1237	894	Mar. 24, 1952	0	64.1	.759	10.35	57.5	9.28
1953	1277	1,040	Mar. 17, 1953	0	37.9	.449	6.07	37.7	6.04
1954	1337	56	Apr. 24, 1954	0	3.69	.044	.60	-	-

## 835. East Branch Fond du Lac River at Fond du Lac, Wis.

Location.--Lat 43°45'15", long 88°27'10", in SW $\frac{1}{4}$  sec.22, T.15 N., R.17 E., on left bank at highway bridge, 0.1 mile west of U.S. Highway 41, 0.5 mile south of Fond du Lac, and 2.5 miles upstream from confluence with West Branch.

Drainage area.--77.9 sq mi (revised).

Records available.--March 1939 to October 1954. May 20 to July 25, 1903, gage heights and discharge measurements only.

Gage.--Water-stage recorder. Datum of gage is 762.82 ft above mean sea level (Corps of Engineers bench mark).

Average discharge.--15 years (1939-54), 32.0 cfs.

Extremes.--1939-54: Maximum discharge, 2,140 cfs June 23, 1940 (gage height, 5.87 ft); maximum gage height, 10.74 ft Mar. 16, 1943 (ice jam), from floodmarks; no flow Jan. 17-29, 1940; Jan. 3, Oct. 12, 1949, July 12, 1950.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	4.75	2.94	3.18	2.32	15.7	214	281	62.4	24.2	12.0	6.28	6.53	53.0
1952	44.5	30.6	21.9	41.4	19.8	204	159	20.0	9.73	51.5	41.9	5.60	54.3
1953	5.77	7.55	9.90	9.71	76.0	137	48.0	64.9	8.05	3.45	34.8	5.13	34.0
1954	4.00	3.55	2.22	.80	5.29	8.38	10.9	7.65	8.04	8.57	1.60	3.83	5.39

Monthly and yearly runoff, in inches, of East Branch Fond du Lac River at Fond du Lac, Wis.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951*	0.07	0.04	0.05	0.03	0.21	3.17	4.02	0.92	0.35	0.18	0.09	0.09	9.22
1952	.66	.44	.32	.61	.27	3.01	2.28	.30	.14	.76	.62	.08	9.49
1953	.09	.11	.15	.14	1.02	2.03	.69	.96	.12	.05	.52	.07	5.95
1954	.06	.05	.03	.01	.07	.12	.16	.11	.12	.13	.02	.05	.93

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	22.2	3.87
1951	1207	899	Apr. 26, 1951	1.8	53.0	0.680	9.22	60.2	10.48
1952	1237	864	Mar. 21, 1952	5.1	54.3	.697	9.49	48.2	8.42
1953	1277	745	Mar. 15, 1953	1.0	34.0	.436	5.95	32.9	5.74
1954	1337	110	July 7, 1954	.8	5.39	.069	.93	-	-

845. Fox River at Rapide Croche Dam, near Wrightstown, Wis.

Location.--Lat 44°19'00", long 88°11'50", in SE $\frac{1}{4}$  sec. 4, T.21 N., R.19 E., at Rapide Croche Dam, 2 miles upstream from Wrightstown and 18 miles upstream from mouth.

Drainage area.--6,150 sq mi, approximately.

Records available.--March 1896 to September 1917 (monthly discharge only), October 1917 to September 1960.

Gage.--Recording headwater and tailwater gages and since 1925, electric generation data are used to compute the discharge records.

Average discharge.--64 years (1896-1960), 4,172 cfs (corrected).

Extremes.--1918-60: Maximum daily discharge, 24,000 cfs Apr. 18, 1952; minimum daily, 138 cfs Aug. 2, 1936.

Remarks.--Flow regulated by storage in Lake Winnebago pool, area 263 sq mi at elevation of Menasha Dam crest. Daily discharge determined from records of flow through turbines, head, gate openings, and lockages through navigation canal. About 20 cfs diverted into basin from Wisconsin River at Portage Canal throughout most of recent years.

Cooperation.--Figures of daily discharge furnished by Corps of Engineers. Records reviewed by Geological Survey.

Correction.--In WSP 744 and 1307, the water year minimum day for 1933 is listed in error; it should be 224 cfs. In WSP 1307, the mean monthly for April 1916, the 1916 water year mean, and the 1916 calendar year mean are listed in error; they should be 13,140 cfs, 6,450 cfs, and 6,490 cfs, respectively.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2,263	2,698	3,034	3,278	3,090	3,867	13,160	7,599	3,773	3,487	2,524	2,511	4,269
1952	3,701	5,100	5,790	4,882	5,422	5,591	17,230	4,144	3,021	3,934	2,784	2,139	5,277
1953	1,629	2,134	3,331	3,461	3,745	5,979	9,405	6,549	2,965	4,07	2,841	2,140	3,880
1954	1,719	2,242	3,141	3,042	2,898	2,325	1,590	2,949	4,020	3,507	2,066	2,223	2,643
1955	8,348	4,695	5,093	4,380	3,625	3,787	6,479	4,774	3,785	2,805	2,115	1,539	4,292
1956	1,604	2,559	3,011	2,571	2,388	3,021	5,903	6,512	3,499	3,183	3,477	2,740	3,374
1957	2,193	2,559	3,180	3,801	3,356	2,510	2,046	3,365	4,474	2,383	1,879	1,615	2,777
1958	1,440	2,239	3,155	3,625	3,198	2,524	1,868	1,982	1,515	1,426	1,177	1,325	2,102
1959	1,448	1,528	1,562	2,075	2,704	4,521	7,027	5,336	3,501	1,946	1,724	1,751	2,925
1960	3,266	5,656	5,040	7,831	4,350	3,909	6,182	20,160	6,794	4,049	4,556	4,825	6,403

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Maximum day		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	3,490	-
1951	1207	20,400	Apr. 26, 1951	1,860	4,269	-	-	4,823	-
1952	1237	24,000	Apr. 18, 1952	1,730	5,277	-	-	4,850	-
1953	1277	12,000	Apr. 22, 1953	1,150	3,880	-	-	3,880	-
1954	1337	5,530	June 28, 1954	1,180	2,643	-	-	3,573	-
1955	1387	12,800	Oct. 8, 1954	1,190	4,292	-	-	3,367	-
1956	1437	10,900	May 14, 1956	1,250	3,374	-	-	3,439	-
1957	1507	5,830	May 29, 1957	1,350	2,777	-	-	2,684	-
1958	1557	4,220	Jan. 3, 1958	728	2,102	-	-	1,908	-
1959	1627	11,600	May 1, 1959	966	2,923	-	-	3,713	-
1960	1707	23,600	May 18, 20, 1960	1,820	6,403	-	-	-	-

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 860. Sheboygan River at Sheboygan, Wis.

Location.--Lat 43°44'25", long 87°45'35", in E $\frac{1}{2}$  sec. 29, T.15 N., R.23 E., on left bank 0.7 mile upstream from bridge on State Highway 28, near west city limits of Sheboygan, and 4.2 miles upstream from mouth.

Drainage area.--432 sq mi (revised).

Records available.--June 1916 to September 1924 (published as "near Sheboygan"), October 1950 to September 1960. Monthly discharge only for October, November 1950, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 584.00 ft above mean sea level, datum of 1929. June 1916 to June 1924 chain gage at site 0.7 mile downstream at different datum. November 1950 to June 1951 staff gage at site 0.3 mile downstream at datum 3.15 ft lower.

Average discharge.--18 years (1916-24, 1950-60), 236 cfs.

Extremes.--1916-24, 1950-60: Maximum discharge observed, 7,140 cfs Mar. 26, 1920 (gage height, 9.40 ft, datum then in use); minimum observed, about 1 cfs Aug. 27, 1922 (gage height, 1.48 ft, datum then in use), caused by shutdown of powerplants.

Remarks.--Diurnal fluctuation caused by numerous powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*35.0	*31.7	51.8	49.2	157	*1,083	1,707	264	111	83.4	54.7	45.8	*303
1952	349	411	176	261	221	1,054	960	117	73.9	420	150	51.9	354
1953	42.5	65.9	110	75.8	306	874	379	370	81.3	50.0	42.1	25.4	202
1954	30.7	41.2	49.5	35.6	95.1	111	175	112	281	111	34.9	51.3	95.2
1955	495	144	101	118	121	427	720	207	251	96.8	60.0	25.7	231
1956	35.9	39.0	41.0	32.8	43.6	216	543	520	98.3	113	251	286	185
1957	56.9	92.8	94.6	53.0	114	193	319	227	186	46.1	20.1	24.3	119
1958	29.5	56.2	37.4	31.1	20.9	129	142	41.5	25.2	19.8	11.2	20.3	47.1
1959	31.9	42.6	19.7	17.1	22.4	344	1,583	143	56.0	36.6	32.2	34.8	196
1960	142	186	378	370	89.6	460	1,003	1,027	133	97.9	116	369	367

\* Revised.

\* Not previously published; estimated on basis of weather records and records for nearby stations.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*0.09	*0.08	0.14	0.13	0.58	*2.89	4.41	0.70	0.29	0.22	0.15	0.12	*9.60
1952	.93	1.06	.47	.70	.55	2.81	2.48	.31	.19	1.12	.40	.13	11.15
1953	.11	.17	.29	.20	.74	2.33	.98	.99	.21	.13	.11	.07	6.33
1954	.08	.11	.13	.09	.22	.30	.45	.30	.73	.30	.09	.13	2.93
1955	1.32	.37	.27	.32	.29	1.14	1.86	.55	.65	.26	.16	.07	7.26
1956	.10	.10	.11	.09	.11	.58	1.40	1.39	.25	.30	.67	.74	5.84
1957	.15	.24	.25	.14	.28	.52	.82	.61	.48	.12	.05	.06	3.72
1958	.08	.15	.10	.08	.05	.34	.37	.11	.07	.05	.03	.05	1.48
1959	.09	.11	.05	.05	.05	.92	4.09	.38	.14	.10	.09	.09	6.16
1960	.38	.48	1.01	.99	.22	1.23	2.59	2.74	.34	.26	.31	1.00	11.55

\* Revised.

\* Not previously published; estimated on basis of weather records and records for nearby stations.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	1207	*4,310	Mar. 30, 1951	*18	*305	*0.701	*9.60	*374	*11.75	
1952	1237	*3,780	July 20, 1952	35	354	.819	11.15	294	9.26	
1953	1277	1,830	Mar. 13, 1953	12	202	.468	6.33	194	6.08	
1954	1337	1,320	June 22, 1954	18	93.2	.216	2.93	145	4.57	
1955	1387	*4,010	Apr. 25, 1955	12	231	.535	7.26	178	5.61	
1956	1437	*2,870	May 6, 1956	23	185	.428	5.84	196	6.17	
1957	1507	894	Apr. 7, 1957	10	119	.275	3.72	108	3.41	
1958	1557	379	Apr. 7, 1958	5.3	47.1	.109	1.48	44.7	1.40	
1959	1627	4,790	Apr. 3, 1959	13.4	196	.454	6.18	247	7.78	
1960	1707	6,300	Mar. 30, 1960	38	367	.850	11.55	-	-	

\* Revised.

\* Not previously published.

865. Cedar Creek near Cedarburg, Wis.

Location.--Lat 43°19'25", long 87°58'50", on line between secs. 14 and 23, T.10 N., R.21 E., on upstream side of highway bridge, 2 miles north of Cedarburg and 6 miles upstream from mouth.

Drainage area.--121 sq mi (revised).

Records available.--August 1930 to September 1960.

Gage.--Wire-weight gage. Altitude of gage is 790 ft (from topographic map). Prior to June 11, 1958, chain gage.

Average discharge.--30 years (1930-60), 62.7 cfs.

Extremes.--1930-60: Maximum discharge, about 3,600 cfs Mar. 30, 1960 (gage height, 12.25 ft, from graph based on gage readings, backwater from ice); minimum observed, 0.2 cfs Aug. 9-12, 1936.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	13.3	11.7	17.6	17.9	52.6	299	366	91.6	28.0	27.4	17.3	23.1	80.3
1952	191	206	62.0	134	89.5	459	286	50.8	36.0	298	64.4	27.5	159
1953	24.4	33.6	45.8	40.5	113	140	111	180	186	17.3	14.0	9.10	75.9
1954	9.68	11.5	19.9	10.6	23.5	26.9	57.7	31.6	209	92.6	37.4	39.4	47.3
1955	306	48.6	36.5	74.4	62.4	235	206	114	205	39.0	12.5	8.41	113
1956	11.9	18.4	11.5	9.89	12.6	61.3	90.3	138	24.2	59.4	49.7	36.7	43.8
1957	11.3	19.2	23.0	21.6	38.8	53.4	99.6	57.4	67.4	18.5	6.75	6.27	35.1
1958	7.79	15.9	13.7	12.6	25.5	82.9	38.9	14.0	13.5	6.34	3.46	7.89	20.2
1959	13.7	17.8	5.54	4.95	5.32	153	453	42.9	9.63	8.15	7.60	7.93	60.5
1960	30.2	40.5	60.3	134	28.1	194	306	230	66.1	57.9	106	207	122

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.13	0.11	0.17	0.17	0.45	2.85	3.37	0.87	0.26	0.26	0.16	0.21	9.01
1952	1.82	1.90	.59	1.27	.80	4.38	2.84	.48	.33	2.84	.61	.25	17.91
1953	.23	.31	.44	.39	.97	1.54	1.02	1.72	1.72	.16	.13	.08	8.51
1954	.09	.11	.19	.10	.20	.26	.53	.30	1.92	.88	.36	.36	5.30
1955	2.92	.45	.35	.71	.54	2.24	1.90	1.09	1.89	.37	.12	.08	12.66
1956	.11	.17	.11	.09	.11	.58	.83	1.31	.22	.57	.47	.34	4.91
1957	.11	.18	.22	.21	.33	.51	.92	.55	.62	.18	.06	.06	5.95
1958	.07	.15	.13	.12	.22	.79	.36	.13	.12	.08	.03	.07	2.25
1959	.13	.16	.05	.05	.05	1.45	4.18	.41	.09	.08	.07	.07	6.79
1960	.29	.37	.57	1.27	.25	1.85	2.82	2.19	.61	.55	1.01	1.91	13.69

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	71.8	8.08
1951	1207	1,470	Mar. 30, 1951	8.0	80.3	0.664	9.01	115	12.91
1952	1237	3,500	Mar. 20, 1952	23	159	1.31	17.91	130	14.58
1953	1277	1,540	June 6, 1953	7.0	75.9	.627	8.51	70.6	7.92
1954	1337	1,000	June 23, 1954	7.0	47.3	.391	5.30	76.9	8.63
1955	1387	1,920	Oct. 4, 1954	6.1	113	.934	12.66	83.1	9.33
1956	1437	433	July 13, 1956	8.8	43.8	.362	4.91	44.8	5.03
1957	1507	273	May 31, 1957	5.2	35.1	.290	3.95	33.7	3.79
1958	1557	180	Mar. 1, 1958	1.4	20.2	.167	2.25	20.1	2.24
1959	1627	3,400	Apr. 1, 1959	3.2	60.5	1.500	6.79	68.5	7.68
1960	1707	3,600	Mar. 30, 1960	9.0	122	1.01	13.69	-	-

## 870. Milwaukee River at Milwaukee, Wis.

Location.--Lat 43°06'00", long 87°54'30", in NW¼ sec.5, T.7 N., R.22 E., on left bank near north limits of Milwaukee, 2,000 ft downstream from Port Washington Road Bridge and 6 miles upstream from mouth.

Drainage area.--686 sq mi (revised).

Records available.--April 1914 to September 1960. Published as "near Milwaukee" prior to 1936.

Gage.--Water-stage recorder. Datum of gage is 607.3 ft above mean sea level, adjustment of 1912. Prior to Apr. 6, 1929, staff or chain gage near present site at different datum. Apr. 6, 1929, to Jan. 8, 1934, chain gage at bridge half a mile upstream at different datum.

Average discharge.--46 years (1914-60), 387 cfs.

Extremes.--1914-60: Maximum discharge, 15,100 cfs Mar. 20, 1918, Aug. 6, 1924 (gage height, 9.00 ft, datum then in use, from floodmark for 1918, from graph based on gage readings for 1924); no flow Sept. 8, 1943.

Remarks.--Occasional regulation caused by dams above station since 1935.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	78.7	80.3	101	96.8	318	1,560	2,183	579	209	181	146	133	471
1952	672	824	359	659	455	2,022	1,468	349	208	1,200	421	154	735
1953	149	207	309	209	520	954	534	803	537	106	189	78.8	382
1954	76.7	95.3	110	71.6	201	188	340	247	837	460	142	152	242
1955	1,040	284	258	338	262	732	1,159	480	777	187	102	653	474
1956	104	114	91.4	79.0	92.6	378	682	1,024	174	376	263	299	308
1957	111	198	169	110	195	325	526	397	366	114	60.2	67.8	219
1958	79.3	184	87.6	77.5	68.4	220	257	86.4	96.6	57.9	57.4	83.1	112
1959	93.8	126	55.5	45.8	47.4	675	2,615	257	90.7	96.6	65.3	95.8	353
1960	285	366	457	552	196	702	1,708	1,450	361	326	606	748	647

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.13	0.13	0.17	0.16	0.48	2.62	3.55	0.97	0.34	0.30	0.25	0.22	9.32
1952	1.13	1.34	.60	1.11	.72	3.40	2.39	.59	.34	2.02	.71	.25	14.60
1953	.25	.34	.52	.35	.79	1.60	.87	1.35	.87	.18	.32	.13	7.57
1954	.13	.15	.19	.12	.30	.32	.55	.41	1.36	.77	.24	.25	4.79
1955	1.75	.46	.43	.57	.40	1.23	1.88	.81	1.26	.31	.17	.11	9.58
1956	.17	.19	.15	.13	.15	.64	1.11	1.72	.28	.63	.44	.49	6.10
1957	.19	.32	.28	.18	.30	.55	.86	.67	.60	.19	.10	.11	4.35
1958	.13	.30	.15	.13	.10	.37	.39	.15	.16	.10	.10	.14	2.22
1959	.16	.20	.09	.08	.07	1.13	4.25	.43	.15	.16	.11	.15	6.98
1960	.48	.60	.77	.93	.31	1.18	2.78	2.44	.59	.55	1.02	1.22	12.87

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	323	6.58
1951	1207	5,740	Mar. 30, 1951	15	471	0.687	9.32	605	11.96
1952	1237	7,010	Mar. 22, 1952	3.8	735	1.07	14.60	636	12.64
1953	1277	6,580	June 5, 1953	2.6	382	.557	7.57	350	6.93
1954	1357	4,030	June 22, 1954	10	242	.353	4.79	352	6.96
1955	1387	4,590	Oct. 4, 1954	39	474	.691	9.38	367	7.25
1956	1437	3,940	May 10, 1956	67	308	.449	6.10	322	6.58
1957	1507	2,040	May 13, 1957	41	219	.319	4.35	209	4.14
1958	1557	2,440	Sept. 24, 1958	7	112	.163	2.22	105	2.09
1959	1627	8,780	Apr. 3, 1959	3.4	353	.515	6.98	424	8.58
1960	1707	9,300	Mar. 31, 1960	4.0	647	.943	12.87	-	-



## 875. Hart ditch at Munster, Ind.

Location.--Lat 41°33'40", long 87°28'50", in N $\frac{1}{2}$  sec.20, T.36 N., R.9 W., on left bank at city limits of Munster, a quarter of a mile downstream from U.S. Highway 41 and 0.4 mile upstream from mouth.

Drainage area.--69.2 sq mi.

Records available.--September 1942 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 591.27 ft (revised) above mean sea level, datum of 1929 (levels by Indiana Flood Control and Water Resources Commission). Auxiliary water-stage recorder a quarter of a mile upstream at same datum since Sept. 11, 1959.

Average discharge.--18 years (1942-60), 58.5 cfs.

Extremes.--1942-60: Maximum discharge, 2,670 cfs Apr. 28, 1959; maximum gage height, 7.83 ft Oct. 11, 1954; minimum discharge, 1.2 cfs July 29, 1946; minimum gage height, 0.47 ft July 29, 1946, Sept. 2, 1948.

Remarks.--Flow from this ditch discharges into Little Calumet River near Munster. Practically all of this flow discharges into the Calumet Sag Channel or Grand Calumet River.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	5.92	7.02	11.6	74.3	133	89.3	134	136	24.1	50.0	13.2	11.4	56.9
1952	22.7	129	32.5	141	38.4	109	112	37.7	102	8.47	6.09	5.17	61.9
1953	5.03	6.43	9.62	18.0	61.4	145	46.0	44.7	55.5	9.65	7.76	4.85	34.3
1954	4.36	4.63	5.88	8.73	24.7	112	146	30.3	29.6	49.7	20.3	6.93	36.9
1955	282	27.5	49.8	107	65.1	75.2	37.2	38.1	39.2	38.2	10.8	5.92	65.0
1956	12.9	13.5	8.62	7.04	79.4	60.4	127	165	14.7	6.95	6.10	3.91	42.0
1957	5.04	4.70	4.99	6.99	12.5	19.1	132	78.9	55.4	161	13.0	5.78	41.8
1958	14.5	63.1	62.9	23.0	52.1	55.0	30.5	11.9	144	15.9	63.0	8.88	45.2
1959	7.53	8.80	7.68	9.45	200	137	193	228	30.1	45.0	18.2	11.8	73.8
1960	40.4	86.0	72.6	117	134	113	117	40.8	96.5	25.1	8.73	5.80	71.0

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.10	0.11	0.19	1.23	2.00	1.49	2.16	2.27	0.39	0.83	0.22	0.18	11.17
1952	.38	2.08	.54	2.35	.60	1.82	1.81	.63	1.64	.14	.10	.08	12.17
1953	.08	.10	.16	.30	.92	2.42	.74	.74	.90	.16	.13	.08	6.73
1954	.07	.07	.10	.15	.37	1.87	2.35	.50	.48	.85	.34	.11	7.24
1955	4.70	.44	.83	1.79	.98	1.26	.60	.64	.63	.64	.18	.10	12.79
1956	.21	.21	.14	.12	1.24	1.01	2.05	2.74	.24	.12	.10	.06	8.24
1957	.08	.08	.08	.12	.19	.32	2.13	1.51	.89	2.59	.22	.09	8.20
1958	.24	1.02	1.05	.38	.78	.92	.49	.20	2.32	.27	1.05	.14	8.86
1959	.13	.14	.13	.16	3.01	2.28	3.11	3.79	.49	.75	.30	.19	14.48
1960	.67	1.58	1.21	1.95	2.09	1.88	1.89	.68	1.55	.42	.15	.09	13.96

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	82.7	16.22
1951	1207	1,430	May 11, 1951	4.1	56.9	0.822	11.17	70.2	13.77
1952	1237	1,190	June 14, 1952	4.2	61.9	.895	12.17	48.4	9.51
1953	1277	960	Mar. 15, 1953	3.5	34.3	.496	6.73	33.8	6.65
1954	1337	1,110	Mar. 25, 1954	3.1	36.9	.533	7.24	66.0	12.97
1955	1387	2,600	Oct. 11, 1954	2.8	65.0	.939	12.79	37.5	7.38
1956	1437	1,550	May 11, 1956	2.8	42.0	.607	8.24	40.3	7.92
1957	1507	2,060	July 14, 1957	3.3	41.8	.604	8.20	52.3	10.27
1958	1557	960	June 10, 1958	4.5	45.2	.653	8.86	35.4	6.95
1959	1627	2,670	Apr. 28, 1959	4.5	73.8	1.07	14.48	88.5	17.34
1960	1707	855	Jan. 13, 1960	3.9	71.0	1.03	13.96	-	-

## 876. Little Calumet River at Munster, Ind.

Location.--Lat 41°34'07", long 87°31'18", in NW $\frac{1}{4}$  sec.13, T.36 N., R.10 W., on left bank 200 ft upstream from Hohman Street Bridge, a quarter of a mile south of intersection of Hohman and 173d Streets, 0.4 mile upstream from Indiana-Illinois State line, 1 mile north of intersection of Hohman Street and Ridge Road, and 4.6 miles upstream from Thorn Creek.

Drainage area.--Indeterminate.

Records available.--June 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 580.72 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge, 1,510 cfs Apr. 28, 1959 (gage height, 13.67 ft); minimum, 6.0 cfs Oct. 6, 1958; minimum gage height, 2.91 ft Sept. 10, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	19.7	69.3	11.6	-
1959	9.49	11.6	9.13	12.8	252	149	147	266	35.3	57.3	20.1	17.2	81.3
1960	45.6	98.4	80.6	139	163	113	136	47.0	129	33.1	12.3	10.9	83.4

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1627	-	-	-	-	-	-	-	-
1959	1627	1,510	Apr. 28, 1959	6.3	81.3	-	-	97.6	-
1960	1707	778	Jan. 13, 1960	7.5	83.4	-	-	-	-

## 880. Thorn Creek at Glenwood, Ill.

Location.--Lat 41°31'50", long 87°36'20", in SW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.9, T.35 N., R.14 E., on right bank 20 ft downstream from Baltimore & Ohio Chicago Terminal Railroad bridge, 0.7 mile north of Chicago Heights, 0.8 mile south of Glenwood, and 1 mile upstream from Deer Creek.

Drainage area.--24.6 sq mi (revised).

Records available.--May 1949 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 610.97 ft above mean sea level, datum of 1929.

Average discharge.--11 years (1949-60), 32.0 cfs.

Extremes.--1949-60: Maximum discharge, 2,460 cfs July 13, 1957 (gage height, 11.14 ft); minimum daily, 6.0 cfs July 4, Aug. 21, Sept. 5, 11, 25, 1949.

Remarks.--Figures of discharge include about 6 cfs pumped from ground-water sources for municipal supply of Chicago Heights and undetermined amount of ground-water pumpage for industrial use above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	11.3	13.0	13.2	37.4	54.1	42.5	49.2	60.0	15.7	22.5	13.9	15.4	28.9
1952	15.8	52.6	24.3	56.5	19.6	51.6	48.1	19.7	48.2	14.0	12.7	14.1	31.4
1953	12.8	14.9	16.7	24.6	28.9	60.2	29.2	27.6	66.5	19.9	16.7	15.8	27.8
1954	15.5	12.3	11.4	12.0	20.6	53.8	61.6	18.2	19.6	34.3	20.3	18.1	24.8
1955	87.1	21.3	23.1	45.8	37.8	33.0	24.6	36.0	38.4	24.2	26.7	16.3	34.6
1956	26.0	17.5	14.0	13.3	43.8	30.3	56.4	67.5	19.5	15.6	14.9	11.1	27.4
1957	12.9	14.7	14.1	16.7	22.7	24.1	63.1	63.0	57.2	89.9	20.2	16.4	34.6
1958	22.1	34.5	30.0	20.0	30.1	29.5	26.4	18.9	80.1	25.9	58.9	15.6	32.6
1959	16.8	16.4	14.5	17.7	74.9	62.8	62.9	70.1	24.4	29.0	19.8	23.6	35.8
1960	28.4	40.8	34.6	54.8	54.8	50.3	53.7	33.5	55.4	28.2	21.5	19.4	39.5

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	831	May 10, 1951	8.0	28.9	-	-	32.2	-
1952	1237	780	June 14, 1952	9.5	31.4	-	-	33.4	-
1953	1277	848	June 10, 1953	9.3	27.8	-	-	27.4	-
1954	1337	729	Mar. 25, 1954	7.9	24.8	-	-	27.3	-
1955	1387, 1437	1,180	Oct. 10, 1954	12	34.6	-	-	32.6	-
1956	1437	830	Apr. 29, May 10	8.8	27.4	-	-	28.3	-
1957	1507	2,460	July 13, 1957	8.9	34.6	-	-	26.1	-
1958	1557	950	Aug. 15, 1958	11	32.6	-	-	38.4	-
1959	1627	1,060	Apr. 28, 1959	11	35.8	-	-	29.4	-
1960	1707	661	Jan. 12, 1960	14	39.5	-	-	40.5	-

## 885. Deer Creek near Chicago Heights, Ill.

Location--Lat 41°31'15", long 87°35'25", 0.1 mile west of center of sec.14, T.35 N., R.14 E., on left bank at downstream side of bridge on Joe Orr Road, 0.4 mile east of Cottage Grove Avenue, 1 mile north of U.S. Highway 30, 1.5 miles northeast of Chicago Heights, and 1.6 miles west of Torrence Avenue.

Drainage area--23.2 sq mi (revised).

Records available--May 1948 to September 1960.

Gage--Water-stage recorder. Datum of gage is 615.95 ft above mean sea level, datum of 1929. Prior to Jan. 11, 1949, wire-weight gage at present site and datum. Jan. 11, 1949, to Oct. 9, 1956, water-stage recorder at present site and datum. Oct. 10, 1956, to Sept. 24, 1957, staff gage at site 250 ft downstream at same datum. Sept. 25, 1957, to Aug. 12, 1958, wire-weight gage at present site and datum.

Average discharge--12 years (1948-60), 14.9 cfs.

Extremes--1948-60: Maximum discharge, 1,380 cfs July 13, 1957 (gage height, 11.75 ft); no flow for several days in 1949, 1953, 1956.

Remarks--Undetermined amount of flow diverted for irrigation.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.63	0.75	1.22	26.5	46.2	26.8	37.9	40.7	5.61	12.4	2.20	1.08	16.7
1952	2.36	55.5	8.52	36.9	7.26	33.3	28.6	8.00	25.8	2.52	1.19	.90	15.9
1953	1.72	.73	2.16	4.25	15.7	36.8	13.8	11.6	20.5	2.00	1.22	.52	9.20
1954	.24	1.30	.99	2.41	7.60	32.1	36.2	5.35	9.68	15.9	3.75	.52	9.67
1955	55.9	3.60	10.6	27.4	20.7	17.7	6.87	18.1	14.2	8.40	3.35	1.31	15.7
1956	2.33	2.52	1.27	.97	32.2	18.6	36.4	44.5	3.17	1.29	.63	.03	11.9
1957	0	.25	.59	1.28	2.34	3.75	38.0	32.0	23.2	55.5	3.96	.68	13.5
1958	2.27	16.6	17.1	5.75	17.2	16.1	6.47	2.38	57.2	3.45	21.0	1.04	13.8
1959	1.29	1.73	.67	1.04	44.4	42.1	52.5	63.3	10.1	3.03	2.05	1.43	18.5
1960	6.85	17.2	18.7	38.1	42.4	39.7	35.3	15.5	26.1	5.36	1.31	.89	20.5

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.08	0.04	0.06	1.32	2.08	1.33	1.82	2.02	0.27	0.61	0.11	0.05	9.79
1952	.12	1.71	.42	1.83	.34	1.65	1.38	.40	1.24	.13	.06	.04	9.32
1953	.09	.04	.11	.21	.71	1.83	.67	.57	.98	.10	.06	.02	5.39
1954	.01	.06	.05	.12	.34	1.60	1.74	.27	.47	.79	.19	.03	5.67
1955	2.78	.17	.53	1.36	.93	.88	.33	.91	.68	.42	.17	.06	9.22
1956	.12	.12	.06	.05	1.50	.95	1.75	2.21	.15	.06	.03	.001	6.98
1957	0	.01	.03	.06	.11	.19	1.83	1.59	1.12	2.76	.20	.03	7.93
1958	.11	.80	.85	.29	.77	.80	.51	.12	2.75	.17	1.04	.05	8.06
1959	.06	.08	.03	.05	1.99	2.09	2.52	3.15	.49	.15	.10	.07	10.78
1960	.34	.83	.93	1.89	1.97	1.97	1.70	.77	1.25	.27	.07	.04	12.03

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	20.3	11.86
1951	1207	467	May 11, 1951	0.5	16.7	0.720	9.79	20.3	11.86
1952	1237	419	Nov. 10, 1951	0.5	15.9	.585	9.32	12.4	7.31
1953	1277	435	June 10, 1953	0	9.20	.397	5.39	9.02	5.27
1954	1337	417	Mar. 25, 1954	0	9.67	.417	5.67	15.4	9.03
1955	1387	637	Oct. 11, 1954	.1	15.7	.677	9.22	10.3	6.04
1956	1437	467	Apr. 29, 1956	0	11.9	.513	6.98	11.5	6.72
1957	1507	1,380	July 13, 1957	0	13.5	.582	7.93	16.5	9.65
1958	1557	471	June 10, 1958	.3	13.8	.595	8.06	11.1	6.47
1959	1627	850	Apr. 28, 1959	.4	18.5	.797	10.78	21.7	12.71
1960	1707	430	Jan. 13, 1960	.6	20.5	.884	12.03	-	-

## 890. Butterfield Creek at Flossmoor, Ill.

Location.--Lat 41°32'25", long 87°38'55", in NE $\frac{1}{4}$ NW $\frac{1}{4}$  sec.8, T.35 N., R.14 E., on left bank at downstream side of Reigle Road Bridge at Homewood city limits, 0.1 mile north of Holbrook Road and three-quarters of a mile east of Flossmoor.

Drainage area.--23.4 sq mi (revised).

Records available.--May 1948 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 616.80 ft above mean sea level, datum of 1929. Prior to Sept. 9, 1948, wire-weight gage at same site and datum.

Average discharge.--12 years (1948-60), 16.1 cfs.

Extremes.--1948-60: Maximum discharge, 2,550 cfs July 13, 1957 (gage height, 11.78 ft); no flow at times in 1948 and for part of day Oct. 1, 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.74	0.59	0.88	23.7	48.6	29.1	36.2	41.6	4.21	10.1	2.06	4.25	16.6
1952	7.52	39.2	12.5	48.6	10.2	43.0	30.8	5.99	21.3	1.34	.47	.43	18.4
1953	.27	.86	2.32	6.31	14.9	45.1	20.5	18.3	43.6	1.59	1.47	.25	12.9
1954	.29	.20	1.66	2.19	9.06	36.9	55.7	9.46	8.62	14.0	4.31	1.62	12.0
1955	76.1	5.05	10.8	33.8	25.3	27.2	8.85	6.57	14.9	6.37	6.94	1.49	18.7
1956	7.85	5.96	2.47	1.04	29.8	19.5	24.8	50.8	2.82	.96	.80	.40	12.2
1957	.95	.67	1.37	2.49	5.18	4.69	42.0	34.3	28.3	85.9	7.21	1.11	17.9
1958	2.57	12.1	10.1	4.91	16.3	15.1	8.01	3.84	54.0	4.90	17.4	1.00	12.4
1959	1.46	1.41	.50	1.02	31.5	36.8	30.3	25.7	4.47	4.02	1.48	1.61	11.5
1960	3.58	12.5	15.1	31.9	30.2	29.6	33.5	11.8	24.3	6.67	1.24	1.09	16.7

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.04	0.03	0.04	1.17	2.16	1.43	1.73	2.05	0.20	0.50	0.10	0.20	9.85
1952	.37	1.87	.62	2.40	.47	2.12	1.47	.50	1.02	.07	.02	.02	10.75
1953	.01	.04	.11	.31	.86	2.22	.98	.90	2.08	.08	.07	.01	7.47
1954	.01	.01	.08	.11	.40	1.82	2.66	.47	.41	.69	.21	.08	6.95
1955	3.75	.24	.53	1.67	1.12	1.34	.42	.32	.71	.31	.34	.07	10.82
1956	.39	.28	.12	.05	1.38	.96	1.18	2.51	.13	.05	.04	.02	7.11
1957	.05	.03	.02	.12	.23	.23	2.00	1.69	1.35	4.23	.36	.05	10.36
1958	.13	.58	.50	.24	.73	.74	.39	.19	2.57	.24	.86	.05	7.21
1959	.07	.07	.02	.05	1.40	1.81	1.44	1.26	.21	.20	.07	.08	6.68
1960	.18	.60	.74	1.57	1.39	1.46	1.60	.58	1.16	.53	.06	.05	9.72

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean
		Discharge	Date					
1950	-	-	-	-	-	-	-	26.4
1951	-	525	May 11, 1951	0.1	16.6	0.709	9.65	21.4
1952	1207	339	Nov. 13, 1951	.1	18.4	.786	10.75	13.8
1953	1277, 1437	810	June 10, 1953	.1	12.9	.551	7.47	12.8
1954	1337	450	Mar. 25, 1954	.1	12.0	.513	6.95	19.6
1955	1387, 1437	1,480	Oct. 10, 1954	.4	18.7	.799	10.82	12.2
1956	1437	510	Apr. 29, 1956	.1	12.2	.521	7.11	11.0
1957	1507	2,550	July 13, 1957	.2	17.9	.765	10.36	19.8
1958	1557	311	June 13, 1958	.3	12.4	.530	7.21	10.6
1959	1627	375	Apr. 28, 1959	.3	11.5	.491	6.68	13.9
1960	1707	318	Jan. 12, 1960	.4	16.7	.714	9.72	-

## 895. Lansing ditch near Lansing, Ill.

Location.--Lat 41°31'40", long 87°31'45", at north boundary of sec.17, T.35 N., R.15 E., on right bank at upstream side of bridge on farm road, 0.2 mile west of Indiana State line, 0.5 mile east of Burnham Avenue, and 2 miles south of Lansing.

Drainage area.--8.7 sq mi, approximately (revised).

Records available.--May 1948 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 607.16 ft above mean sea level, datum of 1929. Prior to Sept. 20, 1948, wire-weight gage at same site and datum.

Average discharge.--12 years (1948-60), 8.25 cfs.

Extremes.--1948-60: Maximum discharge, 461 cfs May 10 or 11, 1948 (gage height, 9.24 ft, from floodmark); maximum gage height, 10.18 ft Oct. 11, 1954; no flow at times.

Remarks.--Undetermined amount of flow diverted for irrigation above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.61	0.50	0.75	21.3	23.2	16.1	20.2	28.2	4.14	10.6	1.41	0.97	10.6
1952	2.14	25.2	4.88	24.1	4.63	18.1	17.9	3.98	11.0	1.04	.42	.23	9.45
1953	.16	.30	.55	1.20	8.26	22.8	5.66	4.87	18.1	.95	.68	.25	5.28
1954	.16	.22	.29	.35	3.29	21.8	32.9	4.38	3.40	17.0	2.44	.77	7.26
1955	41.8	2.83	6.97	20.7	12.0	11.0	4.25	12.4	6.66	3.09	1.76	1.28	10.5
1956	1.65	1.32	.71	.43	20.0	7.95	20.5	21.5	1.92	1.59	1.24	1.52	6.63
1957	.41	.54	.61	.80	1.40	1.52	14.5	12.3	10.4	26.1	3.49	2.12	6.62
1958	2.73	5.71	4.21	2.29	5.11	5.06	4.11	1.53	27.7	5.19	10.1	3.20	6.38
1959	3.98	3.13	1.19	1.42	12.4	12.6	15.7	31.5	7.83	6.63	3.25	3.39	8.56
1960	6.41	9.97	7.49	14.4	16.4	16.7	14.5	6.54	21.4	6.69	2.82	2.08	10.4

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.08	0.06	0.10	2.82	2.77	2.13	2.59	3.74	0.53	1.40	0.19	0.12	16.53
1952	.28	3.23	.85	3.19	.57	2.40	2.30	.73	1.41	.14	.06	.03	14.79
1953	.02	.04	.07	.16	.99	5.02	.73	.85	2.32	.13	.09	.03	8.25
1954	.02	.03	.04	.05	.39	2.89	4.22	.58	.44	2.25	.32	.10	11.33
1955	5.54	.36	.92	2.74	1.44	1.46	.55	1.64	.85	.41	.23	.16	16.30
1956	.22	.17	.09	.06	2.48	1.05	2.63	2.85	.25	.21	.16	.20	10.37
1957	.05	.07	.08	.11	.17	.20	1.80	1.63	1.34	3.46	.46	.27	9.70
1958	.36	.73	.56	.30	.61	.67	.53	.20	3.55	.69	1.34	.41	9.95
1959	.53	.40	.16	.19	1.48	1.67	2.01	4.19	1.00	.88	.45	.45	13.36
1960	.85	1.28	.99	1.91	2.03	2.22	1.65	.87	2.74	.69	.37	.27	16.27

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	11.1	20.45
1951	1207	425	May 11, 1951	0.2	10.6	1.22	16.53	13.1	20.45
1952	1237	323	Jan. 1, 1952	0	9.45	1.09	14.79	6.88	10.76
1953	1277	354	June 10, 1953	.1	5.28	.607	8.25	5.25	8.21
1954	1337	382	Apr. 25, 1954	.1	7.26	.834	11.33	11.6	18.06
1955	1387	302	Oct. 11, 1954	.5	10.5	1.21	16.30	6.39	9.96
1956	1437	320	Apr. 29, 1956	.2	6.63	.762	10.37	6.45	10.09
1957	1507	240	July 13, 1957	.1	6.22	.715	9.70	7.15	11.15
1958	1557	150	June 8, 1958	.4	6.38	.733	9.95	6.02	9.39
1959	1627	155	Apr. 28, 1959	0	8.56	.98	13.36	9.87	15.39
1960	1707	204	June 14, 1960	.3	10.4	1.20	16.27	-	-

900. North Creek near Lansing, Ill.

Location.--Lat 41°32'45", long 87°33'30", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec. 1, T.35 N., R.14 E., on right bank at downstream side of Torrence Avenue Bridge, 1.1 miles south of Lansing and 2.7 miles north of U.S. Highway 30.

Drainage area.--16.7 sq mi (revised).

Records available.--May 1948 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 599.29 ft above mean sea level, datum of 1929. Prior to Dec. 16, 1948, wire-weight gage at same site and datum.

Average discharge.--12 years (1948-60), 15.5 cfs.

Extremes.--1948-60: Maximum discharge, 730 cfs Mar. 20, 1948 (gage height, 8.51 ft, from floodmark); maximum gage height, 8.96 ft Oct. 10, 1954; no flow at times.

Remarks.--Undetermined amount of flow diverted for irrigation above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.71	0.46	1.13	25.7	36.3	28.4	33.3	52.4	5.98	18.1	3.40	2.44	17.3
1952	8.28	57.7	14.7	51.0	10.1	30.4	35.4	9.28	17.2	1.36	.53	.35	19.7
1953	.35	.29	.97	3.22	18.6	51.8	11.9	14.7	29.4	1.55	.86	.31	11.1
1954	.24	.27	.47	.62	5.51	41.1	65.5	7.17	7.25	33.9	4.10	.41	13.9
1955	89.1	6.55	11.8	27.9	17.6	23.6	6.77	15.7	8.84	2.95	2.00	1.01	17.9
1956	4.76	3.91	.95	.54	25.5	18.5	23.8	36.6	2.45	.99	.99	.74	9.91
1957	.37	.66	.75	.93	3.45	3.22	30.2	28.2	16.9	48.8	3.74	1.85	11.7
1958	4.39	15.5	14.2	5.83	8.43	11.7	6.91	2.12	52.3	5.87	16.0	3.30	12.2
1959	5.13	3.59	1.48	2.00	58.8	34.5	29.2	50.8	10.5	10.9	4.95	4.43	16.2
1960	10.9	18.0	12.9	24.0	27.6	27.1	27.6	10.5	32.7	8.23	4.05	3.57	17.3

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.05	0.03	0.08	1.77	2.26	1.96	2.23	3.62	0.40	1.25	0.23	0.16	14.04
1952	.57	3.86	1.01	3.52	.65	2.10	2.36	.64	1.15	.09	.04	.02	16.01
1953	.02	.02	.07	.22	1.16	3.58	.79	1.02	1.97	.11	.06	.02	9.04
1954	.02	.02	.03	.04	.34	2.84	4.38	.49	.48	2.54	.28	.03	11.29
1955	6.15	.44	.82	1.92	1.09	1.65	.45	1.08	.59	.20	.14	.07	14.58
1956	.33	.26	.06	.04	1.64	1.27	1.59	2.52	.16	.07	.07	.05	8.06
1957	.03	.04	.05	.06	.22	.22	2.02	1.95	1.13	3.37	.26	.12	9.47
1958	.30	1.04	.98	.40	.53	.81	.46	.15	3.50	.41	1.10	.22	9.90
1959	.35	.24	.10	.14	2.42	2.37	1.95	3.51	.70	.75	.34	.30	13.17
1960	.75	1.20	.89	1.66	1.78	1.87	1.84	.73	2.19	.64	.28	.24	14.07

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	25.0	20.35
1951	1207	649	May 11, 1951	0.2	17.3	1.04	14.04	23.8	19.32
1952	1237	435	Jan. 1, 1952	.2	19.7	1.18	16.01	13.1	10.68
1953	1277	531	Mar. 15, 1953	.1	11.1	.665	9.04	11.1	9.00
1954	1337	623	Apr. 25, 1954	.1	13.9	.832	11.29	22.9	18.63
1955	1387	692	Oct. 10, 1954	.3	17.9	1.07	14.58	9.64	7.82
1956	1437	348	Apr. 29, 1956	.1	9.91	.593	8.06	9.25	7.53
1957	1507	515	July 13, 1957	0	11.7	.701	9.47	14.4	11.67
1958	1557	269	June 9, 1958	.8	12.2	.731	9.90	10.2	8.27
1959	1627	328	May 21, 1959	0	16.2	.970	13.17	18.8	15.32
1960	1707	285	June 14, 1960	1.2	17.3	1.04	14.07	-	-

## 905. Thorn Creek at Thornton, Ill.

Location.--Lat 41°34'05", long 87°36'30", near center of N $\frac{1}{2}$  sec.34, T.36 N., R.14 E., on right bank at downstream side of Ridge Road Bridge in Thornton, 1 mile downstream from North Creek and  $\frac{1}{2}$  miles upstream from Grand Trunk Railway.

Drainage area.--104 sq mi (revised).

Records available.--May 1948 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 586.43 ft above mean sea level, datum of 1929. Prior to Dec. 18, 1948, wire-weight gage at same site and datum.

Average discharge.--12 years (1948-60), 91.7 cfs.

Extremes.--1948-60: Maximum discharge, 4,700 cfs July 13, 1957 (gage height, 16.00 ft); minimum daily, 4.4 cfs Sept. 11, 1949.

Flood of Apr. 5, 1947, reached a stage of 14.34 ft, from floodmark (discharge, 4,200 cfs).

Remarks.--Some diurnal fluctuation caused by pumping operations above station. Figures of discharge include about 6 cfs pumped from ground-water sources for municipal supply of Chicago Heights and undetermined amount of ground-water pumpage for industrial use above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	12.5	15.0	15.5	118	208	163	196	225	37.5	71.3	27.3	36.7	93.1
1952	67.5	223	63.5	236	56.5	189	150	59.3	128	21.7	16.9	16.0	102
1953	16.3	17.3	27.2	36.2	85.8	216	107	97.5	163	27.6	25.4	19.5	69.7
1954	17.3	16.3	16.3	16.2	53.4	207	273	44.9	56.1	116	38.1	19.9	72.9
1955	356	41.6	79.1	175	123	150	61.5	103	90.4	41.7	45.2	23.8	108
1956	46.6	35.5	22.9	24.5	138	101	178	248	35.1	23.7	21.8	13.6	73.9
1957	15.8	21.3	16.9	25.3	39.4	48.7	198	166	121	318	38.9	22.7	86.1
1958	41.8	113	85.1	39.7	73.2	110	56.3	29.3	314	53.9	175	37.7	93.8
1959	38.9	30.2	19.0	25.4	221	202	185	223	50.8	55.6	31.5	33.0	92.1
1960	66.4	117	100	170	196	165	186	83.7	170	58.5	32.6	26.1	114

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.14	0.16	0.17	1.30	2.08	1.81	2.10	2.50	0.40	0.79	0.30	0.39	12.14
1952	.75	2.39	.70	2.62	.59	2.10	1.61	.66	1.38	.24	.19	.17	13.40
1953	.18	.19	.30	.40	.86	2.39	1.15	1.08	1.75	.31	.28	.21	9.10
1954	.19	.17	.18	.19	.53	2.29	2.93	.50	.60	1.29	.42	.21	9.49
1955	3.95	.45	.88	1.94	1.23	1.66	.66	1.14	.97	.46	.50	.25	14.09
1956	.52	.38	.25	.27	1.44	1.12	1.91	2.75	.38	.26	.24	.15	9.67
1957	.17	.23	.19	.26	.39	.54	2.12	1.84	1.30	3.52	.43	.24	11.23
1958	.46	1.21	.94	.44	.73	1.22	.60	.33	3.37	.60	1.94	.40	12.24
1959	.43	.32	.21	.28	2.21	2.24	1.98	2.47	.55	.62	.35	.35	12.01
1960	.74	1.25	1.11	1.88	1.83	2.04	2.00	.93	1.82	.65	.36	.28	14.89

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	114	14.92	
1951	1207	2,720	May 11, 1951	8.0	93.1	0.895	12.14	119	15.51	
1952	1237	1,570	Nov. 14, 1951	11	102	.981	13.40	78.1	10.23	
1953	1277	2,280	June 11, 1953	9.6	69.7	.670	9.10	68.8	8.97	
1954	1337	1,890	Mar. 25, 1954	10	72.9	.701	9.49	109	14.23	
1955	1387	3,370	Oct. 11, 1954	14	108	1.04	14.09	78.3	9.96	
1956	1437	2,280	Apr. 29, 1956	7.6	73.9	.711	9.67	69.6	9.11	
1957	1507	4,700	July 13, 1957	6.8	86.1	.828	11.23	102	13.25	
1958	1557	1,560	Aug. 16, 1958	15	93.8	.902	12.24	81.2	10.59	
1959	1627	1,780	Apr. 28, 1959	14	92.1	.886	12.01	108	14.15	
1960	1707	1,220	Jan. 13, 1960	12	114	1.10	14.89	-	-	

## 910. Little Calumet River at South Holland, Ill.

Location.--Lat 41°36'05", long 87°34'38", in SW1SW1 sec.13, T.36 N., R.14, E., on right bank at downstream side of bridge on U.S. Highway 6, 0.6 mile downstream from Thorn Creek, 1.6 miles east of South Holland, and 4.1 miles upstream from former gaging station at Harvey.

Records available.--October 1947 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 575.00 ft above mean sea level. Prior to Oct. 27, 1947, wire-weight gage at same site and datum. Auxiliary water-stage recorder at Dixmoor, 6.1 miles downstream. Prior to Nov. 17, 1947, auxiliary wire-weight gage at same site.

Average discharge.--13 years (1947-60), 167 cfs.

Extremes.--1947-60: Maximum discharge, 4,440 cfs July 14, 1957 (gage height, 20.11 ft); minimum daily, 7.9 cfs Oct. 6, 1950.  
Flood of Apr. 6, 1947, reached a stage of 19.24 ft, from floodmark (discharge, 4,760 cfs).

Remarks.--Flow from about 330 sq mi of upper Little Calumet River basin above a point in Gary, Ind., is diverted to Lake Michigan by Burns ditch (see p. ). Calumet Sag Channel, 8 miles below station, usually diverts the entire low flow to the Mississippi River basin.

Revisions.--The mean discharge, in cubic feet per second, for Apr. 25, 26, 1950, was revised in WSP 1507; the resulting revised records, as summarized herewith, supersede those published in WSP 1307.

April 1950..... 712  
Water year 1949-50..... 248  
Calendar year 1950..... 224

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	23.7	26.7	32.5	262	432	295	363	398	73.7	172	66.6	71.3	183
1952	111	441	148	468	137	342	285	91.3	206	69.0	95.4	56.7	206
1953	52.2	50.5	58.1	70.7	181	423	165	125	274	89.1	48.7	60.7	133
1954	42.6	39.2	56.0	47.4	89.3	286	444	76.9	81.3	155	60.9	35.2	118
1955	645	84.3	110	255	209	322	145	162	136	66.8	60.2	40.0	187
1956	84.1	64.5	46.5	41.8	214	236	265	518	63.6	50.0	40.3	22.3	137
1957	19.8	33.5	34.7	48.9	63.5	92.2	389	317	212	555	82.3	40.8	158
1958	66.1	178	159	90.4	130	151	97.5	51.8	425	72.8	185	42.6	137
1959	41.6	43.0	37.4	49.5	541	581	367	485	102	141	61.1	52.3	190
1960	116	206	178	316	350	285	342	147	321	106	61.1	57.4	206

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	*224	-
1951	1207	3,360	May 11, 1951	7.9	183	-	-	235	-
1952	1237	2,480	Nov. 14, 1951	23	206	-	-	161	-
1953	1277, 1507	2,420	June 11, 1953	36	135	-	-	151	-
1954	1337	2,100	Mar. 26, 1954	14	118	-	-	177	-
1955	1387	4,210	Oct. 11, 1954	21	187	-	-	132	-
1956	1437	2,420	Apr. 30, 1956	14	137	-	-	128	-
1957	1507	4,440	July 14, 1957	13	158	-	-	184	-
1958	1557	1,930	June 10, 1958	27	137	-	-	113	-
1959	1627	2,820	Apr. 29, 1959	23	190	-	-	221	-
1960	1707	1,860	Jan. 13, 1960	40	206	-	-	-	-

\* Revised.



## 920. Midlothian Creek at Oak Forest, Ill.

Location.--Lat 41°36'51", long 87°43'46", in SE 1/4 sec. 15, T.36 N., R.13 E., on right bank at downstream side of Kilbourn Avenue Bridge in Oak Forest, 4.4 miles upstream from mouth.

Drainage area.--14.0 sq mi (revised).

Records available.--October 1950 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 620.41 ft above mean sea level, datum of 1929 (Cook County Highway Department bench mark).

Average discharge.--10 years (1950-60), 10.8 cfs.

Extremes.--1950-60: Maximum discharge, 569 cfs Oct. 10, 1954 (gage height, 8.49 ft); maximum gage height, 9.00 ft July 13, 1957; no flow at times most years.

Remarks.--Diurnal fluctuation at low flow caused by small industrial plants upstream.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.01	0.54	1.61	19.3	35.3	17.4	25.7	28.5	5.06	9.07	3.58	31.3	14.5
1952	20.5	36.5	6.59	39.3	7.93	35.1	21.0	4.43	19.4	.84	.49	.28	15.8
1953	.13	.42	.80	1.85	8.41	36.0	12.7	17.2	23.0	1.50	1.89	.52	8.70
1954	.33	.45	1.02	1.75	5.36	23.5	30.8	5.89	8.50	14.3	7.88	1.11	8.41
1955	71.0	5.30	9.23	27.8	21.6	21.7	8.39	3.87	10.2	1.88	1.98	.45	15.3
1956	4.63	5.21	1.56	.96	13.0	7.50	8.13	17.0	1.60	.79	.74	.37	5.09
1957	.48	.66	.68	1.82	2.36	4.51	33.7	22.4	29.1	43.3	4.00	1.01	12.0
1958	1.47	6.12	5.75	3.67	10.2	12.2	7.44	7.19	22.6	5.73	9.85	.73	7.71
1959	1.05	1.28	.88	.86	25.6	28.7	22.3	11.6	3.47	5.90	2.08	1.20	8.63
1960	3.27	7.36	10.1	24.8	20.8	25.5	27.8	9.82	13.2	2.72	1.04	.94	12.2

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.08	0.04	0.13	1.59	2.63	1.43	2.05	2.35	0.24	0.75	0.29	2.49	14.07
1952	1.69	2.91	.54	3.24	.61	2.72	1.67	.36	1.47	.07	.04	.02	15.34
1953	.01	.03	.07	.15	.63	2.97	1.01	1.41	1.83	.12	.15	.04	8.42
1954	.03	.04	.08	.14	.40	1.94	2.46	.49	.68	1.17	.65	.09	8.17
1955	5.84	.42	.76	2.29	1.61	1.79	.67	.32	.82	.15	.16	.04	14.87
1956	.38	.41	.13	.08	1.00	.62	.65	1.40	.13	.07	.06	.03	4.96
1957	.04	.05	.06	.15	.18	.37	2.69	1.84	2.32	3.56	.33	.08	11.67
1958	.12	.49	.47	.30	.76	1.01	.59	.59	1.80	.47	.81	.06	7.47
1959	.09	.10	.07	.07	1.91	2.36	1.78	.96	.28	.49	.17	.10	8.38
1960	.27	.59	.83	2.04	1.61	2.10	2.21	.81	1.05	.22	.09	.07	11.89

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	1207,1337	375	Sept. 26, 1951	0	14.5	1.04	14.07	19.6	18.96	
1952	1237,1337	256	Nov. 14, 1951	.1	15.8	1.13	15.34	10.6	10.31	
1953	1277,1337	384	June 10, 1953	.1	8.70	.621	8.42	8.74	8.46	
1954	1337	248	Mar. 25, 1954	.1	8.41	.601	8.17	15.5	15.04	
1955	1387	569	Oct. 10, 1954	.2	15.3	1.09	14.87	9.04	8.77	
1956	1437	204	May 10, 1956	.3	5.09	.364	4.96	4.30	4.19	
1957	1507	550	July 13, 1957	.3	12.0	.857	11.67	13.0	12.60	
1958	1557	168	June 13, 1958	.4	7.71	.551	7.47	6.86	6.65	
1959	1627	228	Apr. 28, 1959	.3	8.63	.616	8.38	10.1	9.81	
1960	1707	210	Mar. 27, 1960	.4	12.2	.871	11.89	-	-	

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 930. Deep River at Lake George Outlet at Hobart, Ind.

Location--Lat 41°32'10", long 87°15'25", in NW¼ sec.32, T.36 N., R.7 W., on left bank at upstream side of highway bridge, 300 ft upstream from Duck Creek and 400 ft downstream from Lake George Dam.

Drainage area--125 sq mi.

Records available--April 1947 to September 1960.

Gage--Water-stage recorder. Datum of gage is 588.17 ft above mean sea level, datum of 1929 (levels by Indiana Flood Control and Water Resources Commission). Prior to July 30, 1952, staff gage and July 30, 1952, to July 20, 1955, water-stage recorder, at site 400 ft upstream at datum 11.83 ft (corrected) higher.

Average discharge--13 years (1947-60), 98.2 cfs (revised).

Extremes--1947-60: Maximum discharge, 3,880 cfs Oct. 11, 1954 (gage height, 19.48 ft, present datum, site then in use); minimum, 2.0 cfs (regulated) Oct. 8, 1956; minimum gage height, 3.35 ft Sept. 21, 1956.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	24.2	36.2	42.7	125	205	141	237	224	55.8	83.8	30.5	34.1	103
1952	61.1	243	78.1	265	85.5	184	200	55.3	218	23.0	12.3	10.6	120
1953	12.0	18.4	21.7	31.8	78.3	220	83.8	81.7	66.3	32.9	13.1	9.06	55.7
1954	13.5	11.5	15.1	19.5	49.8	209	236	73.8	30.1	67.5	29.9	11.5	64.0
1955	433	50.5	76.9	161	115	175	88.2	30.1	21.5	19.9	26.1	14.2	102
1956	29.5	35.1	23.6	18.3	158	109	120	303	31.8	16.8	11.2	8.95	71.8
1957	6.42	10.7	15.6	18.3	25.9	38.3	227	181	102	222	33.6	13.8	74.9
1958	41.1	118	126	55.1	75.2	102	45.5	21.8	202	41.5	170	25.8	85.3
1959	16.3	30.9	20.1	37.7	415	229	186	219	48.2	250	68.4	28.9	127
1960	155	205	137	227	297	149	241	89.2	187	73.7	18.6	15.2	149

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.22	0.32	0.39	1.15	1.71	1.30	2.12	2.06	0.50	0.77	0.28	0.30	11.12
1952	.56	2.16	.72	2.44	.74	1.70	1.78	.60	1.94	.21	.11	.09	13.05
1953	.11	.16	.20	.29	.65	2.03	.75	.75	.59	.30	.12	.08	6.03
1954	.12	.10	.14	.18	.41	1.92	2.11	.68	.27	.62	.28	.10	6.93
1955	3.99	.45	.71	1.49	.96	1.61	.79	.28	.19	.18	.24	.13	11.02
1956	.27	.31	.22	.17	1.36	1.01	1.07	2.79	.28	.15	.10	.08	7.81
1957	.06	.10	.14	.17	.22	.35	2.03	1.67	.91	2.05	.31	.12	8.13
1958	.38	1.05	1.16	.51	.63	.94	.41	.20	1.81	.38	1.57	.23	9.27
1959	.15	.28	.19	.35	3.46	2.11	1.66	2.02	.43	2.31	.63	.26	13.85
1960	1.43	1.83	1.27	2.10	2.57	1.37	2.15	.82	1.67	.68	.17	.14	16.20

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	152	16.54
1951	1207	1,440	May 11, 1951	9.2	103	0.824	11.12	126	13.63
1952	1237	1,340	Nov. 14, 1951	7.1	120	.960	13.05	92.8	10.10
1953	1277, 1337	912	Mar. 16, 1953	6.0	55.7	.446	6.03	54.7	5.92
1954	1337	1,440	Mar. 26, 1954	6.8	84.0	.512	6.93	108	11.72
1955	1387	3,880	Oct. 11, 1954	4.6	102	.816	11.02	61.4	6.67
1956	1437, 1507	1,320	May 11, 1956	4.9	71.8	.574	7.81	67.2	7.31
1957	1507	1,650	July 14, 1957	4.4	74.9	.599	8.13	96.0	10.42
1958	1557	720	June 10, 1958	12	85.3	.682	9.27	67.0	7.30
1959	1627	1,970	July 24, 1959	11	127	1.02	13.85	163	17.76
1960	1707	1,260	Feb. 11, 1960	8.0	149	1.19	16.20	-	-

## 932. Little Calumet River at Gary, Ind.

Location--Lat 41°34'19", long 87°19'13", in SE $\frac{1}{4}$  sec.15, T.36 N., R.8 W., on right bank at upstream side of Pennsylvania Railroad bridge at Gary, 1.3 miles downstream from bridge on State Highway 53 and 1.5 miles upstream from confluence with Deep River.

Drainage area--Indeterminate.

Records available--June 1958 to September 1960.

Gage--Water-stage recorder. Datum of gage is 580.00 ft above mean sea level, datum of 1929.

Extremes--1958-60: Maximum discharge, 196 cfs May 1, 1959 (gage height, 9.63 ft); no flow Sept. 13-20, 1959, Aug. 30 to Sept. 16, 1960.

Remarks--Flow is generally west to east except during times of flood, when the flow passing the gage may be either east or west, depending on the stages in Hart ditch and in Deep River.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	3.46	19.5	8.41	-
1959	5.18	6.38	3.83	7.97	57.9	48.9	36.9	81.3	20.8	21.6	9.88	1.73	25.0
1960	11.9	19.0	18.7	29.1	41.9	24.3	46.6	20.6	27.6	10.8	1.61	.487	20.9

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1958	1627	a87	June 13, 1958	-	-	-	-	-	-	-	-
1959	1627	196	May 1, 1959	0	25.0	-	-	27.9	-	-	-
1960	1707	94	Feb. 11 or 12	0	20.9	-	-	-	-	-	-

a Maximum during period June 11 to Sept. 30.

## 935. Burns ditch at Gary, Ind.

Location (revised)--Lat 41°34'30", long 87°17'20", in N $\frac{1}{2}$  sec.13, T.36 N., R.8 W., on left bank on downstream side of bridge on Central Avenue, 0.4 mile east of Gary and 0.4 mile downstream from confluence of Deep River and Little Calumet River.

Drainage area--About 160 sq mi.

Records available--October 1943 to September 1960 (October 1950 to September 1955, high-water records only).

Gage--Water-stage recorder. Datum of gage is 577.04 ft above mean sea level, datum of 1929. Prior to July 28, 1955, wire-weight gage at same site and datum.

Average discharge--12 years (1943-50, 1955-60), 139 cfs.

Extremes--1943-60: Maximum discharge, 3,430 cfs Oct. 11, 1954; maximum gage height, 16.44 ft Mar. 16, 1944, from graph based on gage readings: minimum discharge determined, 1.8 cfs Oct. 14, 1946.

Remarks--Burns ditch is an artificial channel which reverses the direction of flow of part of Little Calumet River and flows into Lake Michigan at Wickliffe.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	60.7	56.6	34.2	30.4	209	168	156	475	47.6	35.5	20.4	11.5	109
1957	12.9	15.6	20.8	28.3	44.8	82.2	291	255	121	294	60.8	22.8	104
1958	66.3	173	178	842	92.4	149	72.2	32.0	252	45.2	196	39.9	115
1959	25.8	40.6	27.6	49.7	519	296	259	347	83.6	288	94.2	33.3	170
1960	180	259	177	310	383	195	340	140	243	87.8	21.9	18.1	195

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	0.44	0.40	0.25	0.22	1.41	1.21	1.09	3.42	0.33	0.26	0.15	0.08	9.26
1957	.09	.12	.15	.20	.29	.59	2.03	1.83	.84	2.12	.44	.16	8.86
1958	.48	1.20	1.28	.81	1.60	1.07	.50	1.76	.33	1.41	.28	.28	9.75
1959	.19	.28	.20	.36	3.37	2.13	1.81	2.50	.58	2.08	.68	.23	14.41
1960	1.29	1.81	1.28	2.24	2.58	1.41	2.36	1.01	1.70	.63	.16	.13	16.60

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	-	-
1951	1207	1,540	May 12, 1951	-	-	-	-	-	-	-	-
1952	1237	1,420	Nov. 15, 1951	-	-	-	-	-	-	-	-
1953	1277	946	Mar. 16, 1953	-	-	-	-	-	-	-	-
1954	1337	1,420	Mar. 26, 1954	-	-	-	-	-	-	-	-
1955	1387	3,430	Oct. 11, 1954	-	-	-	-	-	-	-	-
1956	1437	1,690	May 11, 1956	7.6	109	0.681	9.26	100	8.53	-	-
1957	1507	1,640	July 14, 1957	9.0	104	.650	8.86	135	11.46	-	-
1958	1557	755	June 11, 1958	14	115	.719	9.75	87.9	7.46	-	-
1959	1627	1,880	July 25, 1959	9.0	170	1.06	14.41	214	18.12	-	-
1960	1707	1,420	Feb. 12, 1960	8.9	195	1.22	16.60	-	-	-	-

## 940. Little Calumet River at Porter, Ind.

Location.--Lat 41°37'18", long 87°05'13", in NE $\frac{1}{4}$  sec.34, T.37 N., R.6 W., near center of span on downstream side of highway bridge, three-quarters of a mile northwest of Porter and 4.5 miles upstream from Salt Creek.

Drainage area.--62.9 sq mi.

Records available.--May 1945 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 603.48 ft above mean sea level, datum of 1929. Prior to June 26, 1952, wire-weight gage at same site and datum.

Average discharge.--15 years (1945-60), 71.6 cfs.

Extremes.--1945-60: Maximum discharge, 3,110 cfs Oct. 10, 1954 (gage height, 11.66 ft); minimum, 15 cfs Dec. 6, 1958, result of freezeup; minimum gage height, 2.14 ft Aug. 22, 1949.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	34.0	42.3	61.0	115	114	81.9	136	156	45.7	52.7	53.0	77.2	80.5
1952	87.8	144	83.4	154	70.2	82.0	98.4	67.1	64.4	33.5	32.5	28.5	78.8
1953	28.0	36.1	38.6	46.4	58.7	97.6	66.2	81.7	55.9	29.2	27.4	21.4	48.9
1954	24.5	27.4	36.8	34.7	65.6	118	174	49.9	36.4	55.8	38.4	29.7	57.4
1955	414	69.5	84.9	95.3	94.2	113	86.4	47.3	45.1	33.5	52.8	34.7	98.0
1956	62.6	66.3	56.7	41.8	103	94.8	104	107	35.8	28.5	25.0	22.7	62.2
1957	25.7	29.4	34.5	40.2	47.6	56.4	145	68.9	37.4	33.8	50.6	29.2	49.8
1958	57.1	90.5	105	60.1	89.0	91.9	45.3	33.5	58.9	34.1	40.9	23.5	60.7
1959	25.9	33.2	26.3	31.1	170	137	134	69.7	38.2	91.7	32.1	31.5	67.7
1960	100	115	90.4	128	171	99.1	112	58.5	91.2	39.1	49.0	31.3	90.0

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.62	0.75	1.12	2.10	1.88	1.50	2.41	2.86	0.81	0.96	0.97	1.37	17.35
1952	1.61	2.55	1.53	2.82	1.20	1.50	1.74	1.23	1.14	.61	.59	.51	17.03
1953	.51	.64	.71	.85	.97	1.79	1.17	1.50	.99	.53	.50	.38	10.54
1954	.45	.49	.67	.64	1.08	2.17	3.09	.91	.65	1.02	.70	.53	12.40
1955	7.59	1.23	1.56	1.75	1.56	2.08	1.53	.87	.80	.61	.97	.62	21.17
1956	1.15	1.17	1.04	.77	1.77	1.74	1.84	1.96	.63	.52	.46	.42	13.47
1957	.47	.52	.63	.74	.79	1.03	2.58	1.27	.66	.62	.93	.52	10.76
1958	1.05	1.61	1.92	1.10	1.47	1.68	.80	.61	1.04	.62	.75	.42	13.07
1959	.48	.59	.48	.57	2.81	2.51	2.38	1.28	.68	1.68	.59	.56	14.61
1960	1.83	2.04	1.66	2.34	2.93	1.82	1.99	1.07	1.62	.72	.90	.56	19.48

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	105	22.62
1951	1207	1,360	May 11, 1951	30	80.5	1.28	17.35	95.3	20.55
1952	1237	1,060	Nov. 14, 1951	25	78.8	1.25	17.03	61.1	13.20
1953	1277	521	May 23, 1953	19	48.9	.777	10.54	47.7	10.29
1954	1357	1,170	Apr. 26, 1954	18	57.4	.913	12.40	98.0	21.17
1955	1387	3,110	Oct. 10, 1954	26	98.0	1.56	21.17	65.5	14.15
1956	1437	1,370	Apr. 29, 1956	21	62.2	.989	13.47	54.2	11.73
1957	1507	848	Apr. 27, 1957	22	49.8	.792	10.76	63.5	13.72
1958	1557	490	Feb. 28, 1958	20	60.7	.965	13.07	46.6	10.04
1959	1627	1,420	Apr. 28, 1959	22	67.7	1.08	14.61	86.2	18.59
1960	1707	1,120	Feb. 11, 1960	24	90.0	1.43	19.48	-	-

## 945. Salt Creek near McCool, Ind.

Location.--Lat 41°35'48", long 87°08'40", in SE $\frac{1}{4}$  sec.6, T.36 N., R.6 W., on left bank on downstream side of highway bridge, 50 ft downstream from New York Central Railroad bridge, 1 $\frac{1}{2}$  miles north of McCool, and 1.5 miles upstream from Little Calumet River.

Drainage area.--78.7 sq mi.

Records available.--May 1945 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 594.10 ft above mean sea level, datum of 1929 (levels by Indiana Flood Control and Water Resources Commission). Prior to July 25, 1955, wire-weight gage at same site and datum.

Average discharge.--15 years (1945-60), 71.5 cfs (revised).

Extremes.--1945-60: Maximum discharge, 3,180 cfs Oct. 11, 1954 (gage height, 14.12 ft); minimum, 6.3 cfs Aug. 24, 1955 (gage height, 2.31 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	38.7	42.2	55.1	101	123	91.9	152	132	50.6	70.0	64.5	63.9	81.8
1952	92.9	151	66.4	164	77.9	115	126	65.0	88.3	36.9	34.8	31.0	87.5
1953	28.8	36.8	43.9	46.7	53.4	99.9	61.7	65.1	53.4	28.5	26.0	24.2	47.4
1954	26.5	29.5	38.4	37.0	67.5	122	149	49.1	40.7	66.8	40.6	27.8	57.7
1955	335	58.8	73.8	103	88.4	107	82.0	43.6	45.4	35.6	43.5	31.3	87.5
1956	55.9	58.5	42.9	37.1	107	77.3	113	143	36.3	41.6	29.5	25.0	63.8
1957	24.1	27.7	31.7	40.4	51.6	55.7	147	70.4	53.2	72.9	47.8	28.0	54.1
1958	59.3	89.4	93.3	55.6	*59.9	70.2	45.9	29.9	91.1	37.2	65.5	30.2	*60.6
1959	28.6	39.0	31.8	37.9	238	128	127	69.7	40.0	112	36.5	36.1	76.0
1960	91.0	104	76.5	123	153	111	118	61.1	84.2	45.2	40.1	31.4	86.2

\* Revised.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.57	0.60	0.81	1.48	1.63	1.35	2.15	1.93	0.72	1.02	0.94	0.91	14.11
1952	1.36	2.14	.97	2.40	1.07	1.68	1.78	.95	1.25	.54	.51	.44	15.09
1953	.42	.52	.64	.68	.71	1.46	.87	.95	.76	.42	.38	.34	8.15
1954	.39	.42	.56	.54	.89	1.79	2.11	.72	.58	.98	.60	.39	9.97
1955	4.91	.83	1.08	1.51	1.17	1.57	1.16	.64	.64	.52	.64	.44	15.11
1956	.82	.83	.63	.54	1.47	1.13	1.61	2.10	.51	.61	.43	.35	11.03
1957	.35	.39	.46	.59	.68	.82	2.09	1.03	.75	1.07	.70	.40	9.33
1958	.87	1.27	1.37	.81	*7.9	1.03	.65	.44	1.29	.55	.96	.43	*10.46
1959	.42	.55	.47	.56	3.14	1.98	1.80	1.02	.57	1.64	.53	.51	13.09
1960	1.34	1.47	1.12	1.80	2.09	1.63	1.67	.89	1.19	.66	.59	.45	14.90

\* Revised.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	98.6	17.02
1951	1207	970	May 11, 1951	29	81.8	1.04	14.11	96.3	16.80
1952	1237	912	Nov. 14, 1951	27	87.5	1.11	15.09	70.6	12.20
1953	1277	454	Mar. 16, 1953	19	47.4	.602	8.15	46.1	7.94
1954	1337	910	Mar. 26, 1954	20	57.7	.733	9.97	89.3	15.42
1955	1387	3,180	Oct. 11, 1954	22	87.5	1.11	15.11	61.2	10.57
1956	1437	1,280	Apr. 29, 1956	23	63.8	.811	11.03	57.7	9.95
1957	1507	725	Apr. 27, 1957	22	54.1	.687	9.33	67.4	11.64
1958	1557	456	Nov. 15, 1957	23	*60.6	*.770	*10.46	*46.6	*8.39
1959	1627	1,200	Apr. 26, 1959	24	76.0	.966	13.09	90.4	15.58
1960	1707	980	Feb. 11, 1960	28	86.2	1.10	14.90	-	-

\* Revised.

## 965. East Branch Coldwater River at Coldwater, Mich.

Location.--Lat 41°56'25", long 85°01'00", in NW $\frac{1}{4}$  sec.21, T.6 S., R.6 W., on downstream side of Jay Street Bridge at Coldwater, 1 mile upstream from mouth.

Drainage area.--About 60 sq mi.

Records available.--October 1937 to September 1960. Monthly discharge only for October, November 1937, published in WSP 1307.

Gage.--Wire-weight and crest-stage gages. Datum of gage is 930.72 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Oct. 1, 1947, staff gage at site 400 ft downstream at same datum.

Average discharge.--23 years (1937-60), 45.2 cfs.

Extremes.--1937-60: Maximum discharge, 735 cfs Apr. 24, 1950 (gage height, 6.60 ft); minimum, 0.1 cfs Dec. 13, 15-18, 1946, Sept. 12-18, 24, 1953, Sept. 21, 22, 1955.

Remarks.--Flow infrequently affected by contribution to or from Coldwater Lake. Regulation caused by dam at outlet of Marble Lake.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	18.2	25.0	83.7	99.3	108	135	128	121	47.4	46.0	35.2	12.8	71.3
1952	15.9	69.1	74.5	155	133	116	159	103	51.0	16.5	8.05	5.34	75.3
1953	2.08	.99	4.45	10.7	13.6	33.0	34.6	30.6	7.18	2.03	1.06	.85	11.8
1954	2.66	.63	.83	.65	9.07	42.9	114	84.3	46.8	29.9	13.7	5.53	29.1
1955	63.1	59.3	56.9	91.9	54.6	126	63.9	29.7	17.1	9.22	4.48	1.21	48.2
1956	4.22	11.9	12.7	7.93	24.0	91.3	62.1	153	32.1	19.4	13.8	6.87	36.8
1957	1.46	1.16	3.11	5.16	11.7	13.8	39.3	28.2	19.0	14.7	9.81	7.32	12.9
1958	5.39	25.6	51.3	32.9	24.2	46.1	37.6	19.8	10.2	18.2	28.0	16.2	26.3
1959	9.89	15.8	16.3	14.2	84.8	117	121	66.7	23.5	12.7	10.5	4.57	41.0
1960	10.1	25.6	35.9	91.7	93.2	46.5	106	65.5	78.4	48.7	17.8	10.8	52.3

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	116	-
1951	1207	a285	Apr. 29, 1951	7.4	71.3	-	-	73.9	-
1952	1237	a428	Nov. 14, 1951	3.1	75.3	-	-	62.6	-
1953	1277	44	Apr. 30, 1953	.1	11.8	-	-	11.3	-
1954	1337	187	Apr. 26, 1954	.4	29.1	-	-	44.0	-
1955	1387	215	Mar. 4, 1955	.1	48.2	-	-	35.5	-
1956	1437	332	Apr. 29, 1956	.5	36.8	-	-	34.9	-
1957	1507	59	Apr. 27, 1957	.4	12.9	-	-	19.3	-
1958	1557	99	Dec. 20, 1957	3.1	26.3	-	-	23.0	-
1959	1627	230	Feb. 23, 1959	3.3	41.0	-	-	-	-
1960	1707	236	Jan. 13, 1960	4.3	52.3	-	-	-	-

a Observed.

## 975. St. Joseph River at Three Rivers, Mich.

Location.--Lat 41°56'25", long 85°38'00", in S $\frac{1}{2}$  sec.18, T.6 S., R.11 W., on right bank in Scidmore Park at Three Rivers, 250 ft downstream from Rocky River and at mile 112.

Drainage area.--1,320 sq mi, approximately.

Records available.--May 1953 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 781.34 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--7 years (1953-60), 1,008 cfs.

Extremes.--1953-60: Maximum discharge, 3,970 cfs Jan. 17, 1960 (gage height, 7.56 ft); minimum daily, 96 cfs Aug. 30, 1953.

Remarks.--Flow regulated by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	523	330	320	253	-
1954	245	298	389	426	1,043	1,699	2,310	1,464	1,233	857	496	414	903
1955	1,152	1,113	1,153	1,639	1,313	2,174	1,539	935	664	582	423	382	1,089
1956	781	939	871	623	845	2,076	1,396	2,721	1,043	685	579	445	1,086
1957	336	399	532	554	778	859	1,566	1,136	751	574	379	420	670
1958	575	981	1,289	1,136	916	1,523	1,050	735	458	473	491	526	846
1959	520	596	546	528	1,274	2,572	2,342	1,495	730	448	520	346	991
1960	838	1,127	1,217	2,181	2,231	1,431	2,462	1,671	1,934	1,304	719	604	1,472

Monthly and yearly runoff, in inches, of St. Joseph River at Three Rivers, Mich.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	0.44	0.29	0.28	0.21	-
1954	0.21	0.25	0.34	0.37	0.82	1.48	1.95	1.28	1.04	.75	.43	.35	9.27
1955	1.01	.94	1.01	1.43	1.04	1.90	1.30	.82	.56	.51	.37	.32	11.21
1956	.68	.79	.76	.54	.69	1.81	1.18	2.38	.88	.60	.51	.38	11.20
1957	.28	.34	.48	.48	.61	.75	1.15	.99	.62	.50	.33	.35	6.87
1958	.50	.83	1.13	.99	.72	1.33	.89	.64	.39	.41	.43	.44	8.70
1959	.45	.50	.48	.46	1.01	2.25	1.98	1.31	.62	.39	.45	.29	10.19
1960	.73	.95	1.06	1.91	1.82	1.25	2.08	1.46	1.63	1.14	.63	.51	15.17

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-
1953	1277	1,530	May 14, 1953	-	-	-	-	-	-	-
1954	1337	3,200	Mar. 29, 1954	114	903	0.684	9.27	1,112	11.43	10.48
1955	1387	2,620	Mar. 25, 1955	187	1,089	.825	11.21	1,019	-	-
1956	1437	3,740	May 12, 1956	291	1,086	.823	11.20	976	10.06	8.24
1957	1507	2,320	Apr. 30, 1957	141	670	.508	6.87	803	-	-
1958	1557	2,350	Mar. 4, 5, 1958	260	846	.641	8.70	747	7.67	-
1959	1627	3,690	Apr. 6, 1959	220	991	.751	10.19	1,118	11.50	-
1960	1707	3,970	Jan. 17, 1960	402	1,472	1.12	15.17	-	-	-

985. Fawn River near White Pigeon, Mich.

Location.--Lat 41°47'00", long 85°35'00", in SW $\frac{1}{4}$  sec.10, T.8 S., R.11 W., on right bank a quarter of a mile downstream from bridge on county highway, 3.1 miles east of White Pigeon and  $3\frac{1}{2}$  miles upstream from outlet of Klinger Lake.

Drainage area.--191 sq mi.

Records available.--July 1903 to July 1904 (gage height and discharge measurements only), October 1957 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 805.4 ft above mean sea level, datum of 1929.

Extremes.--1957-60: Maximum discharge, 410 cfs Apr. 6 or 7, 1959, estimated on basis of records for nearby stations; minimum, 47 cfs Sept. 17, 1949 (gage height, 1.92 ft).

Remarks.--Small diurnal fluctuation caused by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	92.0	144	161	149	123	184	147	97.7	82.1	125	136	130	131
1959	117	141	126	117	221	299	317	234	119	99.1	80.4	73.6	162
1960	123	143	148	215	261	202	266	227	241	202	138	123	190

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	0.56	0.84	0.97	0.90	0.87	1.11	0.86	0.59	0.48	0.76	0.82	0.76	9.32
1959	.71	.83	.76	.71	1.21	1.91	1.85	1.41	.70	.60	.49	.43	11.51
1960	.74	.83	.90	1.30	1.48	1.22	1.55	1.37	1.41	1.22	.83	.72	13.57

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1958	1557	230	Feb. 28, 1958	59	131	0.686	9.32	130	9.25	-
1959	1627	410	Apr. 6 or 7, 1959	53	162	.848	11.51	164	11.68	-
1960	1707	346	June 17, 18, 1960	92	190	.995	13.57	-	-	-

## 990. St. Joseph River at Mottville, Mich.

Location.--Lat 41°48'05", long 85°45'15", in SW $\frac{1}{4}$  sec.6, T.8 S., R.12 W., Michigan meridian, on right bank 500 ft upstream from bridge on U.S. Highway 112 at Mottville, 0.4 mile downstream from Michigan Gas and Electric Co. hydroelectric plant, 4 miles upstream from Pigeon River, and at mile 96.

Drainage area.--1,860 sq mi, approximately.

Records available.--October 1923 to September 1960. Monthly discharge only for October, November 1923, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 755.3 ft above mean sea level (Michigan Gas and Electric Co. bench mark). Prior to Oct. 1, 1951, at site 0.4 mile upstream at datum 4.2 ft higher.

Average discharge.--37 years (1923-60), 1,525 cfs.

Extremes.--1923-60: Maximum discharge, 10,700 cfs Apr. 27, 1950 (gage height, 6.56 ft, site and datum then in use); minimum daily, 44 cfs Oct. 17, 1937.

Remarks.--Flow regulated by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,228	1,298	2,143	2,597	2,637	2,819	2,587	2,416	1,780	1,839	1,547	1,063	1,994
1952	1,505	2,323	2,292	4,065	3,376	3,114	3,532	2,897	2,286	1,381	1,066	940	2,394
1953	637	898	1,223	1,309	1,307	1,741	1,584	1,471	867	576	659	472	1,078
1954	478	587	734	678	1,437	2,236	3,091	2,025	1,639	1,284	759	660	1,297
1955	1,793	1,770	1,728	2,301	1,725	2,965	2,091	1,302	1,008	815	633	595	1,561
1956	1,123	1,268	1,148	849	1,126	2,805	1,806	3,547	1,411	1,097	984	662	1,490
1957	581	738	876	849	1,078	1,153	1,725	1,523	1,046	881	588	649	972
1958	738	1,234	1,580	1,459	1,165	2,003	1,407	1,011	682	847	946	904	1,166
1959	907	1,057	958	927	1,845	3,269	3,074	2,067	1,065	758	798	635	1,443
1960	1,164	1,442	1,533	2,706	2,884	1,880	3,110	2,325	2,540	1,846	1,073	914	1,946

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.76	0.78	1.33	1.61	1.48	1.75	1.55	1.50	1.07	1.14	0.96	0.64	14.57
1952	.93	1.39	1.42	2.52	1.96	1.93	2.12	1.80	1.37	.86	.66	.56	17.52
1953	.52	.54	.76	.81	.73	1.08	.95	.91	.52	.36	.41	.28	7.87
1954	.30	.35	.46	.42	.80	1.39	1.85	1.25	.98	.80	.47	.40	9.47
1955	1.11	1.06	1.07	1.43	.97	1.84	1.25	.81	.60	.50	.39	.36	11.59
1956	.70	.76	.71	.53	.65	1.74	1.08	2.20	.85	.68	.61	.40	10.91
1957	.36	.44	.54	.53	.60	.71	1.03	.94	.63	.55	.36	.39	7.08
1958	.46	.74	.98	.90	.65	1.24	.84	.63	.41	.52	.59	.54	8.50
1959	.56	.63	.59	.57	1.03	2.03	1.84	1.28	.64	.47	.49	.38	10.51
1960	.72	.87	.95	1.68	1.67	1.17	1.87	1.44	1.52	1.14	.67	.55	14.25

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	2,905	21.20
1951	1207	4,280	Feb. 25, 1951	776	1,994	1.07	14.57	2,115	15.44
1952	1237	5,470	May 27, 28, 1952	488	2,394	1.29	17.52	2,130	15.60
1953	1277	2,540	May 12, 1953	266	1,078	.580	7.87	980	7.16
1954	1337	4,130	Mar. 29, 1954	231	1,297	.697	9.47	1,591	11.60
1955	1387	3,410	Mar. 7, 1955	245	1,561	.839	11.39	1,414	10.32
1956	1437	5,300	May 12, 1956	344	1,490	.801	10.91	1,377	10.08
1957	1507	3,300	May 1, 1957	318	972	.523	7.08	1,086	7.92
1958	1557	3,050	Mar. 5, 1958	395	1,166	.627	8.50	1,113	8.10
1959	1627	4,630	Apr. 6, 1959	282	1,443	.776	10.51	1,546	11.27
1960	1707	4,600	Apr. 3, 1960	646	1,946	1.05	14.25	-	-



995. Pigeon Creek at Hogback Lake Outlet, near Angola, Ind.

Location.--Lat 41°37'24", long 85°05'44", in NE¼NW¼ sec.36, T.37 N., R.12 E., on right bank 200 ft north of lake outlet, 2 miles southeast of Flint, and 5.1 miles west of Angola.

Drainage area.--102 sq mi.

Records available.--October 1945 to September 1960. Prior to October 1947, published as "near Flint."

Gage.--Water-stage recorder. Datum of gage is 940.00 ft above mean sea level, datum of 1929. Prior to October 1947, wire-weight gage at site 1½ miles downstream at different datum. October 1947 to Aug. 3, 1953, staff gage at site 600 ft downstream at same datum.

Average discharge.--15 years (1945-60), 81.8 cfs.

Extremes.--1945-60: Maximum discharge, 744 cfs Apr. 8, 1950 (gage height, 14.95 ft); minimum, 5.2 cfs Oct. 19-25, 1953; minimum gage height, 7.24 ft Sept. 9, 10, 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	46.0	72.1	179	148	193	204	176	186	76.9	154	51.3	27.2	124
1952	34.5	74.7	81.0	236	170	179	192	126	91.4	33.4	28.0	22.5	106
1953	17.0	19.6	28.9	34.0	36.6	85.4	21.4	56.9	21.7	16.7	21.6	8.05	34.9
1954	6.56	8.39	11.7	14.3	33.0	101	215	83.4	39.5	38.5	22.4	14.4	49.0
1955	154	71.6	74.5	156	84.1	174	92.8	43.9	31.5	29.7	28.0	15.1	79.8
1956	33.8	74.9	47.7	24.2	81.3	243	97.9	383	68.3	39.8	61.7	27.0	99.0
1957	16.3	20.9	29.2	38.5	58.6	74.6	204	107	59.3	61.3	21.6	16.7	58.9
1958	25.1	63.7	114	73.1	445	119	79.4	37.6	29.3	29.0	45.4	102	63.6
1959	45.2	67.6	46.6	55.4	257	201	223	119	40.3	24.5	22.6	19.5	92.3
1960	48.9	86.1	77.6	162	158	63.5	197	83.3	152	59.1	25.9	21.2	94.0

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.50	0.79	2.03	1.68	1.97	2.31	1.93	2.10	0.84	1.52	0.58	0.30	16.55
1952	.39	.82	.92	2.67	1.80	2.02	2.10	1.42	1.00	.38	.32	.25	14.09
1953	.19	.21	.33	.38	.37	.96	.78	.64	.24	.19	.24	.09	4.62
1954	.07	.09	.13	.16	.34	1.14	2.35	.94	.43	.43	.25	.16	6.49
1955	1.74	.78	.84	1.76	.86	1.97	1.02	.50	.34	.34	.32	.16	10.63
1956	.38	.82	.54	.27	.86	2.74	1.07	4.32	.75	.45	.70	.30	13.20
1957	.18	.23	.33	.43	.60	.84	2.23	1.21	.65	.69	.24	.18	7.81
1958	.28	.70	1.29	.83	.45	1.35	.87	1.43	.32	.33	.51	1.12	8.48
1959	.51	.74	.53	.63	2.62	2.27	2.44	1.35	.44	.28	.26	.21	12.28
1960	.55	.94	.88	1.83	1.67	.72	2.15	.94	1.66	.67	.29	.23	12.53

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	168	21.88
1951	1207	448	Feb. 24, 1951	21	124	1.22	16.55	115	15.36
1952	1237	370	Jan. 21-22, 1952	17	134.9	1.04	14.09	95.0	12.68
1953	1277	122	Mar. 19, 1953	5.8	34.9	.542	4.82	31.6	4.18
1954	1337	317	Mar. 30, 1954	5.2	49.0	.480	6.49	72.0	9.56
1955	1387	a339	Oct. 17-18, 1954	12	79.8	.782	10.63	67.6	9.01
1956	1437	548	May 4, 1956	13	99.0	.971	13.20	91.5	12.20
1957	1507	317	Apr. 14, 1957	15	58.9	.577	7.81	70.4	9.34
1958	1557	a274	Sept. 20-21, 1958	14	63.6	.624	8.48	59.9	7.99
1959	1627	a442	Feb. 17-19, 1959	15	92.3	.905	12.28	96.7	12.87
1960	1707	339	Jan. 18, 1960	18	94.0	.922	12.53	-	-

a Maximum daily discharge.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

1000. Christiana Creek at Elkhart, Ind.

Location.--Lat 41°41'45", long 85°58'35", in NE $\frac{1}{4}$  sec.5, T.37 N., R.5 E., on right bank at Elkhart Water Works pumping plant, three-eighths of a mile upstream from mouth.

Drainage area.--119 sq mi.

Records available.--December 1946 to June 1952.

Gage.--Staff gage. Datum of gage is 730.00 ft above mean sea level, datum of 1929. Prior to Oct. 1, 1948, wire-weight gage at site 700 ft downstream at same datum.

Extremes.--1946-52: Maximum discharge, 452 cfs Apr. 8, 1947 (gage height, 2.19 ft, site then in use); minimum, 37 cfs Aug. 26, 1949.

Remarks.--Water is diverted down an old millrace about a quarter of a mile upstream, entering into St. Joseph River about 1 mile downstream. Diurnal fluctuation caused by small powerplant about 6 miles above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	95.0	103	137	154	146	141	158	157	128	110	104	92.5	127
1952	137	163	148	206	170	164	164	151	154	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	165	-
1951	1207	247	Jan. 7, 1951	74	127	-	-	136	-
1952	1237	278	Jan. 23, 1952	95	-	-	-	-	-

1002.2. North Branch Elkhart River near Cosperville, Ind.

Location.--Lat 41°29'32", long 85°26'54", in SW $\frac{1}{4}$ NE $\frac{1}{4}$  sec.14, T.35 N., R.9 E., on downstream side of county road bridge over outlet of Waldron Lake at extreme west end of lake, 1.5 miles northeast of Cosperville and 6.6 miles northwest of Albion.

Drainage area.--133 sq mi.

Records available.--October 1950 to September 1960.

Gage.--Wire-weight gage. Datum of gage is 880.00 ft above mean sea level, datum of 1929. Prior to Aug. 7, 1956, staff gage at same site and datum.

Average discharge.--10 years (1950-60), 124 cfs.

Extremes.--1950-60: Maximum discharge observed, 717 cfs May 13, 1956 (gage height, 8.78 ft); minimum, 2.2 cfs Sept. 17, 18, 21, 1959; minimum gage height, 4.50 ft Oct. 3, 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	94.2	107	332	293	334	365	295	215	116	271	134	57.6	216
1952	70.9	82.0	125	246	196	216	233	137	118	48.2	36.4	35.2	129
1953	24.2	36.6	61.1	71.2	63.0	106	99.6	101	39.2	16.1	28.2	6.10	54.4
1954	6.26	13.6	27.7	31.9	63.8	117	213	129	144	142	54.7	30.6	81.1
1955	344	140	120	236	128	294	165	80.7	56.7	54.5	79.2	29.7	145
1956	69.8	119	67.5	44.7	124	288	149	516	117	45.5	70.3	26.0	137
1957	15.3	26.5	44.1	63.0	90.4	101	304	151	84.6	66.7	14.0	15.9	81.0
1958	35.3	70.9	141	120	66.4	114	88.4	41.2	45.6	69.4	78.4	232	91.9
1959	135	74.1	59.2	103	381	353	320	156	64.9	31.7	24.3	14.7	142
1960	105	97.4	126	234	242	134	296	173	316	166	27.6	35.4	162

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.82	0.90	2.88	2.54	2.61	3.16	2.48	1.87	0.97	2.35	1.16	0.48	22.22
1952	.61	.69	1.08	2.13	1.58	1.87	1.95	1.19	.99	.42	.32	.30	13.13
1953	.21	.31	.53	.62	.49	.92	.84	.88	.33	.14	.24	.05	5.56
1954	.05	.11	.24	.28	.50	1.01	1.78	1.12	1.20	1.23	.47	.26	8.25
1955	2.99	1.17	1.04	2.04	1.00	2.55	1.38	.70	.48	.47	.69	.25	14.76
1956	.61	1.00	.59	.39	1.01	2.50	1.25	4.47	.98	.39	.61	.22	14.02
1957	.13	.22	.38	.55	.71	.87	2.56	1.31	.71	.58	.12	.13	8.27
1958	.31	.59	1.22	1.04	.52	.99	.74	.36	.38	.60	.68	1.94	9.37
1959	1.16	.62	.81	.89	2.96	3.06	2.71	1.35	.54	.27	.21	.12	14.44
1960	.91	.82	1.09	2.03	1.96	1.16	2.49	1.50	2.66	1.44	.24	.30	16.60

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1437	623	Feb. 22-25, 1951	39	218	1.64	22.22	196	20.00
1952	1437	330	(a)	25	129	.970	13.13	115	11.80
1953	1437	139	Mar. 16-17, 1953	3.5	54.4	.409	5.56	48.1	4.91
1954	1437	293	Apr. 26-29, 1954	3.5	81.1	.610	8.25	128	13.05
1955	1437	601	Oct. 16-18, 1954	19	145	1.09	14.76	115	11.76
1956	1437	717	May 13, 1956	10	137	1.03	14.02	123	12.55
1957	1507	406	Apr. 12-14, 1957	7.7	81.0	.609	8.27	94.6	8.66
1958	1357	494	Sept. 20, 1958	15	91.9	.691	9.37	93.7	9.56
1959	1627	574	Feb. 15-16, 1959	2.2	142	1.07	14.44	147	14.95
1960	1707	476	June 19-22, 1960	14	162	1.22	16.60	-	-

a Jan. 21-22, Apr. 15-17, 1952.

## 1005. Elkhart River at Goshen, Ind.

Location.--Lat 41°35', long 85°50", near line between secs. 8 and 9, T.36 N., R.6 E., on right bank 20 ft downstream from River Avenue Bridge at Goshen and half a mile upstream from Rock Run.

Drainage area.--580 sq mi.

Records available.--April 1931 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 769.43 ft above mean sea level, datum of 1929. Prior to Nov. 20, 1931, chain gage at same site and datum.

Average discharge.--29 years (1931-60), 512 cfs.

Extremes.--1931-60: Maximum discharge, 5,440 cfs Apr. 4, 1950 (gage height, 10.15 ft); maximum gage height, 10.33 ft July 10, 1951; minimum daily discharge, 11 cfs Oct. 15, 1953.

Remarks.--Flow regulated by three powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	358	401	963	1,005	1,126	1,077	1,071	788	427	1,079	504	278	754
1952	411	691	671	1,438	1,143	988	1,034	709	613	366	260	210	710
1953	170	214	322	422	416	628	527	530	271	165	195	97.9	330
1954	97.4	125	172	183	352	646	1,315	712	545	579	464	513	458
1955	1,652	720	615	1,055	703	1,014	689	441	355	334	359	149	676
1956	381	605	356	245	724	980	800	1,973	471	241	274	176	603
1957	143	171	224	294	397	368	1,149	563	362	315	136	126	353
1958	174	319	655	510	373	541	370	222	279	417	712	784	447
1959	517	420	333	400	1,657	1,395	1,304	718	360	305	175	137	636
1960	350	513	532	996	1,042	672	1,221	815	957	416	208	223	659

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.67	0.77	1.91	2.00	2.02	2.14	2.06	1.57	0.82	2.14	1.00	0.54	17.64
1952	.62	1.33	1.33	2.88	2.13	1.96	1.99	1.41	1.18	.73	.52	.40	16.66
1953	.34	.41	.64	.84	.75	1.24	1.01	1.05	.52	.33	.39	.19	7.71
1954	.19	.24	.34	.36	.63	1.28	2.53	1.42	1.05	1.15	.92	.60	10.71
1955	5.29	1.28	1.22	2.10	1.26	2.02	1.33	.88	.68	.66	.71	.29	15.82
1956	.76	1.16	.71	.49	1.35	1.95	1.54	3.92	.91	.48	.54	.34	14.15
1957	.28	.33	.45	.58	.71	.73	2.21	1.12	.70	.63	.27	.24	8.25
1958	.35	.61	1.30	1.01	.67	1.08	.71	.44	.54	.83	1.42	1.51	10.47
1959	1.03	.81	.66	.80	2.88	2.78	2.51	1.43	.69	.61	.35	.26	14.91
1960	.70	.99	1.06	1.98	1.94	1.34	2.35	1.63	1.84	.83	.41	.43	15.50

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,046	24.47
1951	1207	5,260	July 10, 1951	230	754	1.30	17.64	759	17.77
1952	1237	2,510	Jan. 2, 1952	112	710	1.22	16.66	620	14.57
1953	1277	1,160	Mar. 16, 1953	50	330	.569	7.71	303	7.09
1954	1337, 1557	3,480	Apr. 26, 1954	11	458	.790	10.71	677	15.83
1955	1387	5,260	Oct. 11, 1954	80	676	1.17	15.82	536	12.56
1956	1437	4,320	Apr. 30, 1956	47	603	1.04	14.15	536	12.58
1957	1507	1,820	Apr. 12, 1957	34	353	.609	8.25	404	9.45
1958	1557	1,680	Dec. 21, 1957	30	447	.771	10.47	457	10.71
1959	1627	2,910	Feb. 14, 1959	20	636	1.10	14.91	646	15.16
1960	1707	2,910	Apr. 18, 1960	152	659	1.14	15.50	-	-

1010. St. Joseph River at Elkhart, Ind.

Location.--Lat 41°41'30", long 85°58'25", in NE $\frac{1}{4}$  sec. 5, T.37 N., R.5 E., on left bank 100 ft downstream from Elkhart River, 200 ft upstream from Main Street Bridge in Elkhart, and 1,900 ft downstream from Christiana Creek.

Drainage area.--3,339 sq mi.

Records available.--August 1947 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 700.00 ft above mean sea level, datum of 1929.

Average discharge.--13 years (1947-60), 3,174 cfs.

Extremes.--1947-60: Maximum discharge, 18,400 cfs Apr. 5, 1950 (gage height, 27.82 ft); minimum daily, 564 cfs Nov. 1, 5, 1956.

Remarks.--Flow regulated by Elkhart Hydroelectric Plant, 2,400 ft upstream, and by hydroelectric plant on Elkhart River at Goshen.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2,260	2,577	4,320	5,104	5,209	4,918	4,774	4,559	3,316	3,918	3,033	2,031	3,831
1952	2,754	4,131	4,005	7,086	5,887	5,314	5,866	4,765	3,920	2,580	2,124	1,813	4,183
1953	1,705	1,862	2,311	2,480	2,460	3,349	2,966	2,734	1,762	1,199	1,327	976	2,093
1954	952	1,140	1,305	1,285	2,559	3,951	5,921	3,956	3,346	2,677	1,973	1,583	2,549
1955	4,935	3,425	3,321	4,430	3,556	5,216	3,917	2,560	2,195	1,995	1,719	1,342	3,220
1956	2,322	2,623	2,307	1,786	3,056	5,483	3,759	7,725	3,037	2,150	2,292	1,617	3,185
1957	1,241	1,402	1,861	1,840	2,429	2,465	4,009	3,160	2,239	1,950	1,268	1,315	2,094
1958	1,469	2,451	3,145	2,891	2,283	3,584	2,633	1,911	1,714	2,111	2,599	2,492	2,426
1959	2,045	2,095	1,858	1,827	4,721	6,218	5,400	3,915	2,230	1,755	1,481	1,298	2,889
1960	2,597	2,972	3,081	4,931	5,198	3,573	5,637	4,258	4,866	3,449	2,112	2,026	3,698

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.78	0.86	1.49	1.76	1.62	1.70	1.60	1.58	1.11	1.35	1.05	0.68	15.58
1952	.95	1.38	1.38	2.44	1.90	1.83	1.98	1.65	1.30	.89	.73	.61	17.04
1953	.59	.62	.80	.86	.77	1.15	.99	.94	.59	.41	.46	.33	8.51
1954	.33	.38	.45	.44	.80	1.36	1.98	1.36	1.12	.92	.68	.53	10.35
1955	1.71	1.15	1.15	1.53	1.10	1.80	1.30	.88	.73	.69	.59	.45	13.08
1956	.80	.88	.80	.62	.99	1.89	1.26	2.66	1.02	.74	.79	.54	12.99
1957	.43	.47	.64	.64	.76	.85	1.34	1.09	.75	.67	.44	.44	8.52
1958	.51	.82	1.09	1.00	.71	1.23	.88	.66	.57	.73	.83	.83	9.86
1959	.71	.70	.63	.63	1.47	2.14	1.81	1.35	.75	.61	.51	.43	11.74
1960	.83	.99	1.06	1.71	1.68	1.23	1.89	1.48	1.63	1.19	.73	.68	15.10

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	5,398	21.94
1951	1207	9,380	Feb. 22, 1951	1,690	3,831	1.15	15.58	3,974	16.16
1952	1237	9,920	Jan. 21, 1952	1,290	4,183	1.25	17.04	3,765	15.34
1953	1277	5,240	Mar. 16, 1953	710	2,093	.627	8.51	1,885	7.66
1954	1337	9,560	Apr. 26, 1954	649	2,549	.763	10.35	3,246	13.20
1955	1387	a9,000	Oct. 12, 1954	968	3,220	.964	13.08	2,846	11.55
1956	1437	14,000	May 12, 1956	1,120	3,185	.954	12.99	2,956	12.05
1957	1507	5,480	Nov. 6, 1956	564	2,094	.627	9.52	2,309	9.40
1958	1557	5,160	Mar. 4, 1958	776	2,426	.727	9.86	2,334	9.48
1959	1627	9,600	Apr. 8, 1959	764	2,889	.865	11.74	3,096	12.58
1960	1707	8,600	(b)	1,500	3,698	1.11	15.10	-	-

a Maximum daily.

b Jan. 18, Apr. 18, 1960.

1015. St. Joseph River at Niles, Mich.

Location.--Lat 41°49'45", long 86°15'35", in SW¼ sec.26, T.7 S., R.17 W., on right bank 100 ft upstream from Main Street Bridge at Niles, 0.6 mile downstream from dam of French Paper Co., 1 mile upstream from Dowagiac River, and at mile 44.

Drainage area.--3,620 sq mi, approximately.

Records available.--October 1930 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 635.02 ft above mean sea level, datum of 1929. Oct. 1, 1930, to Feb. 11, 1931, tape gage on Main Street Bridge, and Feb. 12 to June 30, 1931, staff gage 50 ft upstream from present site (gage heights referred to mean sea level). Since Oct. 1, 1943, auxiliary gage is headwater gage at hydroelectric plant at Buchanan Dam, 8 miles upstream.

Average discharge.--30 years (1930-60), 3,143 cfs.

Extremes.--1930-60: Maximum discharge, 20,200 cfs Apr. 5, 1950 (gage height, 13.10 ft); minimum daily, 420 cfs Aug. 30, 1931.

Remarks.--Flow regulated by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2,663	2,723	4,665	5,582	5,561	5,830	5,614	5,116	3,606	4,424	3,532	2,433	4,293
1952	3,357	4,852	4,509	8,125	6,488	5,869	6,460	5,170	4,355	2,987	2,269	1,855	4,685
1953	1,825	2,075	2,620	2,835	2,756	3,743	3,392	3,049	1,855	1,596	1,535	1,122	2,349
1954	1,124	1,237	1,268	1,278	2,629	4,113	6,302	4,161	3,646	3,086	2,170	1,644	2,717
1955	5,687	4,069	3,530	4,617	3,851	5,707	4,298	2,800	2,203	1,899	1,674	1,277	3,513
1956	2,554	2,835	2,402	1,819	3,107	5,770	4,087	8,354	3,379	2,245	2,298	1,585	3,375
1957	1,505	1,702	1,931	2,006	2,560	2,807	4,676	3,569	2,424	2,010	1,347	1,585	2,339
1958	1,905	2,844	3,619	3,248	2,704	4,057	2,980	2,293	1,777	2,188	2,477	2,603	2,727
1959	2,297	2,411	2,068	2,005	5,161	6,941	6,461	4,411	2,425	1,840	1,641	1,402	3,240
1960	2,517	3,211	3,218	5,451	5,798	3,820	6,285	4,620	5,223	3,583	2,189	1,942	3,976

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.85	0.84	1.49	1.71	1.60	1.86	1.73	1.63	1.11	1.41	1.12	0.75	16.10
1952	1.07	1.50	1.44	2.59	1.93	1.87	1.99	1.65	1.34	.95	.72	.57	17.62
1953	.58	.64	.83	.90	.79	1.19	1.05	.97	.57	.44	.49	.35	8.80
1954	.36	.38	.40	.41	.76	1.31	1.94	1.33	1.12	.98	.69	.51	10.19
1955	1.87	1.25	1.16	1.53	1.11	1.82	1.32	.89	.68	.60	.53	.39	13.15
1956	.81	.87	.76	.58	.93	1.84	1.26	2.66	1.04	.71	.73	.49	12.68
1957	.48	.52	.61	.64	.74	.89	1.44	1.14	.75	.64	.43	.49	8.77
1958	.61	.88	1.15	1.03	.78	1.29	.92	.73	.55	.70	.79	.80	10.23
1959	.73	.74	.66	.64	1.48	2.21	1.99	1.40	.75	.59	.52	.43	12.14
1960	.80	.99	1.02	1.74	1.73	1.22	1.94	1.47	1.61	1.14	.70	.60	14.96

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff 10 inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	5,851	21.93
1951	1207	10,600	Jan. 4, 1951	1,560	4,293	1.19	16.10	4,514	16.93		
1952	1237	11,800	Jan. 21, 1952	556	4,683	1.29	17.62	4,166	15.66		
1953	1277	5,700	Mar. 26, 1953	748	2,349	.649	8.80	2,106	7.89		
1954	1337	11,600	Apr. 26, 1954	663	2,717	.751	10.19	3,555	13.33		
1955	1387	12,000	Oct. 12, 1954	663	3,513	.970	13.15	3,024	11.31		
1956	1437	14,500	May 13, 1956	800	3,375	.932	12.68	3,154	11.85		
1957	1507	6,500	Apr. 27, 1957	977	2,339	.646	8.77	2,610	9.80		
1958	1557	15,780	Dec. 20, 1957	774	2,727	.753	10.23	2,593	9.72		
1959	1627	9,470	Apr. 3, 1959	758	3,240	.895	12.14	3,423	12.82		
1960	1707	9,980	Jan. 13, 1960	1,290	3,976	1.10	14.96	-	-		

\* Not previously published.

1020. St. Joseph River at Berrien Springs, Mich.

Location.--Lat 41°56'55", long 86°20'00", in SW $\frac{1}{4}$  sec.18, T.6 S., R.17 W., on right bank 30 ft upstream from bridge on U.S. Highway 31 at Berrien Springs and at mile 24.

Drainage area.--4,081 sq mi.

Records available.--April 1901 to April 1903, October 1903 to December 1906, January 1909 to October 1931, June 1951 to September 1956. Monthly discharge only for some periods, published in WSP 1307. Published as "at Buchanan" 1901-2 and as "near Buchanan" 1903-7.

Gage.--Water-stage recorder. Datum of gage is 594.38 ft above mean sea level (Indiana & Michigan Electric Co. bench mark). Prior to December 1906, records computed from Buchanan powerplant data at site 10.6 miles upstream; January 1909 to October 1931, records computed from Berrien Springs powerplant data at site 0.6 mile upstream.

Average discharge.--31 years (1901-2, 1903-6, 1909-31, 1951-56), 3,373 cfs.

Extremes.--1901-6, 1909-31, 1951-56: Maximum daily discharge, 18,600 cfs Mar. 27, 1904; minimum daily not determined.

Remarks.--Flow regulated by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	4,967	4,186	3,112	-
1952	3,974	5,508	5,139	9,045	7,203	6,461	7,133	5,814	4,997	3,458	2,919	2,446	5,335
1953	2,234	2,508	3,039	3,245	3,123	4,144	3,712	3,478	2,218	1,679	1,884	1,458	2,726
1954	1,464	1,622	1,811	1,799	3,239	4,825	7,266	4,756	4,285	3,785	2,894	2,245	3,328
1955	6,927	4,836	4,401	5,788	4,648	6,564	5,065	3,438	2,896	2,552	2,263	1,802	4,269
1956	3,205	3,457	2,974	2,290	3,648	6,373	4,603	9,251	3,786	2,825	2,700	1,894	3,924
1957	-	-	-	-	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	1.40	1.18	0.85	-
1952	1.12	1.51	1.45	2.56	1.90	1.83	1.95	1.64	1.37	.98	.82	.67	17.80
1953	.63	.69	.86	.92	.80	1.17	1.01	.98	.61	.47	.53	.40	9.07
1954	.41	.44	.51	.51	.83	1.36	1.99	1.34	1.17	1.07	.82	.61	11.06
1955	1.96	1.32	1.24	1.64	1.19	1.85	1.38	.97	.79	.72	.64	.49	14.19
1956	.91	.95	.84	.65	.96	1.80	1.26	2.61	1.03	.80	.76	.52	13.09
1957	-	-	-	-	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	-	-
1951	1237	-	-	-	-	-	-	-	-	-	-
1952	1237	13,200	Jan. 21, 1952	1,410	5,335	1.31	17.80	4,763	15.90		
1953	1277	7,140	Mar. 17, 1953	1,100	2,726	.668	9.07	2,484	8.25		
1954	1337	13,400	Apr. 26, 1954	840	3,328	.815	11.06	4,276	14.22		
1955	1387	14,200	Oct. 16, 1954	1,050	4,269	1.05	14.19	3,718	12.37		
1956	1437	15,600	May 13, 1956	1,300	3,924	.962	13.09	-	-		
1957	-	-	-	-	-	-	-	-	-		
1958	-	-	-	-	-	-	-	-	-		
1959	-	-	-	-	-	-	-	-	-		
1960	-	-	-	-	-	-	-	-	-		

## 1025. Paw Paw River at Riverside, Mich.

Location.--Lat 42°11'10", long 86°22'05", in SE $\frac{1}{4}$  sec.23, T.3 S., R.18 W., on left bank at upstream side of county highway bridge, three-quarters of a mile east of Riverside.

Drainage area.--391 sq mi.

Records available.--October 1951 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 588.80 ft above mean sea level, datum of 1929.

Average discharge.--9 years (1951-60), 397 cfs.

Extremes.--1951-60: Maximum discharge, 1,650 cfs Jan. 23, 1952 (gage height, 8.72 ft); minimum, 139 cfs Sept. 18, 1959; minimum gage height, 2.92 ft Sept. 7, 1953, July 17, 1959.

Remarks.--Diurnal fluctuation, principally during low flow, caused by papermill above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	572	735	566	1,038	741	711	752	628	532	360	320	266	601
1953	275	334	448	454	436	506	395	442	241	199	226	177	344
1954	191	225	278	269	435	544	653	378	435	316	230	208	346
1955	764	641	545	588	523	707	510	347	317	241	202	224	467
1956	410	469	435	317	387	669	495	783	309	244	213	210	412
1957	198	233	277	317	360	390	505	477	255	236	188	218	304
1958	244	376	495	367	350	647	361	287	267	228	208	223	338
1959	210	237	232	226	399	749	512	410	245	201	202	164	315
1960	322	379	414	653	635	441	735	442	523	372	268	211	448

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	1.69	2.10	1.67	3.06	2.04	2.10	2.15	1.85	1.52	1.06	0.94	0.76	20.94
1953	.81	.95	1.32	1.34	1.16	1.49	1.13	1.30	.69	.59	.67	.51	11.69
1954	.56	.64	.82	.79	1.16	1.60	1.86	1.11	1.24	.93	.68	.59	11.98
1955	2.25	1.83	1.61	1.73	1.39	2.09	1.46	1.02	.90	.71	.59	.64	16.22
1956	1.21	1.34	1.28	.94	1.07	1.97	1.41	2.31	.88	.72	.63	.60	14.36
1957	.58	.67	.82	.93	.96	1.15	1.44	1.41	.73	.70	.55	.62	10.56
1958	.72	1.07	1.46	1.08	.93	1.91	1.03	.85	.76	.67	.61	.64	11.73
1959	.62	.68	.68	.67	1.06	2.21	1.46	1.21	.70	.59	.60	.47	10.95
1960	.95	1.08	1.22	1.92	1.75	1.30	2.10	1.30	1.49	1.10	.79	.60	15.60

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	1,650	Jan. 23, 1952	247	601	1.54	20.94	533	18.56
1953	1277	825	May 2, 1953	151	344	.880	11.69	314	10.90
1954	1337	1,120	Apr. 26, 1954	156	346	.885	11.98	451	15.65
1955	1387	1,570	Oct. 18, 1954	160	467	1.19	16.22	414	14.36
1956	1437	1,480	May 3, 1956	192	412	1.05	14.36	362	12.60
1957	1507	815	Apr. 28, 1957	170	304	.777	10.56	358	11.74
1958	1557	1,080	Mar. 5, 1958	169	336	.864	11.73	301	10.46
1959	1627	875	Mar. 21, 1959	144	315	.806	10.95	352	12.22
1960	1707	1,620	Apr. 2, 1960	177	448	1.15	15.60	-	-



1035. Kalamazoo River at Marshall, Mich.

Location.--Lat 42°15'55", long 84°57'55", on line between secs. 25 and 26, T.2 S., R.6 W., on left bank at upstream side of bridge on U.S. Highway 27 at Marshall.

Drainage area.--449 sq mi.

Records available.--October 1948 to September 1960. Monthly discharge only for October 1948, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 877.09 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Nov. 11, 1948, wire-weight gage at same site and datum.

Average discharge.--12 years (1948-60), 325 cfs.

Extremes.--1948-60: Maximum discharge, 2,130 cfs Mar. 29, 1950 (gage height, 8.20 ft); minimum, 26 cfs Aug. 30, 1952; minimum daily, 36 cfs July 24, 1958.

Remarks.--Diurnal fluctuation caused by powerplant above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	303	372	461	501	593	542	545	540	382	440	344	276	441
1952	381	442	400	666	482	581	672	522	336	293	237	230	437
1953	218	270	299	289	268	384	323	268	212	231	167	132	257
1954	141	149	162	158	344	444	489	284	390	279	176	166	264
1955	470	325	322	379	358	534	410	276	275	246	199	164	330
1956	245	283	227	181	270	536	432	702	339	258	232	204	326
1957	146	172	255	236	281	286	387	284	195	195	143	149	225
1958	170	234	302	224	213	307	265	196	156	151	143	137	208
1959	184	199	169	166	312	561	526	338	196	162	147	145	258
1960	248	284	273	407	383	332	503	329	397	336	222	194	325

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.78	0.92	1.18	1.29	1.37	1.39	1.35	1.39	0.95	1.13	0.88	0.69	13.32
1952	.98	1.10	1.03	1.71	1.16	1.49	1.67	1.34	.84	.75	.61	.57	13.25
1953	.56	.67	.77	.74	.62	.99	.80	.74	.53	.59	.45	.33	7.77
1954	.36	.37	.42	.41	.80	1.14	1.22	.73	.97	.72	.45	.41	8.00
1955	1.21	.81	.83	.97	.83	1.37	1.02	.71	.68	.63	.51	.41	9.98
1956	.63	.70	.58	.47	.65	1.38	1.07	1.80	.84	.66	.60	.51	9.89
1957	.38	.43	.60	.61	.65	.73	.96	.73	.48	.50	.37	.37	6.81
1958	.44	.58	.78	.57	.49	.79	.66	.50	.39	.39	.37	.34	6.30
1959	.47	.49	.43	.43	.72	1.44	1.31	.87	.49	.42	.38	.36	7.81
1960	.64	.71	.70	1.05	.92	.85	1.25	.84	.99	.86	.57	.48	9.66

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	521	15.74
1951	1207	1,030	Feb. 21, 1951	175	441	0.982	13.32	448	13.55
1952	1237	1,180	Apr. 16, 1952	127	437	.973	13.25	400	12.14
1953	1277	638	Mar. 5, 1953	78	257	.572	7.77	229	6.92
1954	1337	940	Mar. 27, 1954	82	264	.588	8.00	320	9.70
1955	1387	872	Oct. 14, 1954	110	330	.735	9.98	299	9.04
1956	1437	1,500	May 1, 1956	116	326	.726	9.89	310	9.39
1957	1507	724	Apr. 27, 28, 1957	86	225	.501	6.81	238	7.20
1958	1557	701	Mar. 1, 1958	36	208	.463	6.30	195	5.89
1959	1627	1,040	Apr. 3, 1959	64	258	.575	7.81	280	8.47
1960	1707	1,110	Apr. 1, 1960	92	325	.724	9.86	-	-

## 1040. Battle Creek at Charlotte, Mich.

Location.--Lat 42°32'20", long 84°50'55", in SW $\frac{1}{4}$  sec.24, T.2 N., R.5 W., on left bank at upstream side of highway bridge, 1 mile southwest of Charlotte.

Drainage area.--67 sq mi, approximately.

Records available.--February 1948 to September 1954.

Gage.--Staff gage. Datum of gage is 869.36 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--6 years (1948-54), 38.8 cfs.

Extremes.--1948-54: Maximum discharge, 722 cfs Mar. 20, 1948 (gage height, 7.64 ft); minimum observed (revised), 4.8 cfs Oct. 8, 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	16.5	20.8	53.3	71.9	101	55.4	60.6	41.6	32.9	21.7	18.5	11.7	41.8
1952	25.6	47.3	38.9	120	51.1	94.6	105	52.6	22.7	14.2	10.2	8.58	49.3
1953	7.34	14.1	20.5	25.5	22.9	53.4	54.3	26.2	62.4	11.1	8.60	5.67	24.3
1954	5.70	7.37	9.81	8.96	54.1	88.0	56.2	22.9	32.6	13.2	8.99	7.74	26.1

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.28	0.35	0.92	1.24	1.57	0.95	1.01	0.72	0.55	0.37	0.32	0.20	8.48
1952	.44	.79	.67	2.06	1.82	1.63	1.76	.91	.38	.24	.18	.14	10.02
1953	.13	.23	.35	.44	.36	.92	.57	.45	1.04	.19	.15	.09	4.92
1954	.10	.12	.17	.15	.84	1.51	.94	.39	.54	.23	.15	.13	5.27

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	1207	336	Feb. 20, 1951	10	41.8	0.624	8.48	61.6	12.49	
1952	1237	336	Apr. 14, 1952	5.3	49.3	.736	10.02	43.5	8.83	
1953	1277	326	June 7, 1953	5.1	24.3	.363	4.92	22.7	4.60	
1954	1337	376	Mar. 27, 1954	5.0	26.1	.390	5.27	-	-	

## 1045. Battle Creek at Bellevue, Mich.

Location.--Lat 42°26'35", long 85°02'00", in W $\frac{1}{2}$  sec.28, T.1 N., R.6 W., on right bank at downstream side of bridge on State Highway 78 and 0.8 mile west of Bellevue.

Drainage area.--178 sq mi.

Records available.--February 1948 to September 1953.

Gage.--Staff gage. Datum of gage is 838.51 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--5 years (1948-53), 142 cfs.

Extremes.--1948-53: Maximum discharge, 2,190 cfs Mar. 20, 1948 (gage height, 6.1 ft, from graph based on gage readings); minimum not determined.

Remarks.--Slight diurnal fluctuation caused by mill above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	55.6	80.6	196	306	360	185	197	135	112	623	38.6	31.4	145
1952	102	179	152	450	166	305	320	174	78.8	45.5	56.3	28.4	170
1953	30.8	52.4	63.4	78.7	68.3	190	118	85.0	141	37.0	29.9	22.2	76.3

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.36	0.50	1.27	1.98	2.11	1.20	1.24	0.88	0.70	0.40	0.25	0.20	11.09
1952	.66	1.12	.98	2.92	1.00	1.97	2.01	1.13	.49	.29	.24	.18	12.99
1953	.20	.33	.41	.51	.40	1.23	.74	.55	.88	.24	.19	.14	5.82

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	1174	-	-	-	-	-	-	217	16.53	
1951	1207	1,450	Jan. 5, 1951	26	145	0.815	11.09	154	11.72	
1952	1237	900	Apr. 14, 1952	20	170	.955	12.99	146	11.17	
1953	1277	550	June 7, 1953	19	76.3	.429	5.82	-	-	

1050. Battle Creek at Battle Creek, Mich.

Location.--Lat 42°19'55", long 85°09'15", in sec.5, T.2 S., R.7 W., on right bank 350 ft upstream from Emmett Street Bridge at Battle Creek and 3 miles upstream from mouth.

Drainage area.--241 sq mi.

Records available.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 823.24 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to May 14, 1951, staff gage at same site and datum.

Average discharge.--27 years (1930-31, 1934-60), 199 cfs.

Extremes.--1930-31, 1932-60: Maximum discharge, 3,640 cfs Apr. 7, 1947 (gage height, 4.48 ft, from floodmark); minimum, 22 cfs Aug. 14, 1934; minimum gage height, about -0.5 ft in July 1936 and on Aug. 31, 1939, due to opening of gates at dam forming control.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	119	142	294	407	404	269	321	259	189	119	93.2	87.6	224
1952	181	296	240	591	282	471	522	311	162	94.7	73.4	70.5	274
1953	73.4	110	136	145	135	268	212	164	248	72.1	61.4	45.2	141
1954	52.5	65.0	79.2	70.5	295	397	330	139	202	82.6	62.6	60.6	152
1955	290	194	203	295	239	422	214	112	110	69.1	47.9	44.8	187
1956	83.6	129	108	79.7	92.9	452	329	776	128	89.0	79.9	58.8	202
1957	54.3	72.6	92.1	107	149	175	305	366	129	111	44.5	47.4	138
1958	65.2	201	226	135	126	317	163	87.3	83.0	72.8	62.5	60.8	135
1959	67.8	73.0	68.0	73.0	116	595	354	163	121	63.6	59.2	55.0	151
1960	184	213	222	422	274	238	603	280	456	180	105	71.4	270

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.57	0.66	1.41	1.95	1.75	1.29	1.48	1.24	0.88	0.57	0.45	0.41	12.66
1952	.86	1.37	1.15	2.83	1.26	2.25	2.42	1.49	.75	.45	.35	.33	15.51
1953	.35	.51	.65	.69	.58	1.38	.98	.79	1.15	.34	.29	.21	7.92
1954	.25	.30	.38	.34	1.28	1.90	1.53	.66	.93	.40	.30	.28	8.55
1955	1.39	.90	.97	1.41	1.03	2.02	.99	.54	.51	.33	.23	.21	10.53
1956	.40	.60	.52	.38	.42	2.16	1.52	3.71	.59	.43	.38	.27	11.38
1957	.26	.34	.44	.51	.64	.84	1.41	1.75	.60	.53	.21	.22	7.75
1958	.40	.93	1.08	.64	.54	1.52	.76	.42	.38	.35	.30	.28	7.60
1959	.32	.34	.33	.35	.50	2.85	1.64	.78	.56	.30	.28	.25	8.51
1960	.88	.99	1.06	2.02	1.23	1.14	2.79	1.34	2.11	.86	.50	.33	15.25

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	333	18.76	
1951	1207	1,560	Jan. 6, 1951	63	224	0.929	12.66	238	13.40	
1952	1237	1,300	Jan. 18, 1952	62	274	1.14	15.51	241	13.64	
1953	1277	919	June 8, 1953	40	141	.585	7.92	130	7.34	
1954	1337	1,260	Mar. 27, 1954	40	152	.631	8.55	193	10.88	
1955	1387	901	Feb. 23, 1955	37	187	.776	10.53	156	8.79	
1956	1437	1,840	May 1, 1956	50	202	.838	11.38	193	10.90	
1957	1507	1,000	May 22, 1957	36	138	.573	7.75	162	9.12	
1958	1557	739	Mar. 2, 1958	39	135	.560	7.60	110	6.18	
1959	1627	1,020	Mar. 18, 1959	39	151	.627	8.50	185	10.44	
1960	1707	1,970	Apr. 1, 1960	60	270	1.12	15.25	-	-	

## 1055. Kalamazoo River near Battle Creek, Mich.

Location.--Lat 42°19'26", long 85°11'51", in SW $\frac{1}{4}$  sec.1, T.2 S., R.8 W., near center of span on upstream side of bridge on Kendall Street in Battle Creek.

Drainage area.--824 sq mi.

Records available.--July 1937 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight gage. Altitude of gage is 815 ft (from topographic map). Prior to Oct. 1, 1957, water-stage recorder at site 4.7 miles downstream at various datums. Oct. 1, 1957, to June 15, 1959, staff gage at bridge 1,800 ft upstream at different datum.

Average discharge.--23 years (1937-60), 666 cfs.

Extremes.--1937-60: Maximum discharge, 7,290 cfs Apr. 7, 1947 (gage height, 9.13 ft, site and datum then in use); minimum, 50 cfs Sept. 22, 1939; minimum daily, 131 cfs Aug. 20, 1958.

Remarks.--Diurnal fluctuation, below 1,500 cfs, caused by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	557	659	935	1,157	1,259	1,033	1,046	958	724	659	527	455	828
1952	669	904	852	1,495	964	1,270	1,416	1,064	778	519	439	414	901
1953	375	499	570	543	484	840	622	551	548	377	286	227	494
1954	265	267	323	323	806	1,029	1,021	548	778	414	319	259	527
1955	943	686	684	857	742	1,167	724	490	488	398	300	255	645
1956	418	550	445	330	458	1,260	922	1,751	512	426	373	308	648
1957	275	323	405	412	520	570	798	815	497	424	290	320	470
1958	352	547	632	445	450	762	525	336	364	515	270	246	436
1959	305	339	314	313	525	1,376	1,048	598	369	285	249	250	497
1960	523	537	562	912	746	635	1,143	671	1,007	632	341	304	666

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.76	0.87	1.27	1.57	1.54	1.40	1.37	1.30	0.95	0.89	0.71	0.60	13.23
1952	.91	1.19	1.16	2.03	1.22	1.72	1.86	1.44	1.02	.70	.60	.54	14.39
1953	.51	.66	.77	.74	.59	1.14	.82	.75	.72	.51	.39	.30	7.90
1954	.36	.35	.44	.44	.99	1.40	1.34	.74	1.02	.56	.43	.34	8.41
1955	1.28	.90	.93	1.16	.91	1.58	.95	.67	.64	.54	.41	.33	10.30
1956	.57	.72	.60	.45	.58	1.71	1.21	2.38	.67	.58	.51	.40	10.38
1957	.37	.42	.55	.56	.64	.77	1.05	1.11	.65	.58	.39	.42	7.51
1958	.49	.74	.88	.62	.54	1.07	.71	.47	.49	.44	.38	.33	7.16
1959	.43	.46	.44	.44	.66	1.92	1.42	.84	1.50	.40	.35	.34	8.20
1960	.73	.73	.79	1.28	.98	.89	1.55	.94	1.36	.88	.48	.41	11.02

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	1,092	-	17.51	-
1951	1207	2,850	Jan. 6, 1951	373	828	0.975	13.23	851	13.59		
1952	1237	2,560	Apr. 16, 1952	352	901	1.06	14.39	816	13.07		
1953	1277	1,320	June 9, 1953	149	494	.582	7.90	444	7.11		
1954	1337	2,380	Mar. 28, 1954	161	527	.621	8.41	649	10.37		
1955	1387	1,650	Jan. 8, Mar. 2	205	645	.760	10.30	569	9.08		
1956	1437	3,510	May 2, 1956	213	648	.763	10.38	614	9.83		
1957	1507	1,530	Apr. 30, 1957	194	470	.554	7.51	514	8.28		
1958	1557	1,400	Mar. 2, 1958	131	436	.529	7.16	387	6.38		
1959	1627	2,300	Apr. 5 or 6	180	497	.603	8.20	553	9.12		
1960	1707	3,200	Apr. 1, 1960	218	666	.808	11.02	-	-		

## 1060. Kalamazoo River at Comstock, Mich.

Location.--Lat 42°17'05", long 85°30'50", in NE¼ sec.19, T.2 S., R.10 W., on left bank at downstream side of bridge on River Street, in Comstock, a quarter of a mile downstream from Comstock Creek.

Drainage area.--1,010 sq mi, approximately.

Records available.--April to August 1931, October 1932 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 759.12 ft above mean sea level, datum of 1929. Prior to October 1936, staff gage and October 1936 to October 1945, wire-weight gage, at same site and datum.

Average discharge.--28 years (1932-60), 840 cfs.

Extremes.--1931, 1932-60: Maximum discharge, 6,910 cfs Apr. 8, 1947 (gage height, 7.94 ft); minimum, 119 cfs May 29, 1958 (gage height, 0.09 ft).

Remarks.--Flow regulated by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	743	867	1,198	1,433	1,512	1,300	1,319	1,196	929	869	738	601	1,056
1952	975	1,222	1,056	1,844	1,293	1,575	1,724	1,343	941	700	544	527	1,145
1953	532	725	799	777	752	1,093	894	777	696	505	447	334	694
1954	347	407	447	427	986	1,235	1,251	703	994	581	428	397	680
1955	1,289	896	853	1,071	962	1,434	925	602	644	558	399	361	833
1956	584	710	618	489	646	1,501	1,142	2,062	723	671	552	425	846
1957	368	460	592	602	678	716	999	1,052	586	539	365	414	614
1958	465	806	856	672	647	1,029	677	459	464	509	404	360	612
1959	474	492	437	409	716	1,626	1,257	780	532	451	421	352	662
1960	712	861	833	1,304	1,114	870	1,708	1,025	1,288	874	558	491	968

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.85	0.96	1.36	1.64	1.56	1.48	1.46	1.37	1.03	0.99	0.84	0.66	14.20
1952	1.11	1.35	1.20	2.10	1.38	1.80	1.90	1.53	1.04	.80	.62	.58	15.41
1953	.61	.80	.91	.89	.78	1.25	.99	.89	.77	.58	.51	.37	9.35
1954	.40	.45	.51	.49	1.02	1.41	1.38	.80	1.10	.66	.49	.44	9.15
1955	1.47	.99	.97	1.22	.99	1.64	1.02	.69	.71	.64	.46	.40	11.20
1956	.67	.78	.71	.56	.69	1.71	1.26	2.35	.80	.77	.63	.47	11.40
1957	.42	.51	.68	.69	.70	.82	1.10	1.20	.65	.61	.42	.46	8.26
1958	.53	.89	.98	.77	.67	1.17	.75	.52	.51	.58	.46	.40	8.23
1959	.54	.54	.50	.47	.74	1.86	1.39	.89	.59	.52	.48	.39	8.91
1960	.81	.95	.95	1.49	1.19	.99	1.89	1.17	1.42	1.00	.64	.54	13.04

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,344	18.09
1951	1207	2,940	Jan. 7, 1951	512	1,056	1.05	14.20	1,093	14.69
1952	1237	3,120	Jan. 19, 1952	430	1,145	1.13	15.41	1,045	14.07
1953	1277	1,480	June 10, 1953	260	694	.687	9.35	622	8.39
1954	1357	2,480	Mar. 29, 1954	250	680	.673	9.15	835	11.22
1955	1387	2,000	Mar. 4, 1955	270	833	.825	11.20	738	9.93
1956	1437	3,560	May 3, 1956	280	846	.838	11.40	805	10.85
1957	1507	1,780	Apr. 30, 1957	250	614	.608	8.26	673	9.05
1958	1557	1,780	Mar. 4, 1958	276	612	.606	8.23	552	7.41
1959	1627	2,290	Apr. 6, 1959	294	662	.655	8.91	746	10.04
1960	1707	3,780	Apr. 2, 1960	402	968	.958	13.04	-	-

## STREAMS TRIBUTARY TO LAKE MICHIGAN

1064. West Fork Portage Creek at Kalamazoo, Mich.

Location.--Lat 42°14'40", long 85°36'50", in NE $\frac{1}{4}$  sec.5, T.3 S., R.11 W., on right bank 30 ft upstream from culvert on Oakland Drive, 2 $\frac{1}{2}$  miles upstream from mouth, and 3.7 miles southwest of main business district of Kalamazoo.

Drainage area.--21.2 sq mi.

Records available.--September 1959 to September 1960.

Gage.--Water-stage recorder and sharp-crested trapezoidal weir. Altitude of gage is 860 ft (from topographic map).

Extremes.--1959-60: Maximum discharge, 26 cfs Jan. 13, 1960 (gage height, 2.40 ft); minimum, 4.4 cfs Sept. 11, 16-19, 1959 (gage height, 1.32 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	10.3	9.18	8.28	10.8	10.1	10.1	11.7	11.9	11.4	9.25	9.40	9.64	10.2

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.58	0.48	0.45	0.58	0.51	0.55	0.62	0.64	0.60	0.50	0.51	0.51	6.51

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1707	-	-	-	-	-	-	-	-
1960	1707	26	Jan. 13, 1960	6.6	10.2	0.481	6.51	-	-

## 1065. Portage Creek at Kalamazoo, Mich.

Location.--Lat 42°16'30", long 85°34'35", on line between secs. 22 and 27, T.2 S., R.11 W., on upstream side of Reed Street Bridge at Kalamazoo, 1½ miles upstream from mouth.

Drainage area.--48 sq mi, approximately.

Records available.--October 1947 to September 1958. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 761.50 ft above mean sea level, datum of 1929. December 1947 to Feb. 24, 1948, staff gage and Feb. 25, 1948, to Dec. 7, 1955, wire-weight gage, at same site and datum.

Average discharge.--11 years (1947-58), 56.5 cfs.

Extremes.--1947-58: Maximum discharge, 580 cfs sometime in July 1954, from rating curve extended above 165 cfs by logarithmic plotting (gage height, 5.25 ft), caused by momentary gate opening of millpond; minimum, 2.0 cfs May 8, 1956 (gage height, 1.50 ft).

Remarks.--Flow regulated by St. Regis Paper Co. ponds above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	60.8	63.9	63.4	70.3	69.7	69.7	71.4	65.6	63.7	71.5	63.1	59.7	66.1
1952	75.1	73.6	67.3	80.7	73.3	78.6	81.1	87.0	69.4	70.1	60.9	58.3	73.0
1953	64.2	64.0	67.1	60.8	59.6	64.8	59.4	58.9	49.0	45.9	43.5	38.5	56.3
1954	40.6	41.4	42.1	42.4	49.0	53.0	60.2	46.0	52.5	44.4	48.7	47.1	47.2
1955	55.4	41.6	42.8	50.0	50.7	55.7	52.9	47.7	45.3	43.2	37.8	38.4	46.8
1956	52.9	51.2	47.6	43.7	50.1	57.3	61.6	73.3	63.7	52.6	51.5	53.2	54.9
1957	47.2	46.6	46.7	49.9	46.7	47.9	56.9	52.1	42.2	49.6	39.8	40.4	47.2
1958	45.1	52.1	49.5	45.2	46.0	50.0	49.3	45.4	46.3	45.6	40.7	39.7	46.1
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.46	1.49	1.52	1.69	1.51	1.67	1.66	1.58	1.48	1.72	1.52	1.39	18.69
1952	1.80	1.71	1.62	1.94	1.65	1.89	1.88	2.09	1.61	1.68	1.46	1.56	20.69
1953	1.54	1.49	1.61	1.46	1.29	1.56	1.38	1.41	1.14	1.10	1.05	.90	15.93
1954	.98	.96	1.01	1.02	1.06	1.27	1.40	1.10	1.22	1.07	1.17	1.09	13.35
1955	1.33	.97	1.03	1.20	1.10	1.34	1.23	1.15	1.05	1.04	.91	.89	13.24
1956	1.27	1.19	1.14	1.05	1.13	1.38	1.43	1.76	1.48	1.26	1.24	1.24	15.57
1957	1.13	1.08	1.12	1.20	1.01	1.15	1.32	1.25	.98	1.19	.96	.94	13.33
1958	1.08	1.21	1.19	1.08	1.00	1.20	1.15	1.09	1.08	1.05	.98	.92	13.03
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	1174	-	-	-	-	-	-	69.7	19.71
1951	1207	a272	July 22, 1951	40	66.1	1.38	18.69	68.4	19.35
1952	1237	a195	May 23, 24	18	73.0	1.52	20.69	71.2	20.20
1953	1277	a129	Oct. 9, 1952	30	56.3	1.17	15.93	50.3	14.24
1954	1337	b580	July 1954	10	47.2	.983	13.35	49.6	13.73
1955	1387	a80	Dec. 6, 1954	3.6	46.8	.975	13.24	47.8	13.51
1956	1437	208	Apr. 28, 1956	15	54.9	1.14	15.57	53.9	15.30
1957	1507	230	July 8, 1957	20	47.2	.983	13.33	47.7	13.48
1958	1557	221	July 2, 1958	30	46.1	.960	13.03	-	-
1959	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-

a Maximum observed.

b Peak caused by momentary gate opening of millpond.

## 1085. Kalamazoo River near Fennville, Mich.

Location.--Lat 42°36', long 85°59', in NE $\frac{1}{4}$  sec.5, T.2 N., R.14 W., on left bank 40 ft up-stream from bridge on State Highway 89, 2 miles downstream from Swan Creek,  $3\frac{1}{2}$  miles downstream from Calkins Dam, and  $6\frac{1}{2}$  miles east of Fennville.

Drainage area.--1,600 sq mi, approximately.

Records available.--April 1929 to September 1936, October 1937 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Published as "near Allegan" April 1929 to September 1932; as "at Calkins Bridge, near Allegan" October 1932 to September 1936 and October 1937 to September 1938; as "at Calkins Dam, near Allegan" October 1938 to September 1950.

Gage.--Water-stage recorder. Datum of gage is 586.51 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). April 1929 to September 1936 at bridge and October 1937 to September 1950 in powerplant,  $3\frac{1}{2}$  miles upstream at mean sea level datum (levels by city of Allegan).

Average discharge.--30 years (1929-36, 1937-60), 1,343 cfs.

Extremes.--1929-36, 1937-60: Maximum discharge, 17,500 cfs Apr. 11, 1947 (gage height, 606.76 ft, site and datum then in use); minimum daily, 73 cfs Aug. 31, 1941.

Remarks.--Flow regulated at low and medium stages by powerplants above station, and since June 1936 by Calkins Dam and powerplant  $3\frac{1}{2}$  miles upstream from station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,234	1,367	1,859	2,203	2,271	2,035	2,145	1,890	1,438	1,313	1,211	1,115	1,670
1952	1,537	2,127	1,900	3,013	2,163	2,392	2,643	1,926	1,546	1,203	1,031	1,004	1,873
1953	877	1,152	1,462	1,348	1,361	1,826	1,490	1,422	1,115	857	857	703	1,206
1954	636	792	873	782	1,524	1,931	2,179	1,338	1,535	1,008	792	803	1,178
1955	2,185	1,604	1,580	2,068	1,758	2,361	1,720	1,190	1,158	933	779	751	1,506
1956	1,168	1,454	1,353	1,023	1,164	2,515	2,089	3,418	1,432	1,126	931	842	1,544
1957	725	797	992	1,037	1,529	1,405	1,692	1,861	1,129	1,112	822	831	1,145
1958	997	1,478	1,344	1,217	1,201	1,864	1,294	960	947	861	808	722	1,141
1959	778	878	833	777	1,156	2,506	2,047	1,413	913	718	704	677	1,116
1960	1,110	1,322	1,405	2,135	1,928	1,634	2,562	1,785	1,927	1,324	996	855	1,579

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.89	0.95	1.34	1.59	1.48	1.47	1.50	1.36	1.00	0.95	0.87	0.78	14.18
1952	1.11	1.48	1.37	2.17	1.46	1.72	1.84	1.39	1.08	.87	.74	.70	15.93
1953	.63	.80	1.05	.97	.89	1.52	1.04	1.02	.78	.62	.62	.49	10.23
1954	.46	.55	.83	.56	.99	1.39	1.52	.96	1.07	.73	.57	.56	9.99
1955	1.57	1.12	1.14	1.49	1.14	1.70	1.20	.86	.81	.67	.56	.51	12.77
1956	.84	1.01	.97	.74	.78	1.81	1.44	2.46	1.00	.81	.67	.59	13.12
1957	.52	.55	.71	.78	.86	1.01	1.18	1.34	.79	.80	.59	.58	9.71
1958	.72	1.03	.97	.88	.78	1.34	.90	.69	.66	.62	.58	.50	9.67
1959	.56	.61	.60	.56	.75	1.81	1.43	1.02	.64	.52	.51	.47	9.48
1960	.80	.92	1.01	1.54	1.30	1.18	1.79	1.29	1.34	.95	.72	.60	13.44

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,953	17.09
1951	1207	4,700	-	585	1,670	1.04	14.18	1,762	14.96
1952	1237	5,000	Jan. 19, 1952	720	1,873	1.17	15.93	1,700	14.45
1953	1277	2,450	Mar. 16, 1953	443	1,206	.754	10.23	1,105	9.39
1954	1337	3,320	Mar. 26, 1954	268	1,178	.736	9.99	1,437	12.18
1955	1387	5,420	Oct. 12, 1954	454	1,506	.941	12.77	1,388	11.76
1956	1437	5,280	Mar. 7, 1956	598	1,544	.965	13.12	1,421	12.08
1957	1507	2,830	May 20, 1957	402	1,145	.716	9.71	1,256	10.65
1958	1557	3,400	Mar. 1, 1958	422	1,141	.713	9.67	1,030	8.72
1959	1627	3,590	Mar. 21, 1959	443	1,116	.698	9.48	1,229	10.44
1960	1707	5,280	Mar. 31, 1960	443	1,579	.987	13.44	-	-

\* Not previously published; occurred sometime in January 1951.



## 1090. Grand River at Jackson, Mich.

Location.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., on left bank at sewage-treatment plant, 1 mile north of Jackson, 2 $\frac{1}{4}$  miles upstream from Portage River, and at mile 216.

Drainage area.--174 sq mi.

Records available.--April 1935 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 900.00 ft above mean sea level (Fargo Engineering Co. bench mark). Prior to Sept. 24, 1935, staff gage at same site and datum.

Average discharge.--25 years (1935-60), 119 cfs.

Extremes.--1935-60: Maximum discharge, 1,070 cfs June 25, 1937 (gage height, 13.50 ft); minimum, 9.2 cfs Aug. 22, 1936.

Revisions.--The momentary maximum discharge for the water year 1950, published in WSP 1307, has been revised to 894 cfs.

Remarks.--Slight regulation by mills above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	79.4	130	185	202	252	278	278	263	106	170	81.3	56.4	173
1952	122	150	116	286	220	271	298	203	98.1	61.7	48.1	46.5	160
1953	44.9	58.7	98.4	93.7	93.0	160	118	108	59.4	36.4	33.0	29.1	77.8
1954	26.3	32.8	36.3	42.8	131	189	245	89.6	102	52.5	36.7	39.6	84.7
1955	188	116	112	167	103	247	160	81.5	102	57.3	48.5	32.9	118
1956	80.0	131	84.9	48.5	109	221	204	376	126	95.6	73.4	43.7	133
1957	36.8	54.9	100	89.7	122	141	147	113	79.4	59.7	51.0	54.1	87.1
1958	75.9	120	163	98.7	67.5	131	115	67.2	47.6	42.0	39.5	40.0	83.3
1959	54.7	71.0	65.8	68.6	150	295	247	131	56.8	46.5	49.7	38.2	106
1960	54.5	96.7	98.2	175	164	124	234	117	201	123	69.0	46.5	125

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.53	0.83	1.23	1.34	1.51	1.84	1.78	1.74	0.68	1.13	0.54	0.36	13.51
1952	.81	.96	.77	1.90	1.36	1.80	1.91	1.35	.63	.41	.32	.50	12.52
1953	.30	.38	.65	.62	.56	1.06	.76	.72	.38	.24	.22	.19	6.08
1954	.17	.21	.24	.28	.78	1.25	1.57	.59	.65	.35	.24	.25	6.58
1955	1.25	.74	.74	1.10	.62	1.64	1.03	.54	.65	.38	.32	.21	9.22
1956	.53	.84	.56	.32	.67	1.46	1.31	2.49	.81	.63	.49	.28	10.39
1957	.24	.35	.66	.59	.73	.93	.94	.75	.51	.40	.34	.35	6.79
1958	.50	.77	1.08	.59	.40	.87	.74	.45	.31	.28	.26	.26	6.51
1959	.36	.46	.44	.45	.89	1.95	1.58	.87	.36	.31	.33	.24	8.24
1960	.36	.62	.65	1.16	1.02	.82	1.50	.78	1.29	.82	.46	.30	9.78

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches		Mean	Runoff in inches	
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	206	-	16.08
1951	1207	914	July 22, 1951	44	173	0.994	13.51	173	13.46	-	-
1952	1237	626	Apr. 13, 1952	32	160	.920	12.52	144	11.31	-	-
1953	1277	430	June 5, 1953	15	77.8	.447	6.08	68.8	5.37	-	-
1954	1337	537	Feb. 16, 1954	16	84.7	.487	6.58	112	8.69	-	-
1955	1397	600	Oct. 14, 1954	19	118	.678	9.22	108	8.42	-	-
1956	1437	805	Apr. 29, 1956	30	133	.764	10.39	124	9.71	-	-
1957	1507	603	July 8, 1957	25	87.1	.501	6.79	101	7.89	-	-
1958	1557	736	Aug. 20 or 21	23	83.3	.479	6.51	69.2	5.42	-	-
1959	1627	681	Mar. 6, 1959	16	106	.609	8.24	111	8.61	-	-
1960	1707	621	Mar. 31, 1960	28	125	.718	9.78	-	-	-	-



1100. Orchard Creek at Munith, Mich.

Location.--Lat 42°23'35", long 84°15'50", on line between secs. 12 and 13, T.1 S., R.1 E., on upstream wingwall side of bridge on State Highway 106, half a mile west of Munith and 3 miles upstream from mouth.

Drainage area.--49 sq mi, approximately.

Records available.--March 1944 to September 1956.

Gage.--Wire-weight and crest-stage gages. Datum of gage is 900.00 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Dec. 9, 1955, staff gage at same site and datum.

Average discharge.--12 years (1944-56), 37.1 cfs.

Extremes.--1944-56: Maximum discharge, 1,470 cfs Apr. 5, 1947 (gage height, 14.88 ft, from graph based on gage readings); minimum observed, 1.6 cfs Sept. 5-7, 22, 23, 1946.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	11.8	21.2	49.7	69.3	98.8	75.0	74.8	46.7	20.2	15.7	6.79	5.28	40.9
1952	16.0	33.4	39.5	108	51.2	70.3	98.7	55.1	30.1	8.37	5.64	5.66	43.4
1953	4.77	14.6	18.6	20.5	18.3	52.5	45.6	35.2	31.8	11.3	8.77	6.36	22.4
1954	4.09	5.68	6.25	5.85	52.8	92.1	75.5	28.3	112	29.9	11.0	6.31	35.5
1955	54.0	38.3	40.4	51.2	34.1	64.7	35.8	17.6	13.4	7.30	5.11	3.57	30.5
1956	7.86	15.1	10.3	5.29	11.2	74.7	76.9	123	24.2	11.2	10.4	6.07	31.4
1957	-	-	-	-	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.28	0.48	1.17	1.63	2.10	1.76	1.70	1.10	0.46	0.37	0.16	0.12	11.33
1952	0.38	.76	.93	2.53	1.13	1.65	2.25	1.30	.69	.20	.13	.13	12.08
1953	.11	.33	.44	.48	.39	1.23	1.04	.83	.72	.27	.21	.14	6.19
1954	.10	.13	.15	.14	1.12	2.17	1.72	.67	2.56	.70	.26	.14	9.86
1955	1.27	.87	.95	1.20	.72	1.52	.82	.41	.30	.17	.12	.08	8.43
1956	.19	.34	.24	.12	.25	1.76	1.75	2.88	.55	.26	.24	.14	8.72
1957	-	-	-	-	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	60.1	16.65	
1951	1207	*385	Jan. 4, 1951	4.8	40.9	0.835	11.33	41.4	11.47	
1952	1237	440	Apr. 14, 1952	4.2	43.4	.886	12.08	39.2	10.89	
1953	1277	147	June 6, 1953	3.9	22.4	.457	6.19	20.5	5.69	
1954	1337	438	Mar. 26, 1954	2.5	35.5	.724	9.86	45.4	12.57	
1955	1387	201	(a)	2.7	30.5	.622	8.43	22.1	6.11	
1956	1437	785	Apr. 30, 1956	3.2	31.4	.641	8.72	-	-	
1957	-	-	-	-	-	-	-	-	-	
1958	-	-	-	-	-	-	-	-	-	
1959	-	-	-	-	-	-	-	-	-	
1960	-	-	-	-	-	-	-	-	-	

\* Revised.

a Oct. 4, 1954, Jan. 6, 1955.

## 1110. Grand River near Eaton Rapids, Mich.

Location.--Lat 42°32'05", long 84°37'25", in NE $\frac{1}{4}$  sec.26, T.2 N., R.3 W., on right bank 400 ft upstream from bridge on Petrieville Highway, 2 miles northeast of Eaton Rapids, 2 $\frac{1}{2}$  miles downstream from Spring Brook, 25 miles upstream from Cedar River, and at mile 178.

Drainage area.--661 sq mi.

Records available.--October 1950 to September 1960. Gage-height records for flood seasons collected in this vicinity 1905-28 are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 852.68 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--10 years (1950-60), 468 cfs.

Extremes.--1950-60: Maximum discharge, 3,360 cfs May 1, 1956 (gage height, 7.65 ft. from high-water mark); minimum, 19 cfs Sept. 3, 1960 (gage height, 0.89 ft); minimum daily, 44 cfs Sept. 22, 1955.

Remarks.--Diurnal fluctuation caused by powerplant at Smithville and mills at Eaton Rapids.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	261	414	711	887	1,214	980	972	779	567	419	253	160	615
1952	405	670	568	1,406	791	1,001	1,348	738	387	185	142	154	649
1953	155	275	381	382	351	721	569	485	393	189	141	104	346
1954	89.7	121	182	168	751	1,054	1,128	522	731	318	141	116	440
1955	875	511	511	689	546	1,039	607	323	292	167	129	89.2	482
1956	212	406	292	167	352	1,222	919	1,848	435	293	208	139	541
1957	116	173	270	282	444	536	690	592	289	267	113	159	327
1958	227	463	634	388	319	627	447	200	161	181	126	110	324
1959	199	235	205	195	490	1,442	1,074	533	224	118	113	101	410
1960	349	503	493	831	727	591	1,201	536	676	371	181	132	547

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.46	0.70	1.24	1.55	1.91	1.71	1.64	1.36	0.62	0.73	0.44	0.27	12.63
1952	.71	1.13	.99	2.45	1.29	1.75	2.28	1.29	.65	.32	.25	.26	13.37
1953	.27	.46	.66	.67	.55	1.26	.96	.85	.66	.33	.25	.17	7.09
1954	.16	.20	.32	.29	1.18	1.84	1.90	.91	1.23	.55	.28	.20	9.03
1955	1.53	.86	.89	1.20	.86	1.81	1.02	.56	.49	.29	.23	.15	9.89
1956	.37	.69	.51	.29	.54	2.13	1.55	3.22	.73	.51	.36	.23	11.13
1957	.20	.29	.47	.49	.70	.94	1.16	1.03	.49	.47	.20	.27	6.71
1958	.40	.78	1.11	.68	.50	1.09	.75	.35	.27	.32	.22	.19	6.66
1959	.35	.40	.36	.34	.77	2.51	1.81	.93	.38	.21	.20	.17	8.43
1960	.61	.85	.96	1.45	1.19	1.03	2.03	.94	1.14	.65	.32	.22	11.29

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950									
1951	1207								
1952	1237	2,430	Feb. 20, 1951	131	615	0.930	12.63	636	13.06
1953	1277	2,910	Apr. 15, 1952	104	649	.982	13.37	579	11.93
1954	1337	1,100	June 6, 1953	69	346	.523	7.09	310	6.36
1955	1387	2,160	Mar. 27, 1954	60	440	.666	9.03	567	11.63
1956		1,660	Feb. 21, 1955	44	482	.729	9.89	399	8.18
1957	1437								
1958	1507	3,360	May 1, 1956	96	541	.818	11.13	512	10.52
1959	1557	1,290	Apr. 27, 1957	66	327	.495	6.71	391	8.04
1960	1627	1,200	Dec. 23, 1957	56	324	.490	6.66	266	5.48
	1627	2,500	Mar. 6 or 7	60	410	.620	8.43	469	9.64
	1707	3,060	Mar. 31, 1960	83	547	.828	11.29	-	-

1115. Deer Creek near Dansville, Mich.

Location.--Lat 42°36'30", long 84°19'15", in E $\frac{1}{2}$  sec.33, T.3 N., R.1 E., on right bank 15 ft upstream from bridge on Clark Road, 3 $\frac{1}{2}$  miles north of Dansville, and 7 $\frac{1}{4}$  miles upstream from mouth.

Drainage area.--16.3 sq mi.

Records available.--May 1954 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--6 years (1954-60), 10.8 cfs.

Extremes.--1954-60: Maximum discharge, 570 cfs May 13, 1956 (gage height, 8.83 ft); minimum, 0.1 cfs Dec. 9, 1956, result of freezeup.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	5.01	34.1	4.47	1.47	1.04	-
1955	6.42	7.59	9.34	16.3	15.9	24.4	9.55	3.62	3.89	1.52	.874	.550	8.30
1956	1.71	5.36	3.17	1.32	4.38	38.0	34.7	57.2	4.85	3.14	3.66	1.71	13.3
1957	.95	1.39	2.79	3.60	9.25	8.19	18.2	21.7	6.08	30.5	1.31	1.14	8.78
1958	2.25	7.65	15.8	5.82	10.4	14.5	9.87	2.58	2.64	8.31	2.63	1.10	6.95
1959	1.92	2.38	2.00	3.07	6.88	48.3	24.0	7.47	3.62	9.57	9.39	4.43	10.3
1960	33.8	23.4	18.7	20.7	16.8	31.6	27.3	11.0	14.9	2.55	1.55	1.20	17.0

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	0.35	2.33	0.32	0.10	0.07	-
1955	0.45	0.52	0.66	1.15	1.02	1.72	0.65	.26	.27	.11	.06	.04	6.91
1956	.12	.37	.22	.09	.29	2.69	2.38	4.04	.33	.22	.26	.12	11.13
1957	.07	.10	.20	.25	.59	.58	1.25	1.53	.42	2.15	.09	.08	7.31
1958	.16	.52	1.12	.41	.67	1.02	.68	.18	.18	.59	.19	.08	5.80
1959	.14	.16	.14	.22	.44	3.41	1.64	.53	.25	.68	.66	.30	8.57
1960	2.39	1.60	1.32	1.46	1.11	2.24	1.87	.78	1.02	.18	.11	.08	14.16

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	1337	*241	June 17, 1954	-	-	-	-	-	-
1955	1387	155	Jan. 5, 1955	0.4	8.30	0.509	6.91	7.19	5.99
1956	1437	570	May 13, 1956	.6	13.3	.816	11.13	12.9	10.79
1957	1507	345	July 12, 1957	.6	8.78	.539	7.31	10.5	8.74
1958	1557	131	July 4, 1958	.8	6.95	.426	5.80	5.32	4.44
1959	1627	299	Mar. 6, 1959	.4	10.3	.632	8.57	16.1	13.44
1960	1707	437	Oct. 6, 1959	.8	17.0	1.04	14.16	-	-

\* Revised. Maximum for period May to September.

1120. Sloan Creek near Williamston, Mich.

Location.--Lat 42°40'30", long 84°21'50", in E½ sec.1, T.3 N., R.1 W., on left bank 30 ft downstream from bridge on Meridian Road, 2 miles upstream from mouth, and 4½ miles west of Williamston.

Drainage area.--9.34 sq mi.

Records available.--June 1954 to September 1960.

Gage.--Water-stage recorder and concrete control with V-notch sharp-crested weir. Datum of gage is 862.12 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--6 years (1954-60), 5.78 cfs.

Extremes.--1954-60: Maximum discharge, 685 cfs July 11, 1957 (gage height, 7.35 ft); minimum, 0.01 cfs Sept. 11, 1954, Jan. 18, 1957 (gage height, 1.10 ft), caused by unusual regulation; minimum natural discharge, 0.04 cfs Sept. 18-21, 1955.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	4.20	0.686	0.246	0.142	-
1955	1.53	1.79	3.64	7.81	9.09	13.6	2.86	0.937	.790	.291	.119	.086	3.52
1956	.158	.823	.661	.281	1.67	24.2	18.3	27.6	1.30	.375	4.52	.397	7.58
1957	.228	.290	.488	1.54	5.98	4.63	13.2	16.7	2.23	26.5	.640	.353	6.08
1958	.809	3.32	8.54	2.41	6.22	7.89	4.17	1.07	.960	2.77	.437	.316	3.23
1959	.276	.363	.298	.555	2.76	27.5	14.4	3.33	.907	2.28	5.51	3.80	5.19
1960	20.9	13.5	11.4	9.31	8.94	19.6	14.8	5.35	3.76	.732	.449	.345	9.10

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	0.50	0.08	0.03	0.02	-
1955	0.19	0.21	0.45	0.96	1.01	1.68	0.34	0.12	.09	.04	.01	.01	5.11
1956	.02	.10	.08	.03	.19	2.98	2.19	4.64	.16	.05	.56	.05	11.05
1957	.03	.03	.06	.19	.67	.57	1.58	2.06	.27	3.27	.08	.04	8.85
1958	.10	.40	1.05	.30	.69	.97	.50	.13	.11	.34	.05	.04	4.68
1959	.03	.04	.04	.07	.31	3.40	1.72	.41	.11	.28	.68	.45	7.54
1960	2.58	1.61	1.41	1.15	1.03	2.42	1.77	.66	.45	.09	.06	.04	13.27

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-
1955	1387	186	Mar. 3, 1955	0.04	3.52	0.377	5.11	3.07	4.46
1956	1437	329	May 13, 1956	.06	7.58	.812	11.05	7.53	10.97
1957	1507	685	July 11, 1957	.19	6.08	.651	8.85	7.07	10.28
1958	1557	101	Dec. 20, 1957	.20	3.23	.346	4.68	2.24	3.24
1959	1627	143	Mar. 6, 1959	.10	5.19	.556	7.54	8.97	13.03
1960	1707	486	Oct. 6, 1959	.16	9.10	.974	13.27	-	-

## 1125. Cedar River at East Lansing, Mich.

Location.--Lat 42°43'40", long 84°28'40", in SW $\frac{1}{4}$  sec.18, T.4 N., R.1 W., in left downstream bridge abutment of Farm Lane Bridge on Michigan State University campus in East Lansing, 3 miles upstream from Sycamore Creek and 4 miles upstream from mouth.

Drainage area.--355 sq mi.

Records available.--August 1902 to December 1903, March 1931 to September 1960. Monthly discharge only for some periods, published in WSP 1307. August 1902 to December 1903 published as Red Cedar River at Agricultural College, Mich. Gage-height records collected in this vicinity 1911-19, and for flood seasons only 1920-28, are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft above mean sea level, datum of 1929. August 1902 to December 1903 chain gage at site three-quarters of a mile downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft upstream at present datum.

Average discharge.--30 years (1902-3, 1931-60), 210 cfs.

Extremes.--1902-3, 1931-60: Maximum discharge, 5,920 cfs Apr. 7, 1947 (gage height, 11.58 ft); minimum, 3 cfs July 31, 1931.

Remarks.--Occasional regulation at low flow by mill at Williamston 16 miles above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	80.6	167	361	499	681	478	585	308	104	52.2	39.1	37.3	280
1952	90.5	213	218	644	320	576	768	263	105	49.6	39.3	36.6	277
1953	30.2	83.9	115	130	120	372	328	254	154	59.8	58.1	29.8	145
1954	27.1	39.7	48.2	44.7	471	536	378	135	422	98.1	45.2	31.7	187
1955	160	150	184	313	316	572	205	94.6	82.5	47.0	29.2	19.1	181
1956	38.6	88.9	69.5	36.9	76.3	824	447	1,310	141	67.3	118	47.1	274
1957	35.2	47.3	63.5	78.4	188	201	355	483	135	534	80.5	49.4	186
1958	77.4	156	277	139	150	299	170	78.3	61.9	131	51.8	33.5	136
1959	47.0	59.3	48.5	47.3	116	915	527	202	99.7	72.4	128	93.3	197
1960	471	420	358	377	349	443	795	293	257	65.6	50.3	38.4	326

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.26	0.52	1.17	1.62	2.00	1.55	1.84	1.00	0.33	0.17	0.13	0.12	10.71
1952	.29	.67	.71	2.09	.97	1.87	2.41	.85	.33	.16	.13	.12	10.60
1953	.10	.26	.37	.42	.35	1.21	1.03	.82	.49	.19	.19	.09	5.52
1954	.09	.12	.16	.15	1.38	1.74	1.19	.44	1.32	.32	.15	.10	7.16
1955	.52	.47	.60	1.02	.93	1.86	.65	.31	.26	.15	.09	.06	6.92
1956	.13	.28	.23	.12	.23	2.68	1.40	4.26	.44	.22	.38	.15	10.52
1957	.11	.15	.21	.25	.55	.65	1.12	1.57	.42	1.73	.20	.16	7.12
1958	.25	.49	.90	.45	.44	.97	.53	.25	.19	.43	.17	.11	5.18
1959	.15	.19	.16	.15	.34	2.97	1.66	.66	.31	.24	.42	.29	7.54
1960	1.53	1.32	1.16	1.22	1.06	1.44	2.50	.95	.81	.21	.16	.12	12.48

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	369	14.12
1951	1207	2,240	Jan. 4, 1951	24	280	0.789	10.71	272	10.43
1952	1237	2,740	Apr. 14 or 15	28	277	.780	10.60	252	9.66
1953	1277	878	Mar. 5, 1953	22	145	.408	5.52	135	5.16
1954	1337	2,490	Feb. 17, 1954	12	187	.527	7.16	219	8.38
1955	1387	1,440	Mar. 4, 1955	5.1	181	.510	6.92	156	5.97
1956	1437	3,310	May 14, 1956	8.0	274	.772	10.52	270	10.35
1957	1507	2,400	July 13, 1957	30	186	.524	7.12	217	8.29
1958	1557	895	Dec. 21, 1957	11	136	.383	5.18	106	4.04
1959	1627	1,950	Mar. 7, 1959	11	197	.555	7.54	289	11.05
1960	1707	3,580	Mar. 31, 1960	14	326	.918	12.48	-	-

## 1130. Grand River at Lansing, Mich.

Location.--Lat 42°45'05", long 84°33'20", in NW¼ sec.9, T.4 N., R.2 W., on right bank 30 ft upstream from bridge on North Grand River Avenue in Lansing, 2 miles downstream from Cedar River, and at mile 152.

Drainage area.--1,230 sq mi, approximately.

Records available.--March 1901 to September 1906, October 1934 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only). 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 805.53 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to August 1906, staff gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1¼ miles downstream at datum 2.42 ft lower.

Average discharge.--31 years (1901-6, 1934-60), 851 cfs.

Extremes.--1901-6, 1934-60: Maximum discharge, 24,500 cfs Mar. 26, 1904 (gage height, 18.60 ft, datum then in use), from rating curve extended above 15,000 cfs by logarithmic plotting; minimum, 4.0 cfs Aug. 28, 1952, July 17, 1954 (gage height, 0.90 ft); minimum daily, 20 cfs Aug. 25, 1941  
Maximum discharge since 1901, 24,500 cfs Mar. 26, 1904.

Remarks.--Large diurnal fluctuation at medium and low flows caused by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	371	615	1,190	1,534	2,055	1,726	1,818	1,238	579	525	331	222	1,011
1952	548	985	929	2,338	1,391	2,056	2,585	1,234	597	292	245	251	1,118
1953	207	422	556	571	537	1,333	1,130	887	687	544	278	147	592
1954	145	194	252	230	1,446	1,890	1,772	745	1,434	504	268	215	751
1955	1,173	729	805	1,202	976	2,012	995	495	512	296	206	131	795
1956	292	588	407	233	458	2,511	1,635	3,815	647	425	386	207	972
1957	164	237	385	401	746	885	1,303	1,461	533	1,071	195	244	635
1958	363	743	1,062	594	540	1,184	773	330	289	431	260	199	565
1959	286	310	247	233	645	2,880	2,004	908	370	232	327	227	723
1960	1,079	1,161	1,050	1,451	1,299	1,195	2,565	1,031	1,125	510	288	229	1,080

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.35	0.56	1.12	1.44	1.74	1.62	1.65	1.16	0.52	0.49	0.31	0.20	11.16
1952	.51	.89	.87	2.19	1.22	1.91	2.34	1.16	.54	.27	.23	.23	12.36
1953	.19	.38	.52	.54	.45	1.25	1.02	.83	.62	.32	.26	.13	6.51
1954	.14	.18	.24	.22	1.22	1.77	1.61	.70	1.30	.47	.25	.20	8.30
1955	1.10	.66	.75	1.13	.83	1.89	.90	.46	.46	.28	.19	.12	8.77
1956	.27	.53	.38	.22	.40	2.35	1.48	3.58	.59	.40	.36	.19	10.75
1957	.15	.21	.36	.38	.63	.83	1.18	1.37	.48	1.00	.18	.22	6.99
1958	.34	.67	1.00	.56	.46	1.11	.70	.31	.26	.40	.24	.18	6.23
1959	.27	.28	.23	.22	.55	2.70	1.82	.85	.34	.22	.31	.21	8.00
1960	1.01	1.07	.98	1.36	1.14	1.12	2.33	.97	1.02	.48	.27	.21	11.96

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,340	14.79
1951	1207	4,770	Feb. 21, 1951	156	1,011	0.903	11.16	1,034	11.40
1952	1237	6,200	Apr. 15, 1952	153	1,118	.909	12.36	1,011	11.18
1953	1277	2,260	June 8, 1953	84	592	.481	6.51	542	5.98
1954	1337	4,850	Feb. 17, 1954	76	751	.611	8.30	929	10.25
1955	1397	3,280	Mar. 3, 1955	84	795	.646	8.77	675	7.44
1956	1437	7,700	May 1, 1956	101	972	.790	10.75	930	10.29
1957	1507	4,100	May 20, 1957	123	635	.516	6.99	751	8.28
1958	1557	2,380	Mar. 1, 1958	116	565	.459	6.23	454	5.00
1959	1627	4,650	Mar. 8, 1959	88	723	.588	8.00	930	10.28
1960	1707	8,070	Apr. 1, 1960	140	1,080	.878	11.96	-	-



## 1135. Sebewa Creek near Sunfield, Mich.

Location.--Lat 42°45'21", long 84°57'23", in SE $\frac{1}{4}$  sec.1, T.4 N., R.6 W., on right bank 30 ft downstream from bridge on State Highway 43, 0.2 mile downstream from outlet of Gregg Lake, and 1.8 miles east of Sunfield.

Drainage area.--24.1 sq mi.

Records available.--July 1954 to September 1956.

Gage.--Water-stage recorder and control with V-notch sharp-crested weir. Datum of gage is 813.49 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Extremes.--1954-56: Maximum discharge, 443 cfs May 10, 1956 (gage height, 6.42 ft); minimum, 3.8 cfs Sept. 20, 1955 (gage height, 2.03 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1954	-	-	-	-	-	-	-	-	-	7.96	5.22	4.75	-
1955	20.9	20.8	19.7	30.0	28.4	50.1	22.3	10.7	16.8	5.92	5.15	4.57	19.6
1956	5.75	11.2	9.45	5.83	8.68	73.5	43.5	93.4	10.3	7.07	5.85	5.08	23.4

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1954	-	-	-	-	-	-	-	-	-	0.38	0.25	0.22	-
1955	1.00	0.96	0.94	1.44	1.23	2.39	1.03	0.51	0.78	.28	.25	.21	11.02
1956	.28	.52	.45	.28	.39	3.51	2.01	4.47	.48	.34	.28	.24	13.25

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1954	-	-	-	-	-	-	-	-	-
1955	1387	242	Mar. 4, 1955	4.0	19.6	0.813	11.02	16.6	9.37
1956	1437	443	May 10, 1956	4.7	23.4	.971	13.25	-	-

## STREAMS TRIBUTARY TO LAKE MICHIGAN

## 1140. Grand River at Portland, Mich.

Location.--Lat 42°51'20", long 84°54'45", in NW $\frac{1}{4}$  sec.4, T.5 N., R.5 W., on left bank at downstream side of bridge on Kent Street, 1.0 mile south of Portland, 1.9 miles upstream from Lookingglass River, and at mile 115.

Drainage area.--1,385 sq mi.

Records available.--August 1952 to September 1960. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 705.00 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to July 6, 1953, wire-weight gage at same site and datum.

Average discharge.--8 years (1952-60), 868 cfs.

Extremes.--1952-60: Maximum discharge, 9,100 cfs May 13, 1956; maximum gage height, 11.56 ft Mar. 31, 1960; minimum discharge, 55 cfs Sept. 9, 1953 (gage height, 4.07 ft); minimum daily, 68 cfs Sept. 9, 1953.

Remarks.--Slight diurnal fluctuation caused by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	256	-
1953	256	478	589	612	587	1,519	1,305	1,021	683	353	329	172	659
1954	195	261	331	295	1,635	2,073	1,926	833	1,443	518	249	272	828
1955	1,271	816	897	1,420	1,133	2,319	1,146	602	546	339	245	167	909
1956	346	625	472	279	511	2,846	1,790	4,676	717	448	429	241	1,121
1957	194	279	461	467	859	961	1,468	1,952	626	1,172	248	291	745
1958	446	663	1,148	684	603	1,345	848	373	344	472	304	229	639
1959	311	358	272	252	708	3,203	2,187	987	457	311	391	501	812
1960	1,083	1,326	1,232	1,702	1,511	1,354	2,960	1,176	1,221	629	378	263	1,232

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	0.21	-
1953	0.21	0.39	0.49	0.51	0.44	1.26	1.05	0.85	0.55	0.29	0.27	.14	6.45
1954	.16	.21	.28	.25	1.23	1.73	1.55	.69	1.16	.43	.21	.22	8.12
1955	1.06	.66	.75	1.18	.85	1.93	.93	.50	.44	.28	.20	.13	8.91
1956	.29	.50	.39	.23	.40	2.37	1.44	3.89	.58	.37	.36	.19	11.01
1957	.16	.22	.38	.39	.63	.80	1.18	1.61	.51	.98	.21	.23	7.30
1958	.37	.69	.96	.57	.45	1.12	.68	.31	.28	.39	.25	.18	6.25
1959	.26	.29	.23	.21	.53	2.67	1.76	.82	.37	.26	.33	.24	7.97
1960	.90	1.07	1.03	1.42	1.18	1.13	2.38	.98	.98	.52	.31	.21	12.11

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-
1953	1277	3,040	June 9, 1953	68	659	0.476	6.45	614	6.01	
1954	1357	5,350	Feb. 18, 1954	107	828	.598	8.12	1,013	9.94	
1955	1387	4,370	Mar. 4, 1955	114	909	.656	8.91	779	7.62	
1956	1437	9,100	May 13, 1956	168	1,121	.809	11.01	1,079	10.59	
1957	1507	5,370	May 21, 1957	138	745	.538	7.30	873	8.56	
1958	1557	2,810	Mar. 1, 1958	152	639	.461	6.25	512	5.01	
1959	1627	5,260	Mar. 8, 1959	130	812	.586	7.97	1,039	10.19	
1960	1707	8,710	Mar. 31, 1960	158	1,232	.890	12.11	-	-	

## 1145. Lookingglass River near Eagle, Mich.

Location.--Lat 42°49'45", long 84°46'40", in sec.10, T.5 N., R.4 W., on upstream side of highway bridge, 1½ miles northeast of Eagle and 10 miles upstream from mouth.

Drainage area.--281 sq mi.

Records available.--August 1944 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight gage. Datum of gage is 747.09 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--16 years (1944-60), 182 cfs.

Extremes.--1944-60: Maximum discharge, 2,860 cfs Apr. 5, 1947 (gage height, 7.70 ft, from graph based on gage readings), from rating curve extended above 1,900 cfs by logarithmic plotting; minimum, 18 cfs Aug. 31, 1953 (gage height, 1.11 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	96.4	148	297	353	561	439	403	267	136	52.5	40.9	42.9	234
1952	82.4	184	158	448	290	521	648	206	97.5	40.6	43.6	37.1	229
1953	34.8	63.2	85.0	89.8	98.8	253	185	196	51.1	34.7	38.9	24.3	94.7
1954	28.0	33.9	41.1	38.7	263	352	309	136	128	50.4	27.6	25.2	118
1955	96.5	96.6	110	211	217	460	189	83.1	71.8	43.8	31.6	25.8	136
1956	37.1	81.2	79.6	41.6	66.3	613	321	910	117	57.4	96.7	40.8	207
1957	38.7	48.2	69.1	72.1	132	185	236	530	163	374	57.2	44.0	163
1958	75.8	163	214	141	115	298	130	64.8	49.8	62.8	30.4	29.2	115
1959	30.2	36.7	35.0	33.5	49.5	664	469	151	60.9	30.1	51.9	49.6	139
1960	148	252	235	321	246	243	716	288	138	50.4	38.4	28.3	225

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.40	0.59	1.22	1.45	2.08	1.80	1.60	1.10	0.54	0.22	0.17	0.17	11.34
1952	.34	.73	.65	1.84	1.11	2.14	2.57	.85	.39	.17	.18	.15	11.12
1953	.14	.25	.35	.37	.37	.96	.74	.80	.20	.14	.16	.10	4.58
1954	.12	.13	.17	.16	.98	1.44	1.23	.56	.51	.21	.11	.10	5.72
1955	.40	.38	.45	.86	.80	1.89	.75	.34	.29	.18	.13	.10	6.57
1956	.15	.32	.33	.17	.25	2.52	1.27	3.73	.47	.24	.40	.16	10.01
1957	.16	.19	.28	.30	.49	.76	.94	2.17	.65	1.53	.23	.17	7.87
1958	.31	.65	.88	.58	.43	1.22	.51	.27	.20	.26	.12	.12	5.55
1959	.12	.15	.14	.14	.18	2.72	1.86	.62	.24	.12	.21	.20	6.70
1960	.61	1.00	.96	1.32	.94	1.00	2.84	1.18	.55	.21	.16	.11	10.88

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	307	14.83
1951	1207	al, 500	Feb. 21, 1951	35	234	0.83	11.34	224	10.85
1952	1237	1,180	Apr. 14, 1952	28	229	.815	11.12	209	10.14
1953	1277	357	May 3, 1953	18	94.7	.337	4.58	88.0	4.26
1954	1337	935	Mar. 25, 1954	20	118	.420	5.72	135	6.53
1955	1387	b790	Mar. 4, 1955	20	136	.484	6.57	127	6.14
1956	1437	1,700	May 10, 1956	25	207	.737	10.01	203	9.84
1957	1507	1,340	July 12, 1957	32	163	.580	7.87	188	9.08
1958	1557	600	Mar. 1 or 2	22	115	.409	5.55	85.5	4.12
1959	1627	1,100	Mar. 16, 1959	21	139	.495	6.70	184	8.86
1960	1707	1,260	Mar. 30, 1960	24	225	.801	10.88	-	-

a Maximum daily.

b Maximum observed.

## 1150. Maple River at Maple Rapids, Mich.

Location.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., on upstream side of highway bridge at Maple Rapids, 30 ft downstream from Pine Creek and three-quarters of a mile upstream from Hayworth Creek.

Drainage area. --434 sq mi.

Records available.--August 1944 to September 1960. Monthly discharge only for August 1944, published in WSP 1307.

Gage.--Wire-weight gage. Datum of gage is 642.58 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--16 years (1944-60), 254 cfs.

Extremes.--1944-60: Maximum daily discharge, 6,500 cfs Mar. 20, 1948; maximum gage height, 11.22 ft Mar. 20, 1948, from floodmark (backwater from ice); minimum discharge observed, 8.2 cfs Aug. 11, 1944 (gage height, 1.61 ft).  
Flood in March 1904 reached a stage of 13.8 ft, from information by local resident.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	151	151	516	466	727	672	658	308	175	52.8	48.7	108	334
1952	243	571	329	795	493	769	810	171	107	37.0	55.1	36.9	367
1953	25.7	78.1	194	174	188	466	231	316	65.0	33.0	29.6	15.4	152
1954	15.8	23.8	34.3	26.5	325	426	393	287	124	48.6	18.3	16.1	143
1955	107	97.7	161	372	262	784	371	175	140	29.2	28.0	22.5	213
1956	34.2	81.9	97.8	38.9	39.1	1,015	615	1,812	248	92.3	201	69.2	365
1957	33.2	40.7	54.2	61.3	217	376	344	543	203	55.2	106	43.4	215
1958	63.7	283	263	172	109	599	159	85.6	64.2	55.2	26.2	25.6	159
1959	31.6	48.5	32.2	25.0	35.0	1,057	862	216	48.6	19.6	20.4	18.2	202
1960	64.3	207	294	445	290	399	1,220	334	142	62.9	46.9	27.8	293

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.40	0.39	1.37	1.24	1.74	1.79	1.69	0.82	0.45	0.14	0.13	0.28	10.44
1952	.65	1.47	.87	2.11	1.22	2.04	2.08	.45	.27	.10	.15	.09	11.50
1953	.07	.20	.52	.46	.45	1.24	.59	.84	.17	.09	.08	.04	4.75
1954	.04	.06	.09	.07	.78	1.15	1.01	.76	.32	.13	.05	.04	4.48
1955	.28	.25	.43	.99	.63	2.08	.95	.46	.36	.08	.07	.06	6.64
1956	.09	.21	.26	.10	.10	2.70	1.58	4.81	.64	.25	.53	.18	11.45
1957	.09	.10	.14	.16	.52	1.00	.88	1.44	.52	1.47	.28	.11	6.71
1958	.17	.73	.70	.46	.26	1.59	.41	.23	.16	.15	.07	.07	5.00
1959	.08	.12	.09	.07	.08	2.81	2.22	.57	.13	.05	.05	.05	6.32
1960	.17	.53	.78	1.18	.72	1.06	3.14	.89	.37	.17	.12	.07	9.20

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	449	14.06
1951	1207	2,380	Feb. 23, 1951	27	334	0.770	10.44	360	11.27
1952	1237	a2,000	Jan. 20, 1952	28	367	.846	11.50	297	9.30
1953	1277	700	Mar. 20, 1953	11	152	.350	4.75	133	4.15
1954	1337	940	Feb. 22, 1954	11	143	.329	4.48	168	5.25
1955	1387	1,120	Mar. 6, 1955	14	213	.491	6.64	200	6.24
1956	1437	4,740	May 10, 1956	16	365	.841	11.45	358	11.22
1957	1507	1,190	July 15, 1957	28	215	.495	6.71	255	7.98
1958	1557	1,250	Mar. 4, 1958	11	159	.366	5.00	118	3.69
1959	1627	2,830	Mar. 24, 1959	11	202	.465	6.32	240	7.51
1960	1707	5,550	Mar. 31, 1960	19	293	.675	9.20	-	-

a Maximum daily.

## 1160. Grand River at Ionia, Mich.

Location.--Lat 42°58'20", long 85°04'10", in NW $\frac{1}{4}$  sec.30, T.7 N., R.6 W., on left bank 15 ft downstream from bridge on State Highway 66 at Ionia, 2.7 miles downstream from Prairie Creek, and at mile 87.

Drainage area.--2,840 sq mi, approximately.

Records available.--March to June 1931, July and September 1931 (fragmentary), July 1951 to September 1960. Monthly discharge only for March 1931, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 615.38 ft above mean sea level, datum of 1929. Mar. 19 to Sept. 24, 1931, chain gage at site  $1\frac{1}{2}$  miles upstream at different datum.

Average discharge.--9 years (1951-60), 1,846 cfs.

Extremes.--1931, 1951-60: Maximum discharge, 21,500 cfs Apr. 1, 1960 (gage height, 23.43 ft); minimum, 105 cfs Sept. 8, 9, 1954 (gage height, 6.20 ft); minimum daily, 115 cfs Aug. 27, 1953.

Remarks.--Diurnal fluctuation below about 5,000 cfs caused by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	766	749	-
1952	1,440	2,911	2,212	5,642	3,431	4,982	6,107	2,190	1,246	625	677	555	2,664
1953	464	873	1,329	1,315	1,371	3,119	2,226	2,221	1,053	580	526	336	1,286
1954	311	456	575	502	2,952	3,736	3,778	1,991	2,226	904	425	372	1,505
1955	2,106	1,416	1,720	2,909	2,361	5,023	2,482	1,307	1,176	536	453	382	1,823
1956	628	1,215	1,044	609	935	6,464	4,042	9,715	1,677	922	1,045	548	2,417
1957	403	545	769	871	1,968	2,095	5,015	4,847	1,462	3,348	640	585	1,696
1958	806	1,986	2,188	1,564	1,125	3,272	1,564	779	657	817	550	418	1,314
1959	527	655	490	498	1,314	6,450	4,840	1,873	720	433	602	475	1,574
1960	1,595	2,277	2,313	3,186	2,608	2,429	7,079	2,566	1,902	973	700	487	2,335

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	0.31	0.29	-
1952	0.58	1.14	0.90	2.29	1.30	2.02	2.40	0.89	0.49	0.25	.27	.22	12.75
1953	.19	.34	.54	.53	.50	1.27	.87	.90	.41	.24	.21	.13	6.13
1954	.13	.19	.23	.20	1.08	1.52	1.48	.81	.87	.37	.17	.15	7.19
1955	.85	.56	.70	1.18	.87	2.04	.97	.53	.46	.22	.18	.15	8.71
1956	.26	.48	.42	.25	.36	2.62	1.59	3.94	.66	.37	.42	.22	11.59
1957	.16	.21	.31	.35	.72	.85	1.18	1.89	.57	1.36	.26	.23	8.09
1958	.33	.78	.89	.63	.41	1.33	.61	.32	.26	.33	.22	.16	6.27
1959	.21	.26	.20	.20	.48	2.62	1.90	.76	.28	.18	.24	.19	7.52
1960	.65	.89	.94	1.29	.99	.99	2.78	1.04	.75	.40	.28	.19	11.19

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	14,000	Apr. 15, 1952	386	2,664	0.938	12.75	2,359	11.20
1953	1277	4,360	Mar. 17, 1953	115	1,286	.455	6.13	1,174	5.60
1954	1337	7,700	Mar. 28, 1954	127	1,505	.530	7.19	1,834	8.76
1955	1387	7,700	Mar. 5, 1955	216	1,823	.642	8.71	1,624	7.76
1956	1437	19,000	May 11, 1956	206	2,417	.851	11.59	2,320	11.11
1957	1507	9,840	May 22, 1957	190	1,696	.597	8.09	1,970	9.41
1958	1557	6,100	Mar. 2 or 3	250	1,314	.463	6.27	1,037	4.94
1959	1627	11,200	Apr. 4, 1959	214	1,574	.554	7.52	1,953	9.33
1960	1707	21,500	Apr. 1, 1960	369	2,335	.822	11.19	-	-

## 1165. Flat River at Smyrna, Mich.

Location.--Lat 43°03'10", long 85°15'50" in NW¼ sec.28, T.8 N., R.8 W., on right bank at downstream side of highway bridge, 600 ft downstream from dam and inactive powerplant and half a mile south of Smyrna.

Drainage area.--528 sq mi.

Records available.--October 1950 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 729.53 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--10 years (1950-60), 413 cfs.

Extremes.--1950-60: Maximum discharge, 2,500 cfs Apr. 4, 1959; maximum gage height, 6.81 ft Apr. 1, 1960; minimum discharge, 7.4 cfs Sept. 9, 1953; minimum daily, 86 cfs Aug. 14, 1958.

Remarks.--Diurnal fluctuation caused by powerplants above station prior to September 1956; occasional diurnal fluctuation since.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*259	*318	422	433	597	766	760	481	363	234	249	336	*433
1952	498	612	555	742	649	936	940	483	321	475	479	348	585
1953	286	420	481	403	515	759	530	584	332	256	260	192	418
1954	239	256	285	245	474	584	738	495	329	227	199	188	354
1955	500	344	337	375	339	735	564	421	437	233	219	248	396
1956	268	325	305	237	244	568	722	1,083	371	278	319	238	414
1957	208	258	293	263	360	478	476	484	346	462	207	257	341
1958	310	556	435	352	320	510	366	268	221	197	167	210	326
1959	247	295	243	215	248	689	1,095	507	230	186	241	208	367
1960	335	497	508	592	474	445	1,116	683	471	307	328	237	499

\* Not previously published; estimated on basis of powerplant records.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*0.57	*0.67	0.92	0.95	1.18	1.67	1.61	1.05	0.77	0.51	0.54	0.71	*11.15
1952	1.09	1.29	1.17	1.62	1.33	2.04	1.99	1.05	.68	1.04	1.04	.74	15.08
1953	.63	.89	1.05	.88	1.02	1.66	1.12	1.28	.70	.56	.57	.41	10.77
1954	.52	.54	.62	.53	.93	1.28	1.56	1.08	.70	.49	.43	.40	9.08
1955	1.09	.73	.74	.82	.87	1.60	1.19	.92	.92	.51	.48	.52	10.19
1956	.58	.69	.67	.52	.50	1.24	1.53	2.37	.78	.61	.70	.50	10.69
1957	.46	.55	.64	.58	.71	1.04	1.01	1.06	.73	1.01	.45	.54	8.78
1958	.68	1.18	.95	.77	.63	1.11	.77	.58	.47	.43	.36	.44	9.37
1959	.54	.62	.53	.47	.49	1.50	2.31	1.11	.49	.41	.53	.44	9.44
1960	.73	1.05	1.11	1.29	.97	.97	2.36	1.49	1.00	.67	.72	.50	12.86

\* Not previously published; estimated on basis of powerplant records.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	1,600	Feb. 23, 1951	131	*433	*0.820	*11.15	488	12.54
1952	1237	1,900	Mar. 21, 1952	192	585	1.11	15.08	546	14.10
1953	1277	1,300	Mar. 15, 1953	134	418	.792	10.77	384	9.88
1954	1337	1,410	Apr. 28, 1954	107	354	.670	9.08	387	9.96
1955	1387	1,560	Oct. 3, 1954	141	396	.750	10.19	373	9.57
1956	1437	2,380	May 9, 1956	148	414	.784	10.69	403	10.40
1957	1507	2,140	Feb. 27, 1957	109	341	.646	8.78	386	9.94
1958	1557	1,630	Oct. 24, 1957	86	326	.617	8.37	283	7.25
1959	1627	2,500	Apr. 4, 1959	115	367	.695	9.44	414	10.64
1960	1707	2,460	Apr. 1, 1960	164	499	.945	12.86	-	-

\* Not previously published.

a A discharge of 1,830 cfs occurred July 22 as a result of momentary gate opening in dam above station.

## 1170. Quaker Brook near Nashville, Mich.

Location.--Lat 42°33'57", long 85°05'37", in NW $\frac{1}{4}$  sec.13, T.2 N., R.7 W., on left bank 150 ft upstream from culvert on county road, 500 ft upstream from small tributary, and 2 $\frac{1}{2}$  miles south of Nashville.

Drainage area.--7.60 sq mi.

Records available.--August 1954 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 821.89 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--6 years (1954-60), 5.86 cfs.

Extremes.--1954-60: Maximum discharge, 294 cfs Oct. 4, 1954 (gage height, 5.47 ft), from rating curve extended above 140 cfs; minimum, 1.0 cfs July 15, 16, 17, 1959..

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	2.25	2.61	-
1955	14.2	7.66	7.64	8.01	11.2	11.0	6.80	4.74	4.63	2.83	2.63	2.51	6.98
1956	4.18	6.11	4.34	3.05	5.53	19.5	13.1	12.0	4.40	3.49	2.99	2.66	6.79
1957	2.86	3.41	3.78	4.04	5.57	5.12	9.96	10.0	3.18	5.36	2.03	2.32	4.80
1958	3.78	6.73	6.23	3.97	6.03	6.65	4.69	2.97	3.13	2.77	3.82	2.75	4.45
1959	2.89	3.56	3.07	2.84	4.26	14.9	8.95	4.35	2.05	1.93	2.65	2.76	4.52
1960	6.94	6.94	6.72	9.87	8.08	11.7	10.3	9.83	9.46	4.44	3.78	3.11	7.60

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	0.34	0.38	-
1955	2.15	1.12	1.16	1.22	1.54	1.68	1.00	0.72	0.68	0.43	.40	.37	12.47
1956	.63	.90	.66	.46	.78	2.96	1.93	1.82	.65	.53	.45	.39	12.16
1957	.43	.50	.57	.61	.76	.78	1.46	1.52	.47	.81	.31	.34	8.56
1958	.57	.99	.95	.60	.83	1.01	.69	.45	.46	.42	.58	.40	7.95
1959	.44	.52	.47	.43	.58	2.26	1.31	.66	.30	.29	.40	.41	8.07
1960	1.05	1.02	1.02	1.50	1.15	1.78	1.51	1.49	1.39	.67	.57	.46	13.61

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-
1955	1387	294	Oct. 4, 1954	2.1	6.98	0.918	12.47	5.72	10.23
1956	1437	232	Mar. 7, 1956	2.4	6.79	.893	12.16	6.41	11.47
1957	1507	113	May 19, 1957	1.6	4.80	.632	8.56	5.36	9.57
1958	1557	70	Aug. 6, 1958	1.8	4.45	.586	7.95	3.84	6.87
1959	1627	84	Mar. 15, 1959	1.1	4.52	.595	8.07	5.45	9.73
1960	1707	176	Mar. 29, 1960	2.4	7.60	1.00	13.61	-	-

1175. Thornapple River near Hastings, Mich.

Location.--Lat 42°36'55", long 85°14'15", in sec.27, T.3 N., R.8 W., on downstream side of highway bridge, half a mile downstream from Cedar Creek, 2 miles downstream from Thornapple Lake, and 3½ miles southeast of Hastings.

Drainage area.--385 sq mi.

Records available.--October 1944 to September 1960.

Gage.--Wire-weight gage. Datum of gage is 786.71 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--16 years (1944-60), 311 cfs.

Extremes.--1944-60: Maximum discharge, 6,810 cfs Apr. 7, 1947 (gage height, 10.20 ft, from graph based on gage readings); minimum, 43 cfs Aug. 26-28, 1946.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	139	176	375	545	686	447	536	328	279	137	112	117	321
1952	263	428	318	832	433	664	834	439	223	131	122	99.2	399
1953	95.7	168	215	203	207	412	362	266	144	75.8	90.5	65.1	192
1954	78.5	95.5	112	99.4	473	577	476	197	310	136	90.1	77.4	225
1955	565	317	344	538	435	758	330	188	253	108	77.1	74.4	331
1956	128	195	165	102	147	1,111	550	1,391	180	108	93.5	75.0	356
1957	87.7	107	125	130	187	220	448	860	176	303	78.9	97.0	236
1958	144	316	328	193	197	506	230	111	106	117	151	102	209
1959	105	123	121	116	155	936	538	234	101	73.5	103	92.2	225
1960	264	369	331	565	389	419	957	472	439	163	137	85.8	381

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.42	0.51	1.12	1.63	1.86	1.34	1.55	0.98	0.81	0.41	0.34	0.34	11.31
1952	79.7	1.24	.95	2.49	1.21	1.99	2.42	1.31	.65	.39	.37	.29	14.10
1953	.29	.49	.64	.61	.56	1.23	1.05	.80	.42	.23	.27	.19	6.78
1954	.24	.28	.33	.30	1.28	1.73	1.38	.59	.90	.41	.27	.22	7.93
1955	1.69	.92	1.03	1.61	1.18	2.21	.96	.56	.73	.32	.23	.22	11.66
1956	.38	.57	.50	.31	.41	3.33	1.59	4.17	.52	.32	.28	.22	12.60
1957	.26	.31	.37	.39	.51	.66	1.30	2.57	.51	.91	.24	.28	8.31
1958	.43	.92	.98	.58	.53	1.52	.67	.33	.31	.35	.45	.29	7.36
1959	.31	.36	.36	.35	.42	2.80	1.56	.70	.29	.22	.31	.27	7.95
1960	.79	1.07	.99	1.69	1.09	1.25	2.77	1.41	1.27	.49	.41	.25	13.48

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	504	17.77
1951	1207	1,760	Jan. 6, 1951	88	321	0.834	11.31	347	12.24
1952	1237	2,090	Apr. 15, 1952	84	399	1.04	14.10	354	12.54
1953	1277	723	Apr. 12, 1953	58	192	1.499	6.78	176	6.21
1954	1337	1,810	Mar. 28, 1954	58	225	.584	7.93	304	10.72
1955	1387	1,520	Jan. 7, 1955	58	331	.860	11.66	268	9.47
1956	1437	3,680	Mar. 7, 1956	65	356	.925	12.60	342	12.09
1957	1507	2,350	May 22, 1957	63	236	.613	8.31	275	9.70
1958	1557	1,350	Mar. 12, 1958	72	209	.543	7.36	172	6.06
1959	1627	1,770	Mar. 21, 1959	51	225	.584	7.95	277	9.77
1960	1707	3,880	Apr. 1, 1960	72	381	.990	13.48	-	-



## 1180. Thornapple River near Caledonia, Mich.

Location.--Lat 42°48'40", long 85°29'00", in NW $\frac{1}{4}$  sec.22, T.5 N., R.10 W., on right bank 200 ft downstream from LaBarge powerplant, 2.3 miles northeast of Caledonia, and 3.3 miles downstream from Coldwater River.

Drainage area.--773 sq mi.

Records available.--October 1930 to September 1938, October 1951 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 676.31 ft above mean sea level, unadjusted (Consumers Power Co. benchmark). Oct. 1, 1930, to Sept. 30, 1938, staff gage at same site at mean sea level datum (unadjusted).

Average discharge.--17 years (1930-38, 1951-60), 516 cfs.

Extremes.--1930-38, 1951-60: Maximum discharge, 6,290 cfs May 10, 1956 (gage height, 10.79 ft); minimum not determined.

Flood of Apr. 7, 1947, reached a stage of 14.4 ft, from information by powerplant operator.

Remarks.--Large diurnal fluctuation at low and medium flow caused by powerplant above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	543	889	674	1,435	890	1,136	1,474	753	492	330	343	267	768
1953	262	374	476	434	479	795	660	584	313	201	209	171	413
1954	202	240	263	244	690	964	920	495	570	308	231	196	441
1955	1,006	588	637	966	782	1,255	690	432	477	250	205	203	624
1956	292	452	424	274	344	1,860	1,138	2,489	484	320	261	217	716
1957	216	255	279	298	423	490	838	1,633	476	733	242	258	513
1958	332	655	613	450	446	960	532	291	277	263	322	251	449
1959	253	280	265	252	355	1,648	1,124	580	252	195	238	200	471
1960	455	656	639	1,062	767	791	1,846	878	750	353	303	226	725

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	0.81	1.28	1.01	2.14	1.24	1.69	2.13	1.12	0.71	0.49	0.51	0.39	13.52
1953	.39	.54	.71	.65	.65	1.19	.95	.87	.45	.30	.31	.25	7.26
1954	.30	.35	.39	.36	.93	1.44	1.33	.74	.82	.46	.34	.28	7.74
1955	1.50	.85	.95	1.44	1.05	1.87	1.00	.64	.69	.37	.31	.29	10.96
1956	.44	.65	.63	.41	.48	2.77	1.64	3.71	.70	.48	.39	.31	12.61
1957	.32	.37	.42	.44	.57	.73	1.21	2.44	.69	1.09	.36	.37	9.01
1958	.49	.95	.91	.67	.60	1.43	.77	.43	.40	.39	.48	.36	7.88
1959	.38	.40	.40	.38	.48	2.46	1.62	.86	.36	.29	.35	.29	8.27
1960	.68	.95	.95	1.58	1.07	1.18	2.66	1.31	1.08	.53	.45	.33	12.77

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	3,700	Apr. 13, 1952	186	768	0.994	13.52	685	12.06
1953	1277	1,190	Mar. 16, 1953	103	413	.534	7.26	379	6.66
1954	1337	2,710	Mar. 26, 1954	73	441	.571	7.74	570	10.00
1955	1387	2,570	Oct. 6, 1954	127	624	.807	10.96	534	9.38
1956	1437	6,290	May 10, 1956	90	716	.926	12.61	682	12.00
1957	1507	3,480	May 22, 1957	133	513	.664	9.01	584	10.25
1958	1557	1,930	Mar. 3, 1958	134	449	.581	7.88	382	6.71
1959	1627	3,410	Mar. 21, 1959	147	471	.609	8.27	551	9.67
1960	1707	5,920	Apr. 1,2, 1960	186	725	.938	12.77	-	-

## 1185. Rogue River near Rockford, Mich.

Location.--Lat 43°05'00", long 85°35'30", in NE $\frac{1}{4}$  sec.15, T.8 N., R.11 W., on left bank at downstream side of highway bridge, 2.2 miles upstream from mouth and 3.0 miles southwest of Rockford.

Drainage area.--234 sq mi.

Records available.--February 1952 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 625.2 ft above mean sea level (levels by Blass Survey Co.). Prior to Aug. 30, 1952, wire-weight gage at same site and datum.

Average discharge.--8 years (1952-60), 213 cfs.

Extremes.--1952-60: Maximum discharge, 2,640 cfs Mar. 31, 1960 (gage height, 8.59 ft); minimum, 30 cfs Oct. 5, 13, 1952 (gage height, 3.55 ft); minimum daily, 49 cfs Aug. 27, 1955.

Remarks.--Some diurnal fluctuation caused by mills above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	312	433	411	279	144	233	219	147	-
1953	120	193	229	195	310	350	248	292	176	136	144	95.7	207
1954	116	124	143	125	274	304	419	227	220	137	103	97.3	190
1955	354	184	187	216	190	436	294	310	262	112	100	110	230
1956	130	169	174	116	120	339	400	620	213	155	124	105	223
1957	109	128	154	153	276	280	277	262	213	192	101	120	188
1958	147	297	228	182	175	291	175	122	113	105	117	104	171
1959	162	197	145	120	136	484	547	243	123	106	149	103	210
1960	215	318	308	364	272	333	536	395	245	171	177	121	288

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	1.44	2.13	1.96	1.37	0.69	1.15	1.08	0.70	-
1953	0.59	0.92	1.13	0.96	1.38	1.72	1.18	1.44	.84	.67	.71	.46	12.00
1954	.57	.59	.71	.62	1.22	1.50	2.00	1.12	1.05	.67	.51	.46	11.02
1955	1.74	.88	.92	1.07	.85	2.15	1.40	1.53	1.25	.55	.49	.52	13.35
1956	.64	.81	.86	.57	.55	1.67	1.91	3.05	1.02	.76	.61	.50	12.95
1957	.54	.61	.76	.75	1.23	1.38	1.32	1.29	1.02	.95	.50	.57	10.92
1958	.73	1.41	1.12	.89	.78	1.43	.83	.60	.54	.52	.57	.50	9.92
1959	.80	.94	.71	.59	.60	2.38	2.61	1.20	.59	.52	.73	.49	12.16
1960	1.06	1.51	1.52	1.79	1.25	1.64	2.55	1.94	1.17	.84	.87	.58	16.72

Yearly discharge, in cubic feet per second

Year	WSF	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	1277	1,190	Feb. 23, 1953	58	207	0.885	12.00	194	11.23
1954	1337	900	Apr. 22, 1954	64	190	.812	11.02	219	12.69
1955	1387	1,640	Oct. 3, 1954	49	230	.983	13.35	209	12.12
1956	1437	1,820	May 7, 1956	82	223	.953	12.95	216	12.55
1957	1507	1,080	Feb. 26, 1957	56	188	.803	10.92	212	12.27
1958	1557	911	Aug. 20, 1958	56	171	.731	9.92	157	9.11
1959	1627	1,640	Apr. 3, 1959	69	210	.897	12.16	238	13.80
1960	1707	2,640	Mar. 31, 1960	83	288	1.23	16.72	-	-

## 1190. Grand River at Grand Rapids, Mich.

Location.--Lat 42°57'50", long 85°40'35", in NE $\frac{1}{4}$  sec.25, T.7 N., R.12 W., on right bank 500 ft upstream from bridge on Fulton Street, 1.7 miles upstream from Plaster Creek, and at mile 41.

Drainage area.--4,900 sq mi, approximately.

Records available.--March 1901 to December 1905, January 1906 to August 1918 (gage heights only), October 1930 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 585.70 ft above mean sea level, datum of 1929 (levels by city of Grand Rapids). Prior to August 1918, staff gage at Fulton Street Bridge 500 ft downstream and Oct. 1, 1930, to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mile downstream at datum 2.99 ft higher.

Average discharge.--34 years (1901-5, 1930-60), 3,520 cfs.

Extremes.--1901-5, 1930-60: Maximum discharge, 54,000 cfs Mar. 28, 1904 (gage height, 19.5 ft, from graph based on gage readings, site then in use); minimum daily, 381 cfs Aug. 9, 17, 1936.  
Maximum discharge since 1901, that of Mar. 28, 1904.

Remarks.--Moderate diurnal fluctuation at low and medium flow caused by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2,036	2,318	5,101	6,597	7,736	7,606	7,485	4,733	3,033	1,812	1,694	1,798	4,308
1952	3,112	5,619	4,490	9,456	6,581	8,616	10,220	4,056	2,618	1,966	2,085	1,699	5,019
1953	1,457	2,209	2,992	2,832	3,251	5,715	3,892	3,982	2,063	1,295	1,330	964	2,664
1954	1,046	1,361	1,486	1,339	4,528	5,806	6,268	3,615	3,439	1,810	1,217	1,178	2,740
1955	4,662	2,781	3,080	4,934	3,704	8,189	4,423	2,763	2,702	1,307	1,118	1,265	3,415
1956	1,502	2,231	2,187	1,369	1,764	9,544	6,860	15,650	3,165	1,943	2,068	1,445	4,165
1957	1,214	1,526	1,825	1,710	2,978	3,799	4,885	7,556	2,623	5,048	1,347	1,282	5,004
1958	1,774	5,860	3,757	2,657	2,071	5,690	2,674	1,757	1,590	1,569	1,353	1,159	2,497
1959	1,371	1,621	1,292	1,213	2,182	10,230	9,066	3,868	1,640	1,131	1,512	1,248	3,034
1960	2,562	3,927	4,103	5,913	4,631	3,513	12,890	4,980	3,632	1,932	1,713	1,354	4,247

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.48	0.53	1.20	1.55	1.64	1.79	1.70	1.11	0.69	0.43	0.40	0.41	11.93
1952	.73	1.28	1.06	2.22	1.40	2.03	2.33	.95	.60	.46	.49	.39	13.94
1953	.34	.50	.70	.67	.69	1.34	.89	.94	.47	.30	.31	.22	7.37
1954	.25	.31	.35	.32	.96	1.37	1.43	.85	.78	.43	.29	.27	7.61
1955	1.10	.63	.72	1.16	.79	1.93	1.01	.65	.62	.51	.26	.29	9.47
1956	.35	.51	.51	.32	.39	2.25	1.56	3.68	.72	.46	.49	.33	11.57
1957	.29	.35	.43	.40	.63	.89	1.11	1.78	.64	1.19	.32	.29	8.32
1958	.42	.88	.88	.67	.44	1.35	.61	.41	.32	.37	.32	.26	6.92
1959	.32	.37	.30	.29	.46	2.41	2.06	.91	.37	.27	.36	.28	8.40
1960	.60	.89	.97	1.39	1.02	.83	2.93	1.17	.83	.45	.40	.31	11.79

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	5,470	15.15	
1951	1207	19,800	Feb. 23, 1951	1,320	4,308	0.879	11.93	4,619	12.79		
1952	1237	19,000	Apr. 17, 1952	1,420	5,019	1.02	13.94	4,472	12.41		
1953	1277	8,090	Mar. 17, 1953	740	2,664	.544	7.37	2,432	6.74		
1954	1337	11,500	Mar. 29, 1954	758	2,740	.559	7.61	3,299	9.15		
1955	1387	10,900	Mar. 1, 1955	820	3,415	.697	9.47	3,026	8.39		
1956	1437	26,000	May 13, 1956	992	4,165	.850	11.57	4,052	11.27		
1957	1507	15,800	May 24, 1957	970	3,004	.613	8.32	3,410	9.43		
1958	1557	11,900	Mar. 4, 1958	790	2,497	.510	6.92	2,067	5.73		
1959	1627	18,100	Mar. 25, 1959	740	3,034	.619	8.40	3,563	9.87		
1960	1707	31,800	Apr. 3, 1960	1,080	4,247	.867	11.79	-	-		

## 1210. Muskegon River near Merritt, Mich.

Location.--Lat 44°20'10", long 84°53'25", in NW¼NW¼ sec.2, T.22 N., R.5 W., on right bank 35 ft upstream from bridge on State Highway 55, 0.7 mile upstream from West Branch, 2.7 miles east of Merritt, 4.3 miles downstream from Reedsburg Dam, and at mile 210.8.

Drainage area.--309 sq mi.

Records available.--October 1946 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,117.82 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to July 13, 1949, wire-weight gage on downstream side of bridge at same datum.

Average discharge.--14 years (1946-60), 224 cfs.

Extremes.--1946-60: Maximum discharge, 1,340 cfs Apr. 8, 1959 (gage height, 8.16 ft); maximum gage height, 8.25 ft July 11, 1957; minimum discharge, 26 cfs Aug. 17, 18-20, Sept. 2-5, 12-15, 1958.

Remarks.--Occasional regulation by operation of gates at Reedsburg Dam.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	148	140	175	168	209	313	743	477	353	274	154	148	275
1952	245	344	345	356	311	331	729	351	146	146	166	140	300
1953	111	178	218	230	266	449	454	463	293	204	146	102	259
1954	104	133	145	140	160	244	570	393	527	309	175	159	255
1955	387	320	280	274	260	372	527	298	192	109	65.0	48.1	261
1956	53.5	78.1	99.0	95.3	95.8	131	546	398	94.4	96.5	107	153	162
1957	142	159	177	183	152	237	363	296	242	498	236	196	240
1958	187	277	259	242	192	224	345	184	75.3	41.9	27.5	27.2	173
1959	52.2	110	78.4	70.5	71.2	112	743	500	236	76.0	71.6	70.4	182
1960	226	319	274	286	255	257	725	576	373	227	167	147	319

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.55	0.51	0.65	0.63	0.70	1.16	2.68	1.78	1.27	1.02	0.57	0.53	12.05
1952	.91	1.24	1.29	1.33	1.09	1.23	2.63	1.31	.53	.54	.62	.51	13.23
1953	.41	.64	.81	.86	.90	1.67	1.64	1.73	1.06	.76	.54	.37	11.39
1954	.39	.48	.54	.52	.54	.91	2.05	1.46	1.91	1.15	.65	.57	11.17
1955	1.44	1.16	1.04	1.02	.88	1.38	1.91	1.11	.69	.41	.24	.17	11.45
1956	.20	.28	.37	.36	.33	.49	1.98	1.49	.34	.36	.40	.55	7.15
1957	.53	.57	.66	.68	.51	.88	1.30	1.10	.87	1.82	.88	.71	10.51
1958	.70	1.00	.97	.90	.65	.84	1.25	.69	.27	.16	.10	.10	7.63
1959	.19	.40	.29	.26	.24	.42	2.68	1.87	.85	.28	.27	.25	8.00
1960	.84	1.15	1.02	1.07	.89	.96	2.62	2.14	1.35	.85	.62	.53	14.04

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	177	7.76
1951	1207	965	Apr. 13, 1951	110	275	0.890	12.05	314	13.78
1952	1237	890	Apr. 3, 1952	72	300	.971	13.23	265	11.65
1953	1277	1,050	Mar. 31, 1953	84	259	.838	11.39	249	10.94
1954	1337	796	Apr. 13, 1954	99	255	.825	11.17	306	13.40
1955	1387	664	Apr. 5, 1955	42	261	.845	11.45	197	8.66
1956	1437	930	Apr. 9, 1956	43	162	.524	7.15	183	8.06
1957	1507	962	July 11, 1957	127	240	.777	10.51	260	11.42
1958	1557	480	Apr. 11, 1958	26	173	.560	7.63	133	5.84
1959	1627	1,340	Apr. 8, 1959	29	182	.589	8.00	231	10.13
1960	1707	995	Apr. 18, 1960	100	319	1.03	14.04	-	-

## 1215. Muskegon River at Evart, Mich.

Location.--Lat 43°53'55", long 85°15'20", in NW $\frac{1}{4}$ NE $\frac{1}{4}$  sec.3, T.17 N., R.8 W., on right bank 500 ft downstream from bridge on U.S. Highway 10 at Evart, 0.4 mile upstream from Twin Creek, and at mile 123.9.

Drainage area.--1,450 sq mi, approximately.

Records available.--October 1930 to September 1931, October 1933 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 977.72 ft above mean sea level, datum of 1929. Prior to Apr. 12, 1934, chain gage at site 500 ft upstream, Apr. 12, 1934, to May 22, 1935, chain gage at site 400 ft upstream, and May 23, 1935, to Nov. 7, 1957, wire-weight gage at site 500 ft upstream at present datum.

Average discharge.--28 years (1930-31, 1933-60), 960 cfs.

Extremes.--1930-31, 1933-60: Maximum discharge, 7,750 cfs Apr. 9, 1959 (gage height, 14.42 ft); minimum observed, 164 cfs Dec. 20, 1947 (result of freezeup).

Remarks.--Records of water temperatures for the period November 1956 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	560	600	745	762	904	1,889	3,075	1,590	1,052	919	529	551	1,097
1952	1,207	1,691	1,529	1,505	1,361	1,631	3,635	1,194	763	1,062	884	614	1,421
1953	533	807	987	899	1,132	2,419	1,910	2,108	1,172	837	723	537	1,173
1954	505	630	681	566	884	1,248	2,357	1,479	2,319	992	529	568	1,060
1955	1,569	1,113	1,021	960	865	1,995	2,124	1,145	931	527	402	376	1,087
1956	426	520	536	451	444	779	2,610	1,912	742	650	802	558	869
1957	525	590	683	671	625	1,001	1,453	1,354	993	2,901	743	645	1,020
1958	657	1,035	808	751	674	1,055	1,432	637	511	421	334	375	723
1959	418	646	532	446	450	805	3,844	1,535	646	430	459	405	883
1960	940	1,330	1,136	1,100	897	975	3,668	2,168	1,334	806	679	569	1,298

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.44	0.46	0.59	0.61	0.65	1.50	2.36	1.27	0.81	0.73	0.42	0.42	10.26
1952	0.96	1.30	1.21	1.20	1.01	1.29	2.80	.95	.59	.84	.70	.47	13.32
1953	.42	.62	.79	.71	.81	1.92	1.47	1.67	.90	.67	.58	.41	10.97
1954	.40	.48	.54	.45	.64	.99	1.82	1.18	1.78	.79	.42	.44	9.93
1955	1.24	.86	.81	.76	.62	1.59	1.63	.91	.72	.42	.32	.29	10.17
1956	.34	.40	.43	.36	.33	.62	2.01	1.52	.57	.52	.64	.43	8.17
1957	.42	.45	.54	.53	.45	.80	1.12	1.08	.76	2.31	.59	.50	9.55
1958	.52	.80	.64	.60	.48	.84	1.10	.51	.39	.35	.27	.29	6.77
1959	.33	.50	.42	.36	.32	.64	2.96	1.22	.50	.34	.37	.31	8.27
1960	.75	1.02	.90	.88	.67	.77	2.82	1.73	1.03	.64	.54	.44	12.19

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	990	9.24
1951	1207	3,970	Apr. 28, 1951	400	1,097	0.757	10.26	1,308	12.24
1952	1237	5,320	Apr. 4, 1952	499	1,421	.980	13.32	1,245	11.68
1953	1277	4,630	Mar. 25, 1953	488	1,173	.809	10.97	1,130	10.56
1954	1337	3,680	June 22, 1954	416	1,060	.731	9.93	1,219	11.42
1955	1387	3,200	Mar. 24, 1955	310	1,087	.750	10.17	900	8.43
1956	1437	4,740	Apr. 9, 1956	365	869	.599	8.17	895	8.41
1957	1507	7,320	July 12, 1957	498	1,020	.703	9.55	1,078	10.10
1958	1557	2,400	Apr. 9, 1958	300	723	.499	6.77	648	6.06
1959	1627	7,750	Apr. 9, 1959	354	883	.609	8.27	1,034	9.69
1960	1707	4,920	Apr. 6, 1960	463	1,298	.895	12.19	-	-

## 1220. Muskegon River at Newaygo, Mich.

Location.--Lat 43°25'20", long 85°48'05", in NE-NE $\frac{1}{4}$  sec.24, T.12 N., R.13 W., on left bank, in tailrace of powerplant operated by Consumers Power Co. at Newaygo, 600 ft downstream from Penoyer Creek and at mile 39.1.

Drainage area.--2,350 sq mi, approximately.

Records available.--July to December 1908, July 1909 to July 1915, January 1916 to December 1919, October 1930 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Records for June 1901 to December 1906, published in WSP 129, 170, and 206, have been found to be unreliable and should not be used.

Gage.--Water-stage recorder. Datum of gage is 585.83 ft above mean sea level, datum of 1929. October 1930 to January 1939 staff gage at present site and datum.

Average discharge.--38 years (1909-14, 1916-19, 1930-60), 1,915 cfs.

Extremes.--1908-19, 1930-60: Maximum daily discharge, 14,950 cfs Mar. 25, 1913; minimum, 122 cfs Oct. 3, 1958 (gage height, 45.46 ft); minimum daily, 330 cfs Feb. 15, 1914.

Remarks.--Flow regulated by powerplants above station, the largest of which are at Croton Dam, Hardy Dam (since 1931), and Rogers Dam.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,146	1,326	1,756	1,976	2,046	3,574	3,984	2,679	1,800	1,643	1,254	1,198	2,031
1952	2,363	2,933	2,243	3,282	2,979	2,795	5,061	1,983	1,372	2,183	1,642	1,257	2,503
1953	1,150	1,727	2,105	1,977	2,788	3,923	3,108	3,403	1,941	1,532	1,379	1,062	2,172
1954	1,131	1,250	1,515	1,508	2,225	2,599	3,291	2,320	3,543	1,854	1,203	1,030	1,933
1955	2,905	1,894	1,876	2,467	1,682	3,279	3,193	1,948	1,909	1,075	940	887	2,008
1956	936	1,273	1,203	1,266	1,418	2,116	3,997	3,665	1,497	1,467	1,656	1,210	1,809
1957	1,160	1,233	1,457	1,504	1,862	2,466	2,325	2,397	1,985	1,004	1,300	1,419	1,929
1958	1,539	2,097	2,009	1,780	1,745	2,193	2,171	1,185	1,089	1,006	885	991	1,556
1959	1,121	1,542	1,268	1,184	1,620	2,526	5,837	2,600	1,499	1,084	1,112	1,102	1,870
1960	1,910	2,194	2,273	2,377	2,196	2,204	5,202	3,445	2,566	1,668	1,600	1,138	2,395

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.56	0.63	0.86	0.97	0.91	1.75	1.89	1.31	0.85	0.81	0.62	0.57	11.73
1952	1.16	1.39	1.10	1.61	1.37	1.37	2.40	.97	.65	1.07	.81	.80	14.50
1953	.56	.82	1.03	.97	1.24	1.92	1.48	1.67	.92	.75	.68	.50	12.54
1954	.55	.59	.74	.64	.99	1.28	1.56	1.14	1.68	.91	.59	.49	11.16
1955	1.43	.90	.92	1.21	.75	1.61	1.52	.96	.91	.53	.46	.42	11.62
1956	.46	.60	.59	.62	.65	1.04	1.90	1.80	.71	.72	.81	.57	10.47
1957	.57	.59	.71	.74	.82	1.21	1.10	1.18	.94	1.96	.64	.67	11.13
1958	.76	1.00	.99	.87	.77	1.08	1.03	.58	.52	.49	.43	.47	8.99
1959	.55	.73	.62	.58	.72	1.23	2.77	1.28	.71	.53	.55	.52	10.79
1960	.94	1.04	1.11	1.16	1.01	1.06	2.47	1.70	1.22	.82	.79	.54	13.88

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	2,082	12.02
1951	1207	5,670	May 1, 2, 1951	580	2,031	0.864	11.73	2,308	13.33
1952	1237	6,950	Apr. 13, 1952	548	2,503	1.07	14.50	2,290	13.26
1953	1277	6,150	May 5, 1953	671	2,172	.924	12.54	2,081	12.01
1954	1337	6,150	June 23, 1954	596	1,933	.823	11.16	2,167	12.53
1955	1387	5,030	Mar. 26, 1955	622	2,008	.854	11.62	1,752	10.02
1956	1437	7,600	Apr. 9 or 10	592	1,809	.770	10.47	1,846	10.69
1957	1507	10,000	July 12, 1957	800	1,929	.821	11.13	2,079	12.01
1958	1557	4,360	Oct. 25, 1957	784	1,556	.662	8.99	1,412	8.14
1959	1627	9,750	Apr. 10, 11, 1959	742	1,870	.796	10.79	2,076	11.98
1960	1707	6,630	Apr. 17, 1960	763	2,395	1.02	13.88	-	-

## 1222. White River near Whitehall, Mich.

Location.--Lat 43°27'50", long 86°14'00", in W $\frac{1}{2}$  sec.4, T.12 N., R.16 W., on right bank 30 ft downstream from highway bridge on Fruitvale Road, 5 miles downstream from North Branch, and  $7\frac{1}{2}$  miles northeast of Whitehall.

Drainage area.--380 sq mi, approximately.

Records available.--August 1957 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 594.1 ft above mean sea level, unadjusted. Nov. 18, 1957, to Oct. 22, 1958, wire-weight gage at same site and datum.

Extremes.--1957-60: Maximum discharge, 1,910 cfs Mar. 31, 1960 (gage height, 6.06 ft); minimum, 163 cfs Aug. 18, 19, 1958.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	-	-	-	196	213	-
1958	245	367	337	333	309	423	315	259	230	207	186	241	288
1959	271	313	286	252	240	512	834	447	268	237	318	289	356
1960	409	460	436	499	398	436	863	725	511	416	388	311	488

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	-	-	-	0.59	0.63	-
1958	0.74	1.08	1.02	1.01	0.85	1.28	0.92	0.79	0.68	0.63	.56	.71	10.27
1959	.82	.92	.87	.76	.66	1.56	2.44	1.36	.79	.72	.96	.85	12.71
1960	1.24	1.35	1.33	1.51	1.13	1.33	2.53	2.20	1.50	1.26	1.18	.91	17.47

Yearly discharge, in cubic feet per second

Year.	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1557	a600	Nov. 17, 1957	164	288	0.758	10.27	281	10.04
1959	1627	1,790	Apr. 4, 1959	194	356	.937	12.71	392	14.02
1960	1707	1,910	Mar. 31, 1960	264	488	1.28	17.47	-	-

a Maximum daily.

## 1225. Pere Marquette River at Scottville, Mich.

Location.--Lat 43°56'40", long 86°16'45", in NW $\frac{1}{4}$  sec.19, T.18 N., R.16 W., on right bank 20 ft upstream from highway bridge at south edge of Scottville and  $5\frac{1}{2}$  miles downstream from South Branch.

Drainage area.--709 sq mi.

Records available.--August 1939 to September 1960. Published as "at Custer" prior to October 1942.

Gage.--Water-stage recorder. Datum of gage is 606.30 ft above mean sea level, datum of 1929. Prior to June 12, 1943, wire-weight gage at bridge  $4\frac{1}{2}$  miles upstream at different datum.

Average discharge.--21 years (1939-60), 614 cfs.

Extremes.--1939-60: Maximum discharge, 2,740 cfs Apr. 4, 1959 (gage height, 5.84 ft); minimum daily, 310 cfs Aug. 9, 10, 1941 (site and datum then in use).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	447	519	573	575	730	882	1,056	694	522	478	397	412	606
1952	611	767	711	859	724	859	1,058	644	516	671	518	425	697
1953	439	540	616	583	719	921	831	839	618	467	478	412	621
1954	454	473	523	516	709	696	774	625	807	493	407	429	574
1955	931	700	641	627	694	931	799	672	585	478	400	397	655
1956	400	473	510	443	458	614	1,028	930	544	497	468	404	564
1957	379	445	485	502	514	623	639	574	490	522	366	388	494
1958	400	530	514	509	440	664	553	425	421	375	355	478	472
1959	524	690	582	529	484	835	1,440	761	496	424	428	424	634
1960	605	714	642	662	591	587	1,311	1,078	765	619	629	512	726

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.73	0.82	0.93	0.94	1.07	1.43	1.66	1.13	0.82	0.77	0.65	0.65	11.60
1952	.99	1.20	1.15	1.40	1.10	1.40	1.66	1.05	.81	1.09	.84	.67	13.36
1953	.71	.85	1.00	.95	1.05	1.50	1.30	1.36	.97	.76	.78	.65	11.88
1954	.74	.74	.85	.84	1.04	1.13	1.22	1.02	1.27	.80	.66	.68	10.99
1955	1.51	1.10	1.04	1.02	1.02	1.51	1.26	1.09	.92	.78	.65	.62	12.52
1956	.65	.74	.83	.72	.70	1.00	1.82	1.51	.86	.81	.76	.64	10.84
1957	.62	.70	.79	.82	.76	1.01	1.01	.93	.77	.85	.59	.61	9.46
1958	.65	.83	.64	.83	.65	1.08	.87	.69	.66	.61	.58	.75	9.04
1959	.85	1.09	.95	.86	.71	1.36	2.26	1.23	.78	.69	.70	.67	12.15
1960	.98	1.13	1.04	1.08	.90	.95	2.06	1.75	1.20	1.01	1.02	.81	13.93

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	*655	*12.55
1951	1207	1,480	Apr. 28, 1951	370	606	0.855	11.60	652	12.46
1952	1237	1,470	Apr. 3, 4, 1952	398	697	.983	13.36	656	12.58
1953	1277	1,320	May 5, 1953	382	621	.876	11.88	609	11.65
1954	1337	1,190	June 25, 1954	375	574	.810	10.99	643	12.31
1955	1367	1,410	Oct. 6, 1954	375	655	.924	12.52	580	11.09
1956	1437	2,550	Apr. 6, 1956	360	564	.795	10.84	558	10.73
1957	1507	825	Mar. 17, 1957	350	494	.697	9.46	505	9.67
1958	1557	785	Mar. 3, 1958	326	472	.666	9.04	501	9.61
1959	1627	2,740	Apr. 4, 1959	382	634	.894	12.15	648	12.41
1960	1707	2,300	Apr. 2, 1960	434	726	1.02	13.93	-	-

\* Revised.



## 1230. Big Sable River near Freesoll, Mich.

Location.--Lat 44°07'15", long 86°16'50", in NE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.24, T.20 N., R.17 W., near center of span on downstream side of bridge on U.S. Highway 31, 3.4 miles northwest of Freesoll, and 7 miles upstream from Hamlin Lake.

Drainage area.--127 sq mi.

Records available.--May 1942 to September 1960.

Gage.--Wire-weight gage. Datum of gage is 615.32 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Sept. 15, 1959, staff gage at site 30 ft downstream at same datum.

Average discharge.--18 years (1942-60), 137 cfs.

Extremes.--1942-60: Maximum discharge, 555 cfs Apr. 7, 1959 (gage height, 3.4 ft, from floodmarks); minimum, 81 cfs Aug. 14, 1944, Aug. 7, 1957.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	119	128	136	133	163	212	256	161	129	123	113	121	149
1952	144	180	157	176	146	185	245	139	118	121	110	99.2	151
1953	98.8	117	136	130	152	188	162	166	130	112	101	89.2	132
1954	93.6	100	114	112	142	139	155	133	169	107	92.8	101	121
1955	153	138	128	128	137	199	192	151	145	111	92.8	93.3	139
1956	106	115	123	116	111	133	194	178	133	131	111	99.8	129
1957	90.2	102	111	117	120	140	139	125	116	113	94.3	96.1	114
1958	98.5	127	128	118	106	140	136	112	113	107	89.1	110	115
1959	108	145	120	109	103	162	313	167	113	99.0	102	93.0	136
1960	130	151	146	148	139	136	271	255	157	146	146	122	162

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.08	1.13	1.23	1.21	1.33	1.92	2.25	1.46	1.14	1.12	1.03	1.06	15.96
1952	1.30	1.58	1.43	1.60	1.24	1.66	2.13	1.26	1.04	1.10	1.00	.87	16.21
1953	.90	1.03	1.23	1.18	1.25	1.71	1.43	1.51	1.14	1.02	.92	.78	14.10
1954	.85	.88	1.04	1.02	1.17	1.26	1.36	1.21	1.48	.97	.84	.89	12.97
1955	1.38	1.22	1.16	1.16	1.12	1.81	1.68	1.37	1.27	1.01	.84	.82	14.84
1956	.96	1.01	1.12	1.05	.94	1.21	1.71	1.61	1.17	1.19	1.01	.88	13.86
1957	.82	.90	1.01	1.06	.98	1.27	1.22	1.33	1.02	1.03	.86	.84	12.14
1958	.89	1.12	1.16	1.07	.87	1.27	1.19	1.02	.99	.97	.81	.97	12.33
1959	.98	1.27	1.09	.99	.84	1.48	2.74	1.51	.99	.90	.93	.82	14.54
1960	1.18	1.33	1.33	1.35	1.18	1.23	2.38	2.32	1.38	1.33	1.33	1.07	17.41

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	142	15.14	
1951	1207	342	Mar. 31, Apr. 27	104	149	1.17	15.96	157	16.83	
1952	1237	371	Apr. 2, 3, 1952	92	151	1.19	16.21	140	15.06	
1953	1277	*264	May 4, 1953*	82	132	1.04	14.10	128	13.71	
1954	1337	285	June 5, 1954	84	121	.953	12.97	131	13.96	
1955	1387	a300	Mar. 24, 1955	86	139	1.09	14.84	133	14.17	
1956	1437	336	Apr. 5, 1956	92	129	1.02	13.86	126	13.50	
1957	1507	176	Mar. 15, 1957	82	114	.898	12.14	118	12.58	
1958	1557	a170	Apr. 9, 1958	85	115	.906	12.33	117	12.50	
1959	1627	555	Apr. 7, 1959	88	136	1.07	14.54	141	15.04	
1960	1707	a410	Apr. 3, 1960	100	162	1.28	17.41	-	-	

\* Revised.  
a Maximum daily.

## 1235. Manistee River near Grayling, Mich.

Location.--Lat 44°41'35", long 84°50'50", in NW $\frac{1}{4}$  sec. 31, T. 27 N., R. 4 W., on right bank 25 ft upstream from bridge on State Highway 72, 2 $\frac{1}{2}$  miles downstream from Goose Creek, and 6 $\frac{1}{2}$  miles northwest of Grayling.

Drainage area.--159 sq mi.

Records available.--October 1942 to September 1960. Monthly discharge only for October 1942, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 1,120.64 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--18 years (1942-60), 183 cfs.

Extremes.--1942-60: Maximum discharge, 388 cfs Apr. 18, 1960 (gage height, 1.88 ft); maximum gage height, 2.00 ft Feb. 9, 1951 (ice jam); minimum discharge, 122 cfs Feb. 14, 1943, result of freezeup.

Remarks.--Records of water temperatures for the period May 1957 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	176	173	170	166	176	178	233	192	184	174	162	167	179
1952	187	195	189	187	173	182	232	198	186	205	190	167	191
1953	165	186	176	179	179	211	226	199	197	192	177	162	187
1954	158	172	171	170	178	177	233	200	216	190	173	182	185
1955	203	181	173	166	169	187	232	193	182	165	160	156	181
1956	172	175	168	161	156	157	218	180	168	178	184	173	174
1957	173	182	172	161	155	179	200	186	181	184	166	176	176
1958	166	180	166	162	162	160	175	158	156	154	149	175	163
1959	178	177	172	163	163	162	242	207	181	170	189	184	182
1960	209	199	187	175	166	167	253	227	199	195	175	168	193

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.28	1.22	1.23	1.20	1.16	1.29	1.64	1.40	1.29	1.26	1.18	1.17	15.32
1952	1.36	1.37	1.37	1.36	1.18	1.31	1.63	1.44	1.30	1.49	1.37	1.17	16.35
1953	1.20	1.30	1.28	1.30	1.18	1.53	1.58	1.44	1.38	1.40	1.28	1.14	16.01
1954	1.15	1.20	1.24	1.23	1.17	1.28	1.64	1.45	1.52	1.37	1.26	1.27	15.78
1955	1.48	1.27	1.26	1.20	1.10	1.36	1.63	1.40	1.27	1.20	1.16	1.09	15.42
1956	1.24	1.23	1.22	1.16	1.06	1.14	1.53	1.30	1.18	1.29	1.34	1.22	14.91
1957	1.26	1.27	1.24	1.16	1.02	1.30	1.41	1.35	1.27	1.34	1.20	1.24	15.06
1958	1.20	1.26	1.20	1.18	1.06	1.16	1.23	1.15	1.09	1.12	1.08	1.23	13.96
1959	1.29	1.24	1.24	1.19	1.07	1.18	1.70	1.50	1.27	1.23	1.37	1.29	15.57
1960	1.51	1.40	1.36	1.27	1.12	1.21	1.77	1.65	1.40	1.42	1.27	1.18	16.56

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	178	15.18
1951	1207	278	Apr. 9, 1951	150	179	1.13	15.32	184	15.69	
1952	1237	284	July 23, 1952	160	191	1.20	16.35	187	16.03	
1953	1277	310	Mar. 24, 1953	159	187	1.18	16.01	185	15.82	
1954	1337	341	Apr. 8, 1954	154	185	1.16	15.78	190	16.20	
1955	1387	284	Apr. 16, 1955	150	181	1.14	15.42	177	15.10	
1956	1437	294	Apr. 4, 1956	145	174	1.09	14.91	175	14.99	
1957	1507	244	Apr. 26, 1957	148	176	1.11	15.06	175	14.95	
1958	1557	258	Sept. 7, 1958	142	163	1.03	13.96	165	14.07	
1959	1627	330	Aug. 25, 1959	145	182	1.14	15.57	188	16.07	
1960	1707	388	Apr. 18, 1960	147	193	1.21	16.56	-	-	

## 1240. Manistee River near Sherman, Mich.

Location.--Lat 44°26'10", long 85°41'55", in NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> sec.36, T.24 N., R.12 W., near center span on downstream side of bridge on State Highway 37, 150 ft upstream from Wheeler Creek, 0.9 mile north of Sherman, and at mile 60.8.

Drainage area.--900 sq mi.

Records available.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight gage. Altitude of gage is 804 ft (from river-profile map). Prior to Apr. 13, 1934, chain gages at various datums. Apr. 13, 1934, to May 22, 1935, staff gage at present datum.

Average discharge.--40 years (1903-15, 1930-31, 1933-60), 1,068 cfs.

Extremes.--1903-16, 1930-31, 1933-60: Maximum discharge, 3,570 cfs Mar. 25, 1913 (gage height, 7.1 ft, from graph based on gage readings, datum then in use); minimum daily, 540 cfs Feb. 21-23, 1936.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	919	973	969	963	1,092	1,235	2,058	1,264	1,066	992	874	891	1,105
1952	1,206	1,296	1,171	1,219	1,045	1,150	1,876	1,111	967	1,177	1,063	874	1,180
1953	840	1,043	1,120	1,053	1,208	1,580	1,455	1,265	1,179	1,107	957	885	1,141
1954	861	892	973	900	1,004	1,058	1,782	1,207	1,603	1,075	877	907	1,093
1955	1,397	1,097	1,025	931	959	1,217	1,506	1,048	964	836	781	776	1,045
1956	842	906	906	838	812	878	1,629	1,116	905	1,023	945	903	975
1957	868	936	967	997	938	1,081	1,290	1,157	1,020	1,288	891	881	1,027
1958	838	992	942	914	906	941	1,126	834	802	773	729	864	888
1959	906	1,011	951	962	923	954	1,974	1,162	904	813	828	810	1,016
1960	1,049	1,054	973	977	920	906	1,982	1,561	1,117	946	876	852	1,101

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.18	1.20	1.24	1.23	1.26	1.58	2.52	1.61	1.32	1.27	1.12	1.10	16.63
1952	1.54	1.61	1.50	1.56	1.25	1.48	2.32	1.42	1.19	1.51	1.36	1.08	17.82
1953	1.08	1.29	1.43	1.35	1.40	2.03	1.81	1.63	1.46	1.42	1.22	1.10	17.22
1954	1.10	1.11	1.24	1.15	1.17	1.36	2.21	1.54	1.99	1.57	1.12	1.13	16.49
1955	1.79	1.36	1.31	1.19	1.11	1.56	1.86	1.34	1.19	1.07	1.00	.96	15.74
1956	1.08	1.13	1.16	1.07	.97	1.13	2.02	1.43	1.13	1.31	1.21	1.12	14.76
1957	1.11	1.16	1.23	1.28	1.08	1.38	1.60	1.49	1.26	1.65	1.14	1.09	15.47
1958	1.07	1.23	1.21	1.18	1.05	1.21	1.40	1.07	.99	.99	.93	1.07	13.40
1959	1.16	1.25	1.22	1.23	1.07	1.22	2.44	1.49	1.12	1.04	1.06	1.00	15.30
1960	1.35	1.30	1.24	1.26	1.10	1.16	2.46	1.99	1.38	1.12	1.12	1.06	16.63

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	1,031	15.54
1951	1207	2,510	Apr. 10, 11, 1951	840	1,105	1.23	16.63	1,173	17.66	
1952	1237	2,360	Apr. 14, 15, 1952	840	1,180	1.31	17.82	1,123	16.97	
1953	1277	2,410	Mar. 26, 1953	825	1,141	1.27	17.22	1,117	16.87	
1954	1357	3,370	Apr. 9, 1954	818	1,093	1.21	16.49	1,160	17.50	
1955	1387	2,870	Oct. 4, 1954	720	1,045	1.16	15.74	972	14.65	
1956	1437	2,480	Apr. 9, 1956	760	975	1.08	14.76	985	14.89	
1957	1507	2,900	July 10, 1957	832	1,027	1.14	15.47	1,027	15.48	
1958	1557	1,770	Apr. 7, 1958	676	888	.987	13.40	896	13.52	
1959	1627	2,860	Apr. 8, 1959	750	1,016	1.13	15.30	1,033	15.56	
1960	1707	3,260	Apr. 18, 1960	793	1,101	1.22	16.63	-	-	

## 1245. East Branch Pine River near Tustin, Mich.

Location.--Lat 44°06'10", long 85°31'00", in NE¼NW¼ sec.28, T.20 N., R.10 W., on left bank 75 ft downstream from highway bridge, 1.6 miles upstream from North Branch, 3.0 miles west of Tustin, and 5.5 miles northwest of Le Roy.

Drainage area.--63 sq mi, approximately.

Records available.--July 1952 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,077.65 ft above mean sea level, unadjusted (levels by Michigan Department of Conservation).

Average discharge.--8 years (1952-60), 27.5 cfs.

Extremes.--1952-60: Maximum discharge, 1,410 cfs Aug. 4, 1956 (gage height, 6.23 ft), from rating curve extended above 450 cfs by logarithmic plotting; minimum, 4.1 cfs Mar. 13, 1958, result of freezeup.

Remarks.--Records of water temperatures for the period July 1952 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	30.3	14.9	9.65	-
1953	9.92	19.3	23.9	21.7	40.8	91.3	55.9	51.1	22.3	14.6	10.4	9.06	30.8
1954	10.9	12.3	15.4	10.8	28.3	33.9	68.7	27.6	59.7	16.1	7.07	11.0	25.0
1955	49.3	28.5	20.3	19.7	19.2	67.2	61.1	25.3	13.5	11.3	6.85	6.82	27.5
1956	9.54	14.6	12.4	10.1	10.4	18.7	85.6	50.7	16.5	10.2	68.5	12.5	26.7
1957	12.3	17.0	17.6	15.6	16.9	42.7	46.9	32.2	20.2	27.4	6.29	7.84	22.0
1958	10.7	24.1	17.0	11.5	10.9	24.0	41.7	10.7	11.4	9.07	7.33	13.6	16.0
1959	17.7	42.5	16.9	12.8	13.4	34.1	190	28.5	8.90	7.22	7.71	8.89	32.3
1960	32.5	35.0	24.3	19.5	17.3	30.0	185	75.4	23.9	11.4	12.0	10.1	39.6

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	0.55	0.27	0.17	-
1953	0.18	0.34	0.44	0.40	0.67	1.67	0.99	0.94	0.40	.27	.19	.16	6.65
1954	.20	.22	.28	.20	.47	.62	1.22	.50	1.06	.30	.13	.20	5.40
1955	.90	.50	.37	.36	.32	1.23	1.08	.46	.24	.21	.13	.12	5.92
1956	.17	.26	.23	.18	.18	.34	1.52	.93	.29	.19	1.26	.22	5.77
1957	.22	.30	.32	.29	.28	.78	.83	.59	.36	.50	.12	.14	4.73
1958	.20	.43	.31	.21	.18	.44	.74	.20	.20	.17	.13	.24	3.45
1959	.32	.75	.31	.23	.22	.62	3.37	.52	.16	.13	.14	.16	6.93
1960	.59	.62	.44	.36	.30	.55	3.28	1.38	.42	.21	.22	.18	8.55

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1257	-	-	-	-	-	-	-	-
1953	1277	251	Mar. 23, 1953	7.2	30.8	0.489	6.65	29.6	6.39
1954	1337	239	Apr. 8, 1954	6.2	25.0	.397	5.40	30.0	6.47
1955	1387	180	Mar. 15, 1955	6.0	27.5	.437	5.92	22.3	4.81
1956	1437	1,410	Aug. 4, 1956	6.6	26.7	.424	5.77	27.6	5.95
1957	1507	195	July 8, 1957	5.6	22.0	.349	4.73	22.3	4.83
1958	1557	309	Apr. 6, 1958	5.3	16.0	.254	3.45	18.1	3.89
1959	1627	715	Apr. 7, 1959	5.3	32.3	.513	6.93	33.5	7.20
1960	1707	556	Apr. 3, 1960	6.7	39.6	.629	8.55	-	-

## 1250. Pine River near Le Roy, Mich.

Location.--Lat 44°03'50", long 85°32'55", in SW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.6, T.19 N., R.10 W., on right bank 15 ft downstream from highway bridge, 5.0 miles northwest of Le Roy, 5.1 miles downstream from East Branch, and 5.3 miles southwest of Tustin.

Drainage area.--118 sq mi.

Records available.--July 1952 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,040 ft (by barometer).

Average discharge.--8 years (1952-60), 91.5 cfs.

Extremes.--1952-60: Maximum discharge, 1,550 cfs Aug. 4, 1956 (gage height, 10.02 ft, from floodmark), from rating curve extended above 700 cfs by logarithmic plotting; minimum, 42 cfs Jan. 4, 1954 (result of freezeup), Aug. 3-5, 16-19, 1958, Sept. 14, 1959.

Remarks.--Records of water temperatures for the period January 1953 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	115	73.8	55.4	-
1953	58.9	79.5	87.8	81.4	115	209	139	144	82.0	71.0	62.0	56.0	98.8
1954	59.2	65.4	67.5	56.2	94.4	103	183	94.0	165	77.8	51.3	55.7	89.0
1955	146	106	79.7	70.1	78.2	164	156	101	69.1	63.7	48.8	49.3	94.4
1956	59.9	66.4	64.5	53.2	55.8	73.9	201	146	73.1	62.7	158	61.9	89.8
1957	61.7	66.1	76.2	72.6	67.9	117	136	102	80.5	91.1	49.8	54.3	81.3
1958	61.1	95.0	73.7	58.9	56.5	84.7	117	53.1	56.8	56.2	49.0	66.0	69.0
1959	72.5	131	73.1	61.5	60.1	107	362	96.7	53.9	52.2	51.8	52.5	97.7
1960	111	109	86.6	76.0	67.2	92.6	350	183	91.6	63.0	63.3	58.8	112

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	1.12	0.72	0.52	-
1953	0.58	0.75	0.86	0.80	1.02	2.04	1.32	1.41	0.78	.69	.61	.53	11.39
1954	.58	.62	.66	.55	.83	1.01	1.73	.92	1.56	.76	.50	.53	10.25
1955	1.43	1.00	.78	.68	.69	1.60	1.47	.99	.65	.62	.48	.47	10.86
1956	.59	.63	.63	.52	.51	.72	1.90	1.43	.69	.61	1.54	.59	10.36
1957	.60	.62	.74	.71	.60	1.14	1.28	1.00	.76	.89	.49	.51	9.34
1958	.60	.90	.72	.58	.50	.83	1.11	.52	.54	.55	.48	.62	7.95
1959	.71	1.24	.71	.60	.53	1.05	3.42	.94	.51	.51	.51	.50	11.23
1960	1.08	1.03	.85	.74	.61	.90	3.31	1.79	.87	.62	.62	.56	12.98

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	-	-	-	-	-	-	-	-
1953	1277	582	Mar. 23, 1953	48	98.8	0.837	11.39	95.9	11.06
1954	1337	535	Apr. 8, 1954	46	89.0	.754	10.25	101	11.60
1955	1387	398	Mar. 22, 1955	45	94.4	.800	10.86	82.6	9.50
1956	1437	1,550	Aug. 4, 1956	48	89.8	.761	10.36	90.9	10.47
1957	1507	444	July 9, 1957	46	81.3	.689	9.34	83.5	9.60
1958	1557	572	Apr. 6, 1958	42	69.0	.585	7.95	72.9	8.39
1959	1627	925	Apr. 7, 1959	43	97.7	.828	11.23	100	11.53
1960	1707	682	Apr. 3, 1960	48	112	.849	12.98	-	-

## 1255. Pine River near Hoxeyville, Mich.

Location.--Lat 44°12'10", long 85°48'00", in SW $\frac{1}{4}$ NW $\frac{1}{4}$  sec.20, T.21 N., R.12 W., on right bank 500 ft upstream from bridge on State Highway 37, 4.2 miles northwest of Hoxeyville, 8.0 miles east of Wellston, and 8 miles upstream from mouth.

Drainage area.--251 sq mi.

Records available.--July 1952 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 775 ft (by barometer).

Average discharge.--8 years (1952-60), 275 cfs.

Extremes.--1952-60: Maximum discharge, 2,440 cfs Aug. 6, 1956 (gage height, 6.82 ft), from rating curve extended above 1,100 cfs by logarithmic plotting; minimum, 168 cfs Jan. 9, 1956.

Remarks.--Records of water temperatures for the period July 1952 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	332	260	221	-
1953	230	261	281	260	312	456	356	356	285	255	240	221	293
1954	219	227	240	222	287	292	401	278	383	244	211	220	268
1955	373	294	268	252	254	412	373	298	260	235	202	203	286
1956	219	242	236	209	219	261	445	352	258	258	393	219	276
1957	228	250	243	239	251	303	322	272	249	249	204	218	252
1958	222	267	248	215	212	262	286	222	228	214	198	222	233
1959	234	325	247	222	208	300	670	282	220	223	217	219	280
1960	299	307	261	250	235	270	646	436	293	254	249	237	311

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	1.52	1.20	0.98	-
1953	1.06	1.16	1.29	1.20	1.29	2.10	1.58	1.64	1.27	1.18	1.10	.98	15.85
1954	1.01	1.01	1.10	1.02	1.19	1.34	1.78	1.28	1.71	1.12	.97	.98	14.51
1955	1.72	1.30	1.23	1.15	1.05	1.89	1.66	1.37	1.16	1.08	.93	.90	15.44
1956	1.01	1.08	1.08	.96	.94	1.20	1.98	1.61	1.15	1.19	1.81	.97	14.98
1957	1.05	1.11	1.12	1.10	1.04	1.40	1.43	1.24	1.11	1.14	.94	.97	13.65
1958	1.02	1.18	1.14	.99	.88	1.20	1.27	1.02	1.01	.98	.91	.99	12.59
1959	1.07	1.44	1.13	1.02	.86	1.38	2.98	1.29	.98	1.02	1.00	.97	15.14
1960	1.37	1.36	1.20	1.15	1.01	1.24	2.87	2.01	1.30	1.16	1.14	1.05	16.86

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-
1952	1237	-	-	-	-	-	-	-	-	-
1953	1277	1,040	Mar. 24, 1953	212	293	1.17	15.85	266	15.46	
1954	1337	860	Apr. 9, 1954	195	288	1.07	14.51	289	15.64	
1955	1367	760	Mar. 12, 23	190	286	1.14	15.44	266	14.36	
1956	1437	2,440	Aug. 6, 1956	193	276	1.10	14.98	278	15.09	
1957	1507	620	July 9, 1957	193	252	1.00	13.65	254	13.71	
1958	1557	764	Apr. 7, 1958	182	233	.928	12.59	239	12.89	
1959	1627	1,380	Apr. 8, 1959	185	280	1.12	15.14	285	15.43	
1960	1707	1,140	Mar. 31, 1960	210	311	1.24	16.86	-	-	

## 1260. Manistee River near Manistee, Mich.

Location.--Lat 44°16'15", long 86°11'55", in NW¼NW¼ sec.36, T.22 N., R.16 W., on right bank 6.4 miles northeast of Manistee, 6.4 miles south of Onkama, 7.8 miles upstream from Manistee Lake, and at mile 10.8.

Drainage area.--1,780 sq mi, approximately.

Records available.--October 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 585 ft (from river-profile map).

Average discharge.--9 years (1951-60), 1,991 cfs.

Extremes.--1951-60: Maximum discharge, 6,800 cfs Apr. 9, 1954 (gage height, 8.16 ft); maximum gage height, 9.15 ft Feb. 12, 1955 (ice jam); minimum daily discharge, 1,040 cfs Aug. 25, Sept. 22, 1957, Aug. 3, 17, 18, 1958.

Remarks.--Flow regulated at all stages by powerplant 21 miles upstream.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	#2,208	#2,563	2,325	2,450	2,030	2,288	3,710	2,093	1,763	2,287	1,997	1,607	#2,277
1953	1,602	1,971	2,158	2,022	2,408	2,940	2,680	2,519	2,229	1,958	1,709	1,594	2,147
1954	1,604	1,652	1,846	1,685	1,933	1,996	3,229	2,120	2,978	1,998	1,545	1,698	2,020
1955	2,686	2,072	1,925	1,787	1,808	2,389	2,837	1,991	1,873	1,598	1,479	1,476	1,994
1956	1,531	1,607	1,783	1,627	1,574	1,638	2,973	2,271	1,768	1,825	2,184	1,652	1,887
1957	1,651	1,784	1,822	1,782	1,810	2,009	2,354	2,125	1,765	2,012	1,463	1,475	1,838
1958	1,565	1,856	1,762	1,686	1,611	1,774	2,055	1,550	1,507	1,461	1,343	1,592	1,644
1959	1,707	1,959	1,645	1,623	1,611	1,957	4,002	2,385	1,734	1,619	1,682	1,864	1,981
1960	1,961	2,162	1,967	1,895	1,753	1,841	3,840	3,090	2,050	1,720	1,624	1,710	2,133

\* Not previously published; estimated on basis of weather records and powerplant records of Tippy Dam.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	#1.43	#1.61	1.51	1.59	1.23	1.49	2.32	1.36	1.10	1.48	1.29	1.00	#17.41
1953	1.04	1.24	1.40	1.31	1.41	1.90	1.68	1.64	1.40	1.27	1.11	1.00	16.40
1954	1.04	1.04	1.20	1.09	1.14	1.29	2.02	1.37	1.86	1.29	1.00	1.06	15.40
1955	1.74	1.29	1.24	1.15	1.06	1.54	1.77	1.29	1.17	1.04	.96	.92	15.17
1956	.99	1.01	1.15	1.05	.95	1.19	1.86	1.46	1.11	1.19	1.42	1.04	14.44
1957	1.07	1.12	1.18	1.15	1.06	1.30	1.47	1.37	1.10	1.30	.95	.92	13.99
1958	1.01	1.16	1.14	1.09	.94	1.15	1.28	.99	.94	.95	.87	1.00	12.52
1959	1.11	1.23	1.07	1.05	.94	1.27	2.51	1.54	1.09	1.05	1.09	1.17	15.12
1960	1.27	1.35	1.28	1.22	1.06	1.19	2.41	2.01	1.28	1.11	1.05	1.07	16.30

\* Not previously published; see footnote to preceding table.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	5,540	Apr. 11, 1952	#1,160	#2,277	#1.28	#17.41	2,163	16.54
1953	1277	4,200	Mar. 25, 1953	1,130	2,147	1.21	16.40	2,095	16.00
1954	1337	6,800	Apr. 9, 1954	1,190	2,020	1.13	15.40	2,153	16.39
1955	1387	5,000	Oct. 5, 1954	1,100	1,994	1.12	15.17	1,846	14.05
1956	1437	5,450	Apr. 7, 1956	1,100	1,887	1.06	14.44	1,915	14.66
1957	1507	3,460	Apr. 28, 1957	1,040	1,638	1.03	13.99	1,831	13.93
1958	1557	3,310	Apr. 9, 1958	1,040	1,644	.924	12.52	1,655	12.62
1959	1627	6,500	Apr. 7, 1959	1,200	1,981	1.11	15.12	2,047	15.61
1960	1707	6,080	Apr. 19, 1960	1,150	2,133	1.20	16.30	-	-

\* Not previously published.

## STREAMS TRIBUTARY TO LAKE MICHIGAN

1262. Little Manistee River near Freesoil, Mich.

Location.--Lat 44°11'00", long 86°10'00", in NE 1/4 sec. 31, T. 21 N., R. 15 W., on right bank 25 ft upstream from Sixmile Bridge, 5.8 miles north of Freesoil, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.

Drainage area.--200 sq mi.

Records available.--October 1956 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 610 ft (from survey level line in vicinity).

Extremes.--1956-60: Maximum discharge, 575 cfs Apr. 6, 1959 (gage height, 3.70 ft); minimum, 71 cfs Feb. 11, 1958, result of freezeup.

Remarks.--Records of water temperatures for the period October 1956 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	127	137	143	127	137	153	168	162	135	143	114	118	139
1958	118	141	140	130	123	140	146	123	133	134	118	128	131
1959	131	157	146	128	129	166	353	231	165	146	137	132	168
1960	173	177	162	163	151	148	321	298	222	188	183	161	196

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	0.73	0.76	0.82	0.73	0.71	0.88	0.94	0.93	0.75	0.82	0.66	0.66	9.39
1958	.68	.79	.81	.75	.64	.81	.81	.71	.74	.77	.68	.71	8.90
1959	.76	.88	.84	.74	.67	.96	1.96	1.34	.92	.84	.79	.74	11.44
1960	1.00	.99	.93	.94	.81	.85	1.78	1.72	1.24	1.08	1.05	.90	13.29

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1957	1507	214	May 23, 1957	104	139	0.695	9.39	138	9.36
1958	1557	212	July 1, 1958	92	131	.655	8.90	134	9.10
1959	1627	575	Apr. 6, 1959	99	168	.840	11.44	175	11.88
1960	1707	486	Apr. 2, 1960	130	196	.980	13.29	-	-



## 1270. Boardman River near Mayfield, Mich.

Location.--Lat 44°38'20", long 85°31'10", in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.21, T.26 N., R.10 W., on right bank 25 ft downstream from Brown's Bridge, 300 ft downstream from East Creek, 0.9 mile downstream from Brown's Bridge Dam, 1.0 mile northeast of Mayfield, and 9.6 miles southeast of Traverse City.

Drainage area.--223 sq mi.

Records available.--June 1952 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 760 ft (by barometer).

Average discharge.--8 years (1952-60), 190 cfs.

Extremes.--1952-60: Maximum discharge, 980 cfs July 8, 1957 (gage height, 6.23 ft); minimum daily, 83 cfs Sept. 11, 1959.

Remarks.--Diurnal fluctuation caused by powerplant 0.9 mile upstream.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	227	193	170	-
1953	151	192	198	183	199	279	266	216	199	203	174	165	202
1954	148	152	172	154	181	188	344	234	306	205	168	186	203
1955	253	223	201	187	185	219	296	206	189	171	160	146	203
1956	166	174	167	153	147	157	299	205	177	226	195	178	187
1957	164	177	176	158	155	188	251	221	191	245	173	170	189
1958	161	190	181	159	152	162	200	154	150	147	137	166	163
1959	164	170	146	133	127	144	364	221	164	143	143	138	171
1960	193	189	180	164	154	157	332	321	216	189	177	164	203

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	1.18	1.00	0.85	-
1953	0.78	0.96	1.02	0.95	0.93	1.44	1.33	1.12	1.00	1.05	.90	.83	12.31
1954	.77	.76	.89	.80	.85	.97	1.72	1.21	1.53	1.06	.87	.93	12.36
1955	1.30	1.12	1.04	.97	.86	1.13	1.48	1.06	.95	.88	.83	.73	12.36
1956	.86	.87	.86	.79	.71	.81	1.50	1.06	.89	1.16	1.01	.89	11.41
1957	.85	.89	.91	.82	.72	.97	1.26	1.14	.96	1.27	.89	.85	11.53
1958	.83	.95	.94	.82	.71	.84	1.00	.80	.75	.76	.71	.83	9.94
1959	.85	.85	.76	.69	.59	.74	1.82	1.14	.82	.74	.74	.69	10.43
1960	1.00	.95	.93	.85	.75	.81	1.66	1.66	1.08	.98	.92	.82	12.41

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	-	-	-	-	-	-	-	-
1953	1277	495	Mar. 22, 23, 23, 25	124	202	0.906	12.31	196	11.97
1954	1337	915	Apr. 8, 1954	122	203	.910	12.36	220	13.40
1955	1387	525	Apr. 14, 1955	126	203	.910	12.36	189	11.49
1956	1437	810	July 2, 1956	120	187	.839	11.41	188	11.47
1957	1507	980	July 8, 1957	114	189	.848	11.53	190	11.60
1958	1557	387	Dec. 30, 1957	97	163	.731	9.94	159	9.68
1959	1627	604	Apr. 18, 1959	83	171	.767	10.43	178	10.85
1960	1707	725	Apr. 18, 1960	119	203	.910	12.41	-	-

## 1280. Sturgeon River near Wolverine, Mich.

Location.--Lat 45°17'55", long 84°36'40", in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.36, T.34 N., R.3 W., on left bank 1.8 miles north of Wolverine, 2.8 miles downstream from West Branch, and 9 miles upstream from mouth.

Drainage area.--170 sq mi, approximately; at site used prior to Oct. 1, 1958, 164 sq mi.

Records available.--April 1942 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 740 ft (from topographic map). Prior to June 15, 1942, staff gage at site 1 mile upstream at different datum. June 16, 1942, to Sept. 30, 1958, staff gage at site 0.7 mile upstream at different datum.

Average discharge.--18 years (1942-60), 196 cfs.

Extremes.--1942-60: Maximum discharge, 1,010 cfs Apr. 18, 1960 (gage height, 3.86 ft); minimum, 96 cfs Aug. 13, 1959; minimum daily, 113 cfs Aug. 6, 1958, site and datum then in use.

Remarks.--Intermittent regulation at low flows from ponds 2.4 miles upstream. Records of water temperatures for the period October 1958 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	170	170	181	171	161	220	359	216	188	180	168	175	197
1952	246	239	205	201	195	210	340	204	206	214	166	164	216
1953	164	210	203	178	187	284	271	200	199	181	153	169	200
1954	164	171	189	161	174	172	301	197	248	157	155	205	191
1955	237	188	174	163	156	210	297	185	165	163	138	144	185
1956	168	186	169	162	162	174	315	197	173	170	154	161	182
1957	153	172	162	133	130	174	228	209	224	175	142	157	172
1958	165	212	180	163	159	178	198	154	149	146	139	167	167
1959	182	185	167	154	160	191	384	228	168	142	186	195	195
1960	221	223	200	190	173	182	593	308	226	182	175	181	221

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.20	1.16	1.27	1.20	1.02	1.54	2.44	1.52	1.28	1.27	1.18	1.19	16.27
1952	1.73	1.63	1.44	1.42	1.28	1.48	2.31	1.43	1.41	1.50	1.16	1.12	17.91
1953	1.15	1.43	1.43	1.26	1.19	1.99	1.84	1.41	1.35	1.27	1.08	1.15	16.55
1954	1.15	1.16	1.33	1.13	1.10	1.21	2.05	1.38	1.68	1.10	1.09	1.40	15.78
1955	1.67	1.28	1.22	1.15	.99	1.48	2.02	1.30	1.13	1.15	.97	.98	15.34
1956	1.18	1.26	1.19	1.14	1.07	1.22	2.14	1.38	1.17	1.20	1.08	1.10	15.13
1957	1.08	1.17	1.14	.94	.83	1.22	1.55	1.46	1.53	1.23	1.00	1.07	14.22
1958	1.16	1.44	1.27	1.15	1.01	1.26	1.35	1.08	1.01	1.03	.98	1.14	13.88
1959	1.23	1.20	1.13	1.04	.98	1.29	2.52	1.54	1.10	.96	1.26	1.28	15.53
1960	1.50	1.46	1.36	1.29	1.10	1.23	2.58	2.09	1.48	1.23	1.19	1.18	17.69

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	187	15.50	
1951	1207	*585	Apr. 26, 1951*	120	197	1.20	16.27	211	17.44		
1952	1237	620	Apr. 14, 1952	145	216	1.32	17.91	206	17.12		
1953	1277	638	Mar. 24, 1953	140	200	1.22	16.55	195	16.18		
1954	1337	812	Apr. 27, 1954	140	191	1.16	15.78	197	16.31		
1955	1387	638	Oct. 16, 1954	150	185	1.13	15.34	179	14.80		
1956	1437	725	Apr. 3, 1956	140	182	1.11	15.13	179	14.89		
1957	1507	a390	Apr. 25, 1957	120	172	1.05	14.22	178	14.70		
1958	1557	a310	Nov. 16, 1957	113	167	1.02	13.88	165	13.57		
1959	1627	771	Apr. 19, 1959	125	195	1.15	15.53	204	16.29		
1960	1707	1,010	Apr. 18, 1960	150	221	1.30	17.69	-	-		

\* Revised.  
a Maximum daily.

## 1285. Indian River at Indian River, Mich.

Location--Lat 45°24'40", long 84°37'10", in NE $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 24, T.35 N., R.3 W., on left bank at Indian River, 500 ft downstream from Burt Lake and 2.3 miles upstream from Mullett Lake.

Drainage area--583 sq mi.

Records available--April 1942 to September 1960.

Gage--Water-stage recorder. Datum of gage is 590.21 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Nov. 12, 1942, staff gage at site 100 ft downstream at same datum.

Average discharge--18 years (1942-60), 546 cfs.

Extremes--1942-60: Maximum daily discharge, 1,140 cfs May 22, 23, 1960; maximum daily gage height, 5.58 ft May 13, 14, 1960; minimum daily discharge, 249 cfs Sept. 9, 1955; minimum daily gage height, 3.34 ft Oct. 21, 1957.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	506	468	529	567	518	568	779	811	648	543	473	468	575
1952	617	717	676	748	748	707	904	823	657	601	520	426	678
1953	406	439	573	569	638	747	817	788	639	548	449	411	585
1954	437	414	473	492	503	552	624	733	688	550	409	387	522
1955	540	538	510	493	550	555	695	620	489	336	277	262	486
1956	318	408	449	451	451	453	613	606	483	433	450	401	459
1957	380	412	469	453	457	486	529	567	570	498	329	435	465
1958	404	520	620	568	550	458	379	501	360	355	314	363	449
1959	398	468	498	468	382	499	680	919	685	402	343	484	519
1960	543	609	626	615	608	532	762	1,078	857	623	519	435	651

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.00	0.93	1.05	1.12	0.93	1.12	1.50	1.60	1.24	1.07	0.94	0.90	13.40
1952	1.22	1.37	1.34	1.48	1.38	1.40	1.73	1.63	1.26	1.19	1.03	.82	15.85
1953	.80	.84	1.13	1.13	1.14	1.48	1.56	1.56	1.23	1.08	.89	.79	13.63
1954	.86	.79	.94	.97	.90	1.09	1.19	1.45	1.32	1.09	.81	.74	12.15
1955	1.07	1.03	1.01	.98	.98	1.10	1.33	1.22	.94	.66	.55	.50	11.37
1956	.63	.78	.89	.89	.83	.90	1.17	1.20	.92	.86	.89	.77	10.73
1957	.75	.79	.93	.90	.82	.96	1.01	1.12	1.09	.98	.65	.83	10.83
1958	.80	1.00	1.22	1.12	.98	.91	.75	.99	.69	.70	.62	.70	10.46
1959	.79	.90	.98	.93	.88	.99	1.30	1.62	1.30	.80	.68	.93	12.10
1960	1.07	1.16	1.23	1.21	1.12	1.05	1.46	2.13	1.64	1.23	1.03	.83	15.16

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950								544	12.65
1951	1207	8910	May 2, 3, 1951	445	575	0.986	13.40	616	14.35
1952	1237	1,050	Apr. 22, 1952	401	678	1.16	15.85	629	14.69
1953	1277	932	May 2, 1953	390	585	1.00	13.63	577	13.45
1954	1337	787	May 5, 1954	339	522	.895	12.15	544	12.67
1955	1387	768	Apr. 25, 1955	249	488	.637	11.37	453	10.56
1956	1437	693	Apr. 21, 1956	271	459	.787	10.73	467	10.90
1957	1507	822	May 27, 1957	293	465	.798	10.83	469	11.38
1958	1557	655	Dec. 15, 1957	291	449	.770	10.46	434	10.11
1959	1827	1,050	May 7, 1959	288	519	.890	12.10	554	12.89
1960	1707	1,140	May 22, 23, 1960	400	651	1.12	15.16	-	-

a Maximum daily.

## 1290. Pigeon River near Vanderbilt, Mich.

Location.--Lat 45°10'15", long 84°26'20", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec.9, T.32 N., R.1 W., on right bank at Pigeon River Fisheries Experiment Station, 11.1 miles east of Vanderbilt.

Drainage area.--63 sq mi, approximately.

Records available.--September 1950 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 886.24 ft above mean sea level, datum of 1929.

Average discharge.--10 years (1950-60), 74.2 cfs.

Extremes.--1950-60: Maximum discharge, 1,500 cfs May 15, 1957 (gage height, 6.80 ft, from floodmark), from rating curve extended above 500 cfs by logarithmic plotting, result of failure of Lansing Club Dam 3.5 miles upstream; minimum, 13 cfs Jan. 8, 1957.

Remarks.--Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam 3.5 miles upstream. Records of water temperatures for the period October 1950 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	67.4	69.4	72.5	65.5	69.4	85.2	142	83.8	73.7	76.2	58.8	66.2	77.4
1952	92.3	89.9	80.3	82.5	68.2	76.9	135	76.2	80.1	87.8	61.3	58.0	82.4
1953	59.8	77.1	77.2	70.9	83.7	111	107	78.0	69.8	84.1	55.8	56.1	75.8
1954	61.5	68.0	70.9	64.3	70.1	76.7	126	81.0	87.2	55.6	55.8	87.3	75.3
1955	96.0	80.6	69.1	65.1	56.8	74.7	125	61.9	62.9	55.5	50.5	57.8	71.3
1956	60.0	77.3	68.5	63.7	62.3	67.3	126	83.3	65.9	+66.7	59.0	56.7	71.3
1957	57.5	78.1	70.4	69.2	55.7	72.9	102	94.0	70.2	54.5	45.2	59.0	69.1
1958	63.5	82.8	67.1	61.0	59.2	65.0	82.8	54.4	50.7	56.8	42.6	62.7	62.3
1959	64.9	68.2	61.1	55.1	58.6	66.2	145	89.8	57.5	48.5	70.3	68.4	71.1
1960	89.5	82.7	81.8	75.7	73.1	78.5	164	115	75.2	65.6	63.3	66.2	85.8

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.23	1.23	1.33	1.20	1.14	1.56	2.51	1.53	1.30	1.40	1.08	1.17	16.68
1952	1.70	1.60	1.46	1.51	1.16	1.41	2.39	1.40	1.42	1.60	1.12	1.03	17.80
1953	1.09	1.36	1.42	1.30	1.38	2.03	1.90	1.43	1.24	1.18	1.02	.99	16.34
1954	1.13	1.20	1.30	1.19	1.16	1.41	2.23	1.49	1.54	1.02	1.02	1.55	16.24
1955	1.75	1.43	1.27	1.19	.94	1.37	2.21	1.13	1.11	1.02	.92	1.02	15.36
1956	1.10	1.37	1.26	1.16	1.07	1.23	2.23	1.52	1.17	1.22	1.08	1.00	15.41
1957	1.05	1.38	1.29	1.27	.92	1.34	1.81	1.72	1.24	1.00	.83	1.05	14.90
1958	1.16	1.46	1.23	1.12	.98	1.19	1.46	.99	.90	1.04	.78	1.11	13.42
1959	1.19	1.20	1.12	1.01	.97	1.21	2.57	1.65	1.02	.89	1.29	1.22	15.34
1960	1.64	1.46	1.50	1.38	1.25	1.44	2.90	2.11	1.33	1.20	1.15	1.17	18.53

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	1207	-	-	-	-	-	-	-	-
1951	1207	345	July 4, 1951	51	77.4	1.23	16.68	81.9	17.65
1952	1237	345	Nov. 14, 1951	51	82.4	1.31	17.80	78.3	16.91
1953	1277	270	Mar. 24, 1953	43	75.8	1.20	16.34	74.6	16.10
1954	1337	345	Apr. 8, 1954	47	75.3	1.20	16.24	79.1	17.06
1955	1387	270	Oct. 18, 1954	31	71.3	1.13	15.36	67.9	14.64
1956	1437	345	Apr. 4, 1956	29	71.3	1.13	15.41	71.3	15.40
1957	1507	al,500	May 15, 1957	24	69.1	1.10	14.90	69.7	15.03
1958	1557	174	Nov. 15, 1957	36	62.3	.989	13.42	60.7	13.08
1959	1627	530	Apr. 19, 1959	37	71.1	1.13	15.34	76.1	16.43
1960	1707	602	Apr. 17, 1960	45	85.8	1.36	18.53	-	-

a Result of failure of Lansing Club Dam 3.5 miles upstream.

## 1295. Pigeon River at Afton, Mich.

Location.--Lat 45°22'25", long 84°30'55", in NW¼NE¼ sec.2, T.34 N., R.2 W., on right upstream abutment of bridge on State Highway 68, 0.9 mile west of Afton, 2.2 miles downstream from Wilkes Creek, and 7 miles upstream from Mullett Lake.

Drainage area.--159 sq mi.

Records available.--April 1942 to September 1960.

Gage.--Staff gage. Altitude of gage is 675 ft (by barometer). Prior to Sept. 13, 1943, staff gage at site 50 ft upstream at same datum.

Average discharge.--18 years (1942-60), 133 cfs.

Extremes.--1942-60: Maximum discharge, 1,170 cfs Apr. 17, 1960 (gage height, 6.80 ft, from high-water mark); maximum gage height, about 10.5 ft Mar. 31, 1943, from floodmarks (ice jam); minimum discharge, 49 cfs Aug. 8, 1958.

Remarks.--Occasional regulation by Lansing Club Dam about 22 miles upstream.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	103	117	103	95.4	88.6	212	344	141	119	122	96.6	109	137
1952	182	188	150	171	141	168	402	145	151	151	97.9	90.2	168
1953	91.5	123	124	111	158	249	206	143	127	103	85.3	96.7	133
1954	94.9	105	111	92.6	119	119	247	157	205	93.3	94.7	141	131
1955	189	137	115	111	98.6	167	268	121	104	80.9	64.5	77.0	128
1956	95.1	111	103	95.1	97.9	101	234	128	107	103	81.7	87.6	111
1957	82.1	113	109	89.4	80.2	124	201	197	172	131	72.8	99.6	123
1958	103	144	109	99.0	92.9	115	144	97.0	80.4	91.6	65.3	109	104
1959	116	122	105	87.9	85.5	136	381	183	99.1	75.0	97.9	114	133
1960	163	154	144	139	127	142	420	262	137	107	99.8	99.9	166

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.75	0.82	0.75	0.68	0.58	1.53	2.41	1.02	0.83	0.88	0.70	0.77	11.72
1952	1.31	1.32	1.09	1.24	.96	1.22	2.82	1.05	.92	1.10	.71	.63	14.37
1953	.66	.86	.90	.80	.90	1.81	1.45	1.04	.89	.75	.62	.68	11.36
1954	.69	.72	.80	.67	.78	.86	1.73	1.14	1.44	.68	.69	.99	11.19
1955	1.37	.96	.83	.80	.65	1.21	1.89	.88	.73	.59	.47	.54	10.92
1956	.68	.78	.75	.68	.66	.73	1.64	.93	.75	.75	.59	.61	9.55
1957	.59	.79	.79	.65	.52	.90	1.41	1.43	1.20	.95	.53	.70	10.46
1958	.75	1.01	.79	.72	.61	.83	1.01	.70	.56	.66	.47	.77	8.88
1959	.84	.86	.76	.64	.56	.99	2.68	1.33	.70	.54	.71	.80	11.41
1960	1.19	1.08	1.04	1.01	.86	1.03	2.94	1.90	.96	.78	.72	.70	14.21

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	121	*10.38
1951	1207	578	Apr. 13, 1951	70	137	0.862	11.72	154	13.12	
1952	1237	730	Apr. 2, 1952	83	168	1.06	14.37	153	13.07	
1953	1277	634	Mar. 23, 1953	72	133	.836	11.36	131	11.15	
1954	1337	752	Apr. 28, 1954	75	131	.824	11.19	142	12.14	
1955	1387	463	Oct. 17, 1954	57	128	.805	10.92	116	9.97	
1956	1437	a600	Apr. 5, 1956	63	111	.698	9.55	111	9.51	
1957	1507	804	May 16, 1957	64	123	.774	10.46	127	10.84	
1958	1557	265	Sept. 7, 1958	50	104	.654	8.88	103	8.79	
1959	1627	756	Apr. 9, 1959	61	133	.836	11.41	143	12.26	
1960	1707	1,170	Apr. 17, 1960	88	166	1.04	14.21	-	-	

\* Revised.

a Maximum daily.

## 1300. Cheboygan River near Cheboygan, Mich.

Location.--Lat 45°34'40", long 84°29'15", in SW $\frac{1}{4}$  sec.19, T.37 N., R.1 W., 300 ft downstream from Mullett Lake,  $2\frac{1}{2}$  miles upstream from Black River, and 5 miles south of Cheboygan.

Drainage area.--865 sq mi.

Records available.--October 1942 to September 1960. Monthly discharge only for October 1942, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 591.21 ft above mean sea level, datum of 1929. Auxiliary staff gage at Cheboygan 5.2 miles downstream. Datum of auxiliary gage is 590.00 ft above mean sea level, datum of 1929.

Average discharge.--18 years (1942-60), 774 cfs.

Extremes.--1942-60: Maximum daily discharge, 1,640 cfs May 8, 1959; maximum daily gage height, 3.27 ft May 13, 14, 1960; minimum daily discharge, 90 cfs Mar. 29, 30, 1958; minimum daily gage height, 1.12 ft Dec. 29, 1952.

Remarks.--Flow affected by variable backwater from powerplant at Cheboygan 5.2 miles below station and by Alverno powerplant.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	742	606	952	778	665	1,024	1,372	1,163	942	742	625	759	865
1952	1,019	1,162	1,045	1,177	1,058	988	1,387	1,198	926	724	590	519	982
1953	349	494	769	848	915	1,114	1,035	979	773	542	529	577	742
1954	492	550	609	642	732	742	935	945	1,078	595	534	682	710
1955	883	702	691	745	705	878	1,070	701	724	458	463	384	700
1956	489	638	713	663	647	714	913	726	627	656	550	636	664
1957	702	886	668	711	662	749	781	1,022	906	919	541	746	775
1958	638	808	698	748	641	602	533	561	477	431	418	674	602
1959	677	865	859	863	867	887	1,280	1,306	620	426	603	794	836
1960	839	1,005	892	941	827	739	1,129	1,476	1,139	681	539	540	895

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.99	0.78	1.15	1.04	0.80	1.36	1.77	1.54	1.22	0.99	0.83	0.98	13.45
1952	1.36	1.50	1.40	1.57	1.32	1.31	1.78	1.59	1.19	.96	.79	.67	15.44
1953	.46	.64	1.02	1.13	1.10	1.49	1.33	1.30	1.00	.72	.71	.74	11.64
1954	.66	.71	.81	.86	.88	.99	1.20	1.26	1.40	.79	.71	.88	11.15
1955	1.18	.91	.92	.99	.85	1.18	1.38	.93	.93	.61	.62	.50	11.00
1956	.65	.82	.95	.88	.81	.95	1.18	.97	.81	.87	.73	.82	10.44
1957	.94	1.14	.89	.95	.80	1.00	1.01	1.36	1.17	1.22	.72	.96	12.16
1958	.85	1.04	.93	1.00	.77	.80	.69	.75	.61	.57	.56	.87	9.44
1959	.90	1.12	1.14	1.15	1.04	1.19	1.65	1.74	.80	.57	.80	1.02	13.12
1960	1.12	1.29	1.19	1.26	1.03	.98	1.46	1.97	1.47	.91	.72	.70	14.10

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Maximum day		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	799	12.41	
1951	1207	1,550	Apr. 28, 29, 1951	326	865	1.00	13.45	942	14.79	
1952	123/	1,550	Apr. 22, 1952	359	982	1.14	15.44	847	13.30	
1953	1277	1,350	Mar. 29, 1953	129	742	.858	11.64	745	11.70	
1954	1337	1,200	June 15, 1954	120	710	.821	11.15	762	11.98	
1955	1387	1,200	June 8, 10, 1955	200	700	.809	11.00	663	10.41	
1956	1437	1,040	Apr. 18, 1956	200	664	.768	10.44	699	10.99	
1957	1507	1,160	July 17, 1957	290	775	.896	12.16	765	12.01	
1958	1557	1,030	Nov. 19, 22, 1957	90	602	.696	9.44	624	9.78	
1959	1627	1,640	May 8, 1959	150	836	.966	13.12	864	13.56	
1960	1707	1,560	May 13, 14, 1960	242	895	1.03	14.10	-	-	

1305. Black River near Tower, Mich.

Location.--Lat 45°23'35", long 84°20'00", in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.29, T.35 N., R.1 E., on right bank 400 ft downstream from Kleber Dam, 1,000 ft upstream from Milligan Creek, 3.0 miles northwest of Tower, and 10.8 miles upstream from Black Lake.

Drainage area.--313 sq mi.

Records available.--October 1942 to September 1960. Monthly discharge only for October 1942, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 658.00 ft above mean sea level (Stanley Engineering Co. bench mark). Prior to Aug. 1, 1949, at site 1 mile upstream at different datum.

Average discharge.--18 years (1942-60), 248 cfs.

Extremes.--1942-60: Maximum discharge, 2,340 cfs Apr. 17, 1960 (gage height, 7.13 ft); minimum, 0.6 cfs Mar. 11, 1950; minimum daily, 4.0 cfs Nov. 27, 1949.

Remarks.--Flow regulated by powerplants at Tower and Kleber Dam.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	180	188	223	176	188	334	749	285	239	263	186	212	268
1952	362	379	291	316	251	291	749	303	257	338	195	163	324
1953	157	203	247	204	268	481	411	289	258	174	135	157	248
1954	146	175	197	158	198	219	489	292	343	150	161	254	231
1955	377	269	212	206	195	312	562	248	212	123	108	121	245
1956	154	192	177	151	152	188	492	273	202	185	148	161	206
1957	158	202	197	162	155	216	406	410	294	291	119	182	231
1958	185	270	221	177	157	215	303	195	140	160	115	185	194
1959	203	208	168	151	155	232	737	419	177	131	176	192	246
1960	308	308	260	245	215	220	882	594	296	212	177	178	324

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.66	0.67	0.82	0.65	0.63	1.23	2.67	1.05	0.85	0.97	0.68	0.76	11.64
1952	1.34	1.35	1.07	1.16	.86	1.07	2.67	1.12	.92	1.24	.72	.58	14.10
1953	.58	.72	.91	.75	.89	1.76	1.46	1.06	.92	.64	.50	.56	10.77
1954	.54	.62	.73	.58	.66	.81	1.74	1.08	1.23	.55	.59	.91	10.04
1955	1.58	.96	.78	.76	.65	1.15	2.01	.91	.76	.45	.40	.43	10.64
1956	.57	.68	.65	.56	.52	.69	1.75	1.01	.72	.68	.55	.57	8.95
1957	.51	.72	.73	.60	.52	.80	1.45	1.51	1.05	1.07	.44	.65	10.05
1958	.68	.96	.81	.65	.52	.79	1.08	.72	.50	.59	.42	.66	8.38
1959	.75	.74	.62	.56	.52	.85	2.62	1.54	.63	.48	.65	.68	10.64
1960	1.13	1.10	.96	.90	.74	.81	3.15	2.19	1.06	.78	.65	.63	14.10

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	226	9.78
1951	1207	1,500	Apr. 13, 1951	78	268	0.856	11.64	305	13.25
1952	1237	1,200	Apr. 19, 1952	120	324	1.04	14.10	289	12.55
1953	1277	1,280	Dec. 18, 1952	57	248	.792	10.77	241	10.45
1954	1337	888	Apr. 11, 1954	65	231	.738	10.04	260	11.27
1955	1387	1,000	Oct. 4, 17, 1954	58	245	.783	10.64	217	9.42
1956	1437	980	Apr. 7, 1956	59	206	.658	8.95	207	9.01
1957	1507	1,020	May 22, 1957	62	231	.738	10.05	243	10.54
1958	1557	508	Apr. 23, 1958	69	194	.620	8.38	186	8.04
1959	1627	1,350	Apr. 19, 1959	79	246	.786	10.64	271	11.72
1960	1707	2,340	Apr. 17, 1960	115	324	1.04	14.10	-	-

## 1310. Rainy River near Onaway, Mich.

Location.--Lat 45°21'25", long 84°10'00", in SW $\frac{1}{4}$  sec.2, T.34 N., R.2 E., on left bank 50 ft upstream from bridge on State Highway 68, 1 $\frac{1}{2}$  miles downstream from Little Rainy River, and 3 miles east of Onaway.

Drainage area.--79 sq mi, approximately.

Records available.--January 1942 to September 1952. Monthly discharge only for January 1942, published in WSP 1307.

Gage.--Staff gage. Datum of gage is 747.77 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--10 years (1942-52), 24.8 cfs.

Extremes.--1942-52: Maximum discharge observed, 668 cfs Apr. 1, 1943 (gage height, 5.55 ft); no flow Aug. 24-28, 1943.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	5.33	6.81	14.1	7.58	5.46	40.3	203	36.7	10.7	19.3	4.85	6.24	29.9
1952	59.2	52.5	37.5	39.7	33.1	46.6	272	37.0	8.07	19.8	9.04	1.41	51.1

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.08	0.10	0.21	0.11	0.07	0.59	2.87	0.54	0.15	0.28	0.07	0.09	5.16
1952	.86	.74	.55	.58	.45	.68	3.84	.54	.11	.29	.13	.02	8.79

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	15.4	2.66
1951	1207	a324	Apr. 13, 1951	2.3	29.9	0.378	5.16	40.2	6.92
1952	1237	a386	Apr. 15, 17-19	.8	51.1	.647	8.79	-	-

a Maximum daily.



## 1315. Rainy River near Ocqueoc, Mich.

Location.--Lat 45°24'30", long 84°10'45", in NE¼NW¼ sec.22, T.35 N., R.2 E., on upstream side of highway bridge, 4.4 miles west of Ocqueoc and 5 miles upstream from Black Lake.

Drainage area.--85 sq mi, approximately.

Records available.--October 1952 to September 1960.

Gage.--Wire-weight gage. Datum of gage is 674.85 ft above mean sea level, unadjusted.

Average discharge.--8 years (1952-60), 35.9 cfs.

Extremes.--1952-60: Maximum discharge, 946 cfs Apr. 18, 1960 (gage height, 6.33 ft, from floodmark); minimum, 0.4 cfs Sept. 7, 1955.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	2.0	4.05	12.9	14.5	18.8	130	93.0	47.5	50.2	7.91	1.14	2.79	32.1
1954	2.80	5.29	8.45	6.34	12.5	26.1	135	48.5	51.7	16.8	7.81	17.8	28.1
1955	32.2	44.0	22.8	12.2	10.4	52.6	160	35.6	18.0	1.68	.70	1.10	37.6
1956	2.54	6.17	5.25	2.53	4.10	8.84	120	32.5	9.22	6.07	2.96	3.24	16.8
1957	2.90	10.0	14.8	9.47	7.09	28.4	119	97.0	50.5	118	6.80	9.99	39.7
1958	13.7	46.1	37.6	16.7	13.0	29.6	70.7	32.8	6.64	8.35	2.25	9.13	23.9
1959	15.2	22.5	9.06	6.94	6.32	26.8	237	157	15.6	1.88	1.88	3.89	42.0
1960	29.3	52.6	60.6	34.1	26.9	31.6	334	178	33.3	15.2	5.30	4.33	66.8

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	0.03	0.05	0.18	0.20	0.23	1.76	1.22	0.84	0.66	0.11	0.01	0.04	5.13
1954	.04	.07	.11	.09	.15	.35	1.77	.66	.68	.23	.11	.23	4.49
1955	1.24	.58	.31	.17	.13	.71	2.10	.48	.24	.02	.009	.01	6.00
1956	.03	.08	.07	.03	.05	.12	1.57	.44	.12	.08	.04	.04	2.67
1957	.04	.13	.20	.13	.09	.39	1.56	1.31	.66	1.60	.09	.13	6.33
1958	.19	.60	.51	.23	.16	.40	.93	.44	.09	.11	.03	.12	3.81
1959	.21	.30	.12	.09	.08	.36	3.11	2.13	.21	.03	.03	.05	6.72
1960	.40	.69	.82	.46	.34	.43	4.38	2.41	.44	.21	.07	.06	10.71

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	1277	400	Mar. 24, 1953	0.6	32.1	0.378	5.13	31.9	5.09
1954	1337	362	Apr. 28, 1954	1.7	28.1	.331	4.49	40.1	6.40
1955	1387	305	Apr. 4, 1955	.5	37.6	.442	6.00	25.4	4.05
1956	1437	280	Apr. 5, 1956	1.2	16.8	.198	2.67	18.0	2.86
1957	1507	600	Apr. 28, 1957	1.6	39.7	.467	6.33	45.5	7.26
1958	1557	108	Apr. 25, 1958	.6	23.9	.281	3.81	19.6	3.14
1959	1627	525	May 5, 1959	.8	42.0	.494	6.72	50.1	8.00
1960	1707	946	Apr. 18, 1960	2.1	66.8	.786	10.71	-	-

## 1320. Black River near Cheboygan, Mich.

Location.--Lat 45°30'00", long 84°19'35", in NW¼NW¼ sec.21, T.36 N., R.1 E., on left bank 0.3 mile downstream from Black Lake, 5.3 miles upstream from Alverno Dam, and 12.6 miles southeast of Cheboygan.

Drainage area.--597 sq mi.

Records available.--October 1942 to September 1960. Monthly discharge only for October 1942, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 609.26 ft above mean sea level, datum of 1929. Auxiliary water-stage recorder 3 miles downstream at same datum.

Average discharge.--18 years (1942-60), 424 cfs.

Extremes.--1942-60: Maximum daily discharge, 2,500 cfs Apr. 20, 1960; maximum daily gage height, 5.74 ft Apr. 20, 1960; minimum daily discharge, 11 cfs Aug. 14, 1949; minimum daily gage height, 1.60 ft Sept. 2, 1947.

Remarks.--Flow regulated by powerplant at Alverno Dam.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	362	344	420	367	308	559	1,497	579	348	437	364	233	485
1952	631	785	498	625	541	545	1,708	653	352	505	248	212	607
1953	237	224	467	430	515	904	866	576	498	216	123	194	437
1954	203	143	239	356	388	356	825	573	722	153	254	432	385
1955	763	422	319	422	374	540	1,076	276	401	137	194	208	427
1956	278	355	367	348	309	363	816	470	329	330	91.9	246	358
1957	195.1	243	347	389	256	394	564	1,188	678	711	191.7	296	439
1958	288	654	591	455	378	361	420	258	142	178	80.3	280	340
1959	335	355	276	296	333	324	1,396	1,019	213	113	319	460	453
1960	498	654	465	532	431	336	1,599	1,564	414	242	189	248	597

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.70	0.64	0.81	0.71	0.54	1.08	2.80	1.12	0.85	0.84	0.70	0.44	11.03
1952	1.22	1.46	.96	1.21	.98	1.05	3.19	1.26	.66	.98	.48	.40	13.85
1953	.46	.42	.90	.83	.90	1.74	1.62	1.11	.93	.42	.24	.36	9.93
1954	.39	.27	.46	.69	.68	.69	1.54	1.11	1.35	.30	.49	.81	8.78
1955	1.48	.79	.62	.82	.65	1.04	2.01	.53	.75	.26	.37	.39	9.71
1956	.54	.66	.71	.67	.56	.70	1.53	.91	.61	.64	.18	.46	8.17
1957	.18	.45	.67	.75	.45	.76	1.05	2.29	1.27	1.37	.18	.55	9.97
1958	.56	1.23	1.14	.88	.66	.70	.79	.50	.27	.34	.16	.52	7.75
1959	.65	.66	.53	.57	.58	.63	2.61	1.97	.40	.22	.62	.86	10.30
1960	.96	1.23	.90	1.03	.78	.65	2.99	3.02	.77	.47	.37	.46	13.63

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Maximum day		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	411	9.35
1951	1207	1,920	Apr. 16, 1951	23	485	0.812	11.03	551	12.52
1952	1237	2,260	Apr. 19, 1952	62	607	1.02	13.85	525	11.99
1953	1277	1,580	Mar. 29, 1953	20	437	.732	9.93	408	9.27
1954	1337	1,410	May 2, 1954	31	385	.645	8.78	463	10.55
1955	1387	1,210	Apr. 19, 1955	47	427	.715	9.71	384	8.73
1956	1437	1,240	Apr. 15, 1956	23	358	.600	8.17	332	7.56
1957	1507	1,900	May 1, 1957	20	439	.735	9.97	510	11.60
1958	1557	1,080	Nov. 20, 1957	15	340	.570	7.75	292	6.66
1959	1627	1,840	Apr. 21, 1959	16	453	.759	10.30	507	11.55
1960	1707	2,500	Apr. 20, 1960	40	597	1.00	13.63	-	-

## 1325. Thunder Bay River near Hillman, Mich.

Location.--Lat 45°00'30", long 83°58'20", in NE 1/4 sec. 8, T.30 N., R.4 E., on left bank 25 ft upstream from bridge on State Highway 32, 0.4 mile downstream from Miller Creek, and 5.2 miles southwest of Hillman.

Drainage area.--232 sq mi.

Records available.--June 1945 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 760 ft (by barometer).

Average discharge.--15 years (1945-60), 207 cfs.

Extremes.--1945-60: Maximum discharge, 1,380 cfs Apr. 12, 1947 (gage height, 8.86 ft); minimum daily, 98 cfs Aug. 7, 1949.

Remarks.--Prior to May 12, 1950, diurnal fluctuation below about 500 cfs by powerplant at Atlanta. Occasional regulation by dam at Atlanta thereafter.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	182	200	220	169	200	280	476	221	192	207	157	176	223
1952	249	255	266	262	213	228	512	238	199	270	177	159	252
1953	163	192	206	191	202	347	313	250	233	182	153	168	217
1954	160	181	185	153	196	197	375	231	237	148	157	196	201
1955	287	222	187	197	186	280	392	204	169	129	126	128	209
1956	147	181	174	159	152	163	381	233	179	187	152	144	187
1957	153	182	185	154	128	172	322	305	278	216	141	160	200
1958	173	215	184	174	137	201	259	164	143	150	121	144	171
1959	159	170	167	160	170	200	484	265	155	134	162	163	199
1960	222	232	216	172	158	184	545	422	281	192	167	170	247

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.90	0.96	1.09	0.84	0.90	1.40	2.29	1.10	0.92	1.03	0.78	0.85	13.06
1952	1.23	1.23	1.33	1.30	.99	1.13	2.47	1.19	.96	1.34	.88	.76	14.81
1953	.81	.92	1.02	.95	.91	1.73	1.51	1.24	1.12	.90	.76	.81	12.68
1954	.80	.87	.92	.76	.88	.98	1.81	1.15	1.14	.74	.78	.94	11.77
1955	1.43	1.07	.93	.98	.84	1.40	1.89	1.01	.81	.64	.63	.62	12.25
1956	.73	.87	.86	.79	.71	.81	1.83	1.15	.86	.93	.76	.69	10.99
1957	.76	.87	.92	.77	.57	.85	1.55	1.51	1.34	1.07	.70	.77	11.68
1958	.86	1.03	.96	.86	.62	1.00	1.15	.82	.69	.75	.60	.69	10.03
1959	.79	.82	.83	.80	.76	.99	2.33	1.31	.75	.67	.80	.78	11.63
1960	1.10	1.12	1.07	.85	.73	.91	2.62	2.10	1.35	.95	.83	.82	14.45

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	196	11.42
1951	1207	776	Apr. 13, 1951	120	223	0.961	13.06	237	13.90
1952	1237	1,140	Apr. 14, 1952	146	252	1.09	14.81	235	13.77
1953	1277	659	Mar. 24, 1953	132	217	.935	12.68	214	12.52
1954	1337	1,110	Apr. 8, 1954	129	201	.866	11.77	215	12.61
1955	1387	592	Apr. 21, 1955	112	209	.901	12.25	192	11.28
1956	1437	998	Apr. 4, 1956	130	187	.806	10.99	189	11.08
1957	1507	1,250	Apr. 25, 1957	110	200	.862	11.68	205	11.98
1958	1557	318	Nov. 19, 1957	110	171	.737	10.03	164	9.62
1959	1627	976	Apr. 6, 1959	121	199	.858	11.63	214	12.48
1960	1707	1,270	May 10, 1960	150	247	1.06	14.45	-	-

1330. Upper South Branch Thunder Bay River near Lachine, Mich.

Location.--Lat 45°03'30", long 83°47'00", on line between secs. 23 and 26, T.31 N., R.5 E., on left bank 50 ft upstream from bridge on State Highway 32, 1 mile upstream from mouth, 3½ miles downstream from Fletcher Pond, and 3½ miles southwest of Lachine.

Drainage area.--171 sq mi.

Records available.--March 1945 to October 1953.

Gage.--Water-stage recorder. Datum of gage is 711.80 ft above mean sea level, datum of 1929. Prior to June 24, 1945, staff gage at same site and datum.

Average discharge.--8 years (1945-53), 108 cfs.

Extremes.--1945-53: Maximum discharge, 490 cfs May 27, 1947 (gage height, 4.19 ft); maximum gage height, 4.60 ft Apr. 12, 1947 (backwater from Thunder Bay River); minimum daily discharge, 0.7 cfs Nov. 21, 1949.

Remarks.--Flow regulated by Fletcher Pond (usable capacity, 40,170 acre-ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	155	129	70.3	142	126	164	34.6	128	129	151	227	164	135
1952	44.3	90.5	215	178	169	134	56.1	104	145	97.4	225	275	144
1953	100	44.3	66.3	96.2	84.5	60.3	69.0	134	136	125	163	213	108
1954	146	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	848	-
1951	1207	446	Mar. 8-10, 1951	12	135	-	-	135	-
1952	1237	400	Sept. 10-12, 1952	17	144	-	-	133	-
1953	1277	330	June 6, 1953	12	108	-	-	-	-
1954	1277	-	-	-	-	-	-	-	-

1335. Thunder Bay River near Bolton, Mich.

Location.--Lat 45°07'40", long 83°38'30", in NE¼ sec. 36, T.32 N., R.6 E., on left bank half a mile upstream from Orchard Hill Bridge, 4 miles upstream from North Branch Thunder Bay River, 5 miles southwest of Bolton, and 11 miles northwest of Alpena.

Drainage area.--588 sq mi.

Records available.--March 1945 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 671.96 ft above mean sea level, unadjusted. Prior to Aug. 12, 1945, staff gage at site 500 ft downstream at different datum.

Average discharge.--15 years (1945-60), 436 cfs.

Extremes.--1945-60: Maximum discharge, 3,350 cfs Apr. 7, 1959 (gage height, 9.12 ft); minimum, 92 cfs Sept. 28, 29, 1955.

Revisions.--The momentary maximum discharge for water year 1947, published in WSP 1307, has been revised to 3,250 cfs.

Remarks.--Diurnal fluctuation caused by powerplant at Hillman and regulation by Fletcher Pond on the Upper South Branch Thunder Bay River (usable capacity, 40,170 acre-ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	391	420	508	386	404	705	1,163	443	378	431	402	408	503
1952	522	651	659	762	506	595	1,409	433	412	461	463	472	611
1953	280	270	326	347	334	865	566	594	534	336	324	433	435
1954	332	322	311	275	334	412	895	401	558	383	397	349	413
1955	620	474	405	470	426	630	972	393	397	326	232	210	463
1956	242	303	285	298	318	345	815	355	313	393	351	324	361
1957	256	326	374	325	295	353	695	907	590	671	312	325	445
1958	321	403	403	364	291	475	422	269	212	225	199	257	320
1959	265	280	266	256	277	462	1,238	642	257	219	259	271	391
1960	362	506	558	424	405	440	1,476	1,099	595	427	355	297	578

Yearly discharge, in cubic feet per second, of Thunder Bay River near Bolton, Mich.

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	406	-
1951	1207	2,000	Apr. 1, 1951	250	503	-	-	546	-
1952	1237	2,710	Apr. 15, 1952	265	611	-	-	532	-
1953	1277	1,800	Mar. 20, 1953	209	435	-	-	442	-
1954	1337	2,300	Apr. 9, 1954	230	413	-	-	458	-
1955	1387	1,860	Apr. 20, 21, 1955	152	463	-	-	406	-
1956	1437	2,100	Apr. 6, 1956	151	361	-	-	372	-
1957	1507	2,240	May 24, 1957	209	445	-	-	459	-
1958	1557	671	Mar. 29, 1958	147	320	-	-	294	-
1959	1627	3,350	Apr. 7, 1959	184	591	-	-	442	-
1960	1707	2,840	May 11, 1960	210	578	-	-	-	-

1340. North Branch Thunder Bay River near Bolton, Mich.

Location.--Lat 45°08'55", long 83°36'35", in sec. 29, T. 32 N., R. 7 E., on left bank  $\frac{1}{2}$  miles upstream from mouth,  $2\frac{1}{2}$  miles south of Bolton, and 9 miles northwest of Alpena.

Drainage area.--184 sq mi.

Records available.--March 1945 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 675.52 ft above mean sea level, unadjusted. Prior to Aug. 16, 1945, staff gage at site half a mile upstream at different datum.

Average discharge.--15 years (1945-60), 106 cfs.

Extremes.--1945-60: Maximum discharge, 2,330 cfs Apr. 13, 1947 (gage height, 7.00 ft); maximum gage height, 7.98 ft Mar. 31, 1950 (ice jam); minimum discharge, 0.4 cfs Oct. 14, 1955.

Remarks.--Occasional regulation during low flows.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	36.5	58.4	115	49.8	45.1	228	682	94.6	42.3	69.2	34.3	45.0	125
1952	262	249	162	171	94.0	86.0	781	95.9	41.1	65.9	35.6	14.1	171
1953	9.87	17.3	37.2	42.0	51.0	453	217	143	173	34.5	13.4	17.3	101
1954	9.90	21.6	37.8	31.0	68.6	108	418	137	193	43.4	44.2	56.8	96.9
1955	257	117	99.2	86.9	63.9	210	489	107	37.9	9.09	3.33	1.55	124
1956	3.83	22.9	32.5	28.1	36.4	61.7	492	103	46.2	33.9	14.4	22.5	74.3
1957	14.5	46.8	64.2	36.7	25.1	104	295	292	115	211	10.2	36.1	105
1958	31.1	106	87.8	58.1	43.3	127	196	55.5	17.0	24.2	6.03	32.3	65.3
1959	35.6	62.7	25.5	20.4	20.9	58.9	737	244	40.3	7.89	11.1	30.4	107
1960	96.5	149	150	102	88.2	102	924	402	112	36.0	17.7	14.7	182

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.23	0.35	0.72	0.31	0.26	1.43	4.14	0.59	0.26	0.43	0.21	0.27	9.20
1952	1.64	1.51	1.01	1.07	.55	.54	4.73	.60	.25	.41	.22	.09	12.62
1953	.06	.10	.23	.26	.29	2.84	1.32	.90	1.05	.22	.08	.10	7.45
1954	.06	.13	.24	.19	.39	.68	2.53	.86	1.17	.27	.28	.34	7.14
1955	1.61	.71	.62	.54	.36	1.31	2.97	.67	1.23	.06	.02	.01	9.11
1956	.02	.14	.20	.18	.21	.39	2.98	.65	.28	.21	.09	.14	5.49
1957	.09	.28	.40	.23	.14	.65	1.78	1.83	.70	1.33	.06	.22	7.71
1958	.19	.64	.55	.36	.24	.80	1.19	.35	.10	.15	.04	.20	4.81
1959	.22	.38	.16	.13	.12	.37	4.47	1.53	.24	.05	.07	.18	7.92
1960	.60	.90	.94	.64	.52	.64	5.60	2.51	.68	.23	.11	.09	13.46

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	92.5	6.81
1951	1207	1,260	Apr. 1, 1951	23	125	0.679	9.20	164	12.06
1952	1237	1,520	Apr. 16, 1952	10	171	.929	12.62	120	8.85
1953	1277	1,140	Mar. 24, 1953	4.5	101	.549	7.45	102	7.49
1954	1337	1,390	Apr. 9, 1954	4.8	96.9	.527	7.14	131	9.65
1955	1387	992	Apr. 3, 1955	.6	124	.674	9.11	88.6	6.53
1956	1437	1,740	Apr. 6, 1956	.6	74.3	.404	5.49	79.8	5.90
1957	1507	1,040	Apr. 27, 1957	5.1	105	.571	7.71	113	8.32
1958	1557	402	Mar. 31, 1958	2.9	65.3	.355	4.81	56.9	4.19
1959	1627	2,020	Apr. 7, 1959	4.1	107	.582	7.92	130	9.60
1960	1707	1,980	Apr. 15, 1960	7.2	182	.989	13.46	-	-

## 1345. Lower South Branch Thunder Bay River near Hubbard Lake, Mich.

Location.--Lat 44°51'35", long 83°35'40", in NE $\frac{1}{4}$  sec.4, T.28 N., R.7 E., on right bank 50 ft downstream from Hubbard Lake, 1 mile south of town of Hubbard Lake, and 8 $\frac{1}{2}$  miles upstream from Wolf Creek.

Drainage area.--146 sq mi.

Records available.--August 1945 to October 1953.

Gage.--Water-stage recorder. Datum of gage is 701.08 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--8 years (1945-53), 104 cfs.

Extremes.--1945-53: Maximum daily discharge, 660 cfs Apr. 18, 1952; no flow May 25-27, 30,31, 1949.

Remarks.--Flow regulated by Hubbard Lake (usable capacity, 30,070 acre-ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	124	105	46.8	167	190	199	134	124	107	115	157	133	133
1952	41.6	89.1	140	177	197	180	227	130	137	133	219	164	153
1953	88.8	80.3	75.5	62.6	60.1	56.0	91.4	178	181	184	169	92.1	110
1954	95.0	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	72.9	-
1951	1207	425	Apr. 28, 1951	23	133	-	-	133	-
1952	1237	660	Apr. 18, 1952	13	153	-	-	150	-
1953	1277	500	May 2, 1953	25	110	-	-	-	-
1954	1277	-	-	-	-	-	-	-	-

## 1355. Au Sable River at Grayling, Mich.

Location.--Lat 44°39'35", long 84°42'45", in SE $\frac{1}{4}$  sec.7, T.26 N., R.3 W., on right bank 65 ft upstream from bridge on U.S. Highway 27 at Grayling and three-quarters of a mile upstream from East Branch.

Drainage area.--110 sq mi.

Records available.--October 1942 to September 1960. Prior to October 1954, published as Middle Branch Au Sable River at Grayling. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder above steel-crested dam. Datum of gage is 1,123.49 ft above mean sea level, datum of 1929.

Average discharge.--18 years (1942-60), 75.2 cfs.

Extremes.--1942-60: Maximum discharge, 274 cfs June 2, 1943 (gage height, 3.00 ft); minimum, 28 cfs Apr. 21, 1946.

Remarks.--Prior to Dec. 31, 1952, diurnal fluctuation caused by powerplant 2.5 miles upstream. Records of water temperatures for the period March 1953 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	64.8	68.2	66.4	59.2	59.4	79.8	129	85.9	76.6	69.4	59.4	63.1	73.5
1952	88.0	95.1	79.6	82.3	77.2	75.5	134	83.6	72.4	94.3	74.2	64.9	85.0
1953	58.8	77.1	85.3	90.2	88.5	114	114	94.1	96.5	91.0	76.5	70.0	87.8
1954	66.7	70.4	72.5	65.8	73.1	77.1	118	93.3	109	77.4	63.5	68.8	79.5
1955	87.5	76.8	69.3	64.2	64.8	78.0	107	76.5	70.5	53.3	51.5	48.4	70.7
1956	55.1	62.2	61.7	56.1	53.6	57.6	103	77.0	66.6	74.0	76.0	69.0	67.6
1957	60.9	64.2	62.8	57.8	56.1	65.9	78.5	72.4	70.3	72.1	49.9	61.1	64.4
1958	59.1	70.4	63.8	57.0	54.9	59.2	68.5	52.3	50.0	48.0	45.1	58.4	57.2
1959	60.1	61.6	56.0	50.7	47.7	56.3	118	83.9	61.3	53.4	68.2	69.2	65.5
1960	91.7	84.3	74.4	72.4	64.3	62.9	129	114	86.2	74.3	70.4	65.2	82.4

Monthly and yearly runoff, in inches, of Au Sable River at Grayling, Mich.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.68	0.69	0.70	0.62	0.56	0.84	1.30	0.90	0.78	0.73	0.62	0.64	9.06
1952	.92	.97	.83	.86	.76	.79	1.36	.88	.73	.99	.78	.66	10.53
1953	.62	.78	.87	.95	.84	1.20	1.16	.99	.98	.95	.80	.71	10.85
1954	.70	.71	.76	.69	.69	.81	1.19	.98	1.11	.81	.67	.70	9.82
1955	.92	.78	.73	.67	.61	.82	1.09	.90	.72	.56	.54	.49	8.73
1956	.58	.63	.65	.59	.53	.60	1.04	.81	.68	.78	.80	.70	8.39
1957	.64	.65	.66	.61	.53	.69	.80	.76	.71	.76	.52	.62	7.95
1958	.62	.71	.67	.60	.52	.62	.70	.55	.51	.50	.47	.59	7.06
1959	.63	.62	.59	.53	.45	.59	1.19	.88	.62	.56	.71	.70	8.07
1960	.96	.85	.78	.76	.63	.66	1.30	1.20	.87	.78	.74	.66	10.19

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	70.5	8.70
1951	1207	189	Apr. 10, 1951	43	73.5	0.668	9.06	78.8	9.71
1952	1237	189	Apr. 14, 1952	46	85.0	.773	10.53	81.4	10.08
1953	1277	176	Mar. 25, 1953	52	87.8	.798	10.85	87.0	10.75
1954	1337	189	Apr. 9, 1954	57	79.5	.723	9.82	81.5	10.08
1955	1387	128	Apr. 6, 1955	45	70.7	.643	8.73	66.1	8.16
1956	1437	146	Apr. 8, 9, 1956	49	67.6	.615	8.39	68.4	8.48
1957	1507	113	July 9, 1957	46	64.4	.585	7.95	64.8	8.00
1958	1557	93	Nov. 16, 1957	41	57.2	.520	7.06	55.9	6.90
1959	1627	156	Apr. 19, 1959	45	65.5	.595	8.07	71.7	8.82
1960	1707	186	Apr. 18, 1960	52	82.4	.749	10.19	-	-

1356. East Branch Au Sable River at Grayling, Mich.

Location.--Lat 44°40'10", long 84°42'20", in NW<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub> sec.8, T.26 N., R.3 W., on right bank at south boundary of State fish hatchery area at Grayling, 0.4 mile upstream from mouth.

Drainage area.--76.0 sq mi.

Records available.--April 1958 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 1,110 ft (from topographic map). Prior to Sept. 30, 1958, staff gage at site 10 ft downstream at same datum.

Extremes.--1958-60: Maximum discharge, 135 cfs Apr. 14, 1960 (gage height, 4.67 ft); minimum, 15 cfs Mar. 6, 1959 (gage height, 2.58 ft), result of freezeup.

Remarks.--Occasional regulation by State fish hatchery above gage.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	41.7	32.6	28.2	24.4	22.2	26.8	-
1959	30.6	33.3	29.5	25.4	22.6	24.6	79.4	57.9	37.3	31.1	39.8	44.3	38.0
1960	64.4	60.2	49.2	45.1	39.3	38.1	64.6	76.9	58.2	42.9	38.8	38.0	53.0

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	0.61	0.49	0.41	0.37	0.34	0.39	-
1959	0.46	0.49	0.45	0.39	0.31	0.37	1.16	.88	.55	.47	.60	.65	6.78
1960	.98	.88	.75	.68	.56	.58	1.24	1.16	.85	.65	.59	.56	9.48

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1707	-	-	-	-	-	-	-	-
1959	1707	119	Aug. 30, 1959	19	38.0	0.500	6.78	44.8	7.99
1960	1707	135	Apr. 14, 1960	32	53.0	.697	9.48	-	-

## 1365. Au Sable River at Mio, Mich.

Location.--Lat 44°39'35", long 84°07'30", on line between sec.7, T.26 N., R.3 E., and sec.12, T.26 N., R.2 E., on right bank 150 ft upstream from bridge on State Highway 33 at Mio, 10 miles downstream from Big Creek, and 80 miles upstream from mouth.

Drainage area.--1,100 sq mi, approximately.

Records available.--July 1952 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 929.60 ft above mean sea level, datum of 1929.

Average discharge.--8 years (1952-60), 922 cfs.

Extremes.--1952-60: Maximum discharge, 3,260 cfs Apr. 18, 1960 (gage height, 5.38 ft); minimum, 113 cfs Sept. 22, 1954; minimum daily, 456 cfs Feb. 17, 1958; minimum gage height, 0.83 ft July 17, 1959.

Remarks.--Flow regulated at all stages by powerplant 500 ft upstream. Records of water temperatures for the period July 1952 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	974	861	-
1952	823	934	929	869	955	1,459	1,416	1,290	1,182	1,027	899	851	1,053
1953	807	830	827	759	848	864	1,570	1,108	1,422	968	802	841	969
1954	1,167	1,007	878	830	807	1,041	1,443	958	847	718	682	676	921
1955	724	755	777	716	686	733	1,400	1,010	751	865	832	790	836
1956	740	820	788	721	719	807	1,023	1,004	950	1,072	785	789	852
1957	785	938	805	715	660	767	977	723	683	655	578	661	746
1958	702	745	714	717	667	776	1,786	1,239	876	721	869	865	890
1959	1,216	1,174	1,063	1,011	914	887	1,885	1,506	1,116	924	843	823	1,113
1960													

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	1.02	0.87	-
1952	-	-	-	-	-	-	-	-	-	-	1.02	0.87	-
1953	0.86	0.95	0.97	0.91	0.90	1.53	1.44	1.35	1.19	1.08	.94	.86	12.98
1954	.85	.84	.87	.80	.80	.90	1.60	1.16	1.44	1.01	.84	.85	11.96
1955	1.22	1.02	.92	.87	.76	1.09	1.46	1.00	.86	.75	.71	.69	11.35
1956	.76	.77	.81	.75	.67	.77	1.42	1.06	.76	.91	.87	.80	10.35
1957	.78	.83	.83	.76	.68	.85	1.04	1.05	.96	1.12	.82	.80	10.52
1958	.82	.95	.84	.75	.62	.80	.99	.76	.69	.69	.61	.67	9.19
1959	.74	.76	.75	.75	.63	.81	1.81	1.30	.89	.76	.91	.88	10.99
1960	1.28	1.19	1.11	1.06	.90	.93	1.91	1.58	1.13	.97	.88	.83	13.77

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	-	-	-	-	-	-	-	-
1953	1277	2,740	Mar. 23, 1953	665	1,053	0.957	12.98	1,035	12.76
1954	1337	2,920	July 28, 1954	602	969	.881	11.96	1,019	12.56
1955	1387	2,800	Nov. 16, 1954	526	921	.837	11.35	854	10.53
1956	1437	2,800	Nov. 6, 1955	573	836	.760	10.35	†844	10.45
1957	1507	2,870	Aug. 9, 1957	564	852	.775	10.52	867	10.69
1958	1557	2,820	Oct. 7, 1957	456	746	.678	9.19	715	8.83
1959	1827	2,690	Oct. 1, 1958	473	890	.809	10.99	998	12.32
1960	1707	3,260	Apr. 18, 1960	624	1,113	1.01	13.77	-	-

† Corrected.



1380. East Branch Au Gres River at McIvor, Mich.

Location.--Lat 44°14'20", long 83°41'50", on line between secs. 3 and 10, T.21 N., R.6 E., on right bank 25 ft downstream from highway bridge at McIvor, 1.1 miles east of National City, and 9 miles southwest of Tawas City.

Drainage area.--84 sq mi, approximately.

Records available.--October 1950 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 646.58 ft above mean sea level, datum of 1929. Prior to Aug. 30, 1951, wire-weight gage at site 25 ft upstream at same datum.

Average discharge.--10 years (1950-60), 67.9 cfs.

Extremes.--1950-60: Maximum discharge, 1,310 cfs May 20, 1959 (gage height, 8.88 ft); minimum, 16 cfs Dec. 4, 1952; minimum daily, 27 cfs Dec. 16-24, 1958, Jan. 31 to Feb. 10, 1959.

Remarks.--Since 1952, some intermittent regulation at low and medium flow by dam and 2½ miles upstream. Records of water temperatures for the period October 1951 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*37.7	*38.6	70.0	43.9	71.9	104	181	93.5	63.7	66.5	37.5	39.2	*70.5
1952	57.4	71.4	63.8	66.9	62.6	138	235	90.0	52.3	52.0	46.3	43.0	81.5
1953	37.4	47.8	56.7	56.4	65.9	120	95.1	118	33.4	69.6	49.3	42.0	71.0
1954	41.7	45.5	45.8	39.0	67.5	95.9	117	87.3	143	58.5	40.7	42.2	68.5
1955	90.6	68.8	57.6	49.9	42.9	151	124	86.7	55.4	42.1	42.1	36.9	70.9
1956	44.1	48.8	40.3	32.4	30.8	46.9	†154	100	66.0	56.5	55.8	44.3	59.9
1957	42.1	44.2	44.5	43.7	44.5	67.2	117	87.0	82.4	55.0	34.2	41.0	58.5
1958	43.5	62.0	57.2	42.3	37.4	76.0	74.3	43.1	37.4	33.0	29.6	33.3	47.5
1959	37.3	40.7	29.7	29.7	27.8	51.3	196	171	68.0	42.0	44.1	38.7	64.7
1960	57.8	76.1	85.4	72.7	66.3	68.4	230	142	89.6	55.5	46.7	41.8	85.9

† Corrected.

\* Not previously published; estimated on basis of records for nearby stations and weather records.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*0.52	*0.51	0.96	0.60	0.89	1.43	2.40	1.28	0.85	0.91	0.51	0.52	*11.38
1952	.79	.95	.88	.92	.80	1.89	3.12	1.23	.70	.71	.64	.57	13.20
1953	.51	.63	.78	.77	.82	1.65	1.26	1.61	1.24	.96	.68	.56	11.47
1954	.57	.60	.63	.53	.84	1.31	1.55	1.20	1.90	.80	.56	.56	11.05
1955	1.24	.91	.79	.68	.53	2.08	1.65	1.19	.74	.58	.58	.49	11.46
1956	.61	.65	.55	.44	.40	.64	2.04	1.37	.88	.78	.77	.59	9.72
1957	.58	.59	.61	.60	.55	.92	1.55	1.20	1.09	.76	.47	.54	9.46
1958	.60	.82	.79	.58	.46	1.04	.99	.59	.50	.45	.41	.44	7.67
1959	.51	.54	.41	.39	.34	.70	2.60	2.35	.90	.58	.61	.51	10.44
1960	.79	1.01	1.18	1.00	.85	.94	3.06	1.95	1.19	.76	.64	.56	13.93

\* Not previously published; see footnote to preceding table.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	*581	Apr. 27, 1951	*23	*70.5	*0.839	*11.38	74.3	12.01
1952	1237	865	Apr. 14, 1952	35	81.5	.970	13.20	77.3	12.50
1953	1277	352	May 2, 1953	35	71.0	.845	11.47	70.3	11.35
1954	1337	747	June 26, 1954	31	68.5	.815	11.05	75.6	12.19
1955	1387	617	Mar. 22, 1955	34	70.9	.844	11.46	63.8	10.33
1956	1437	545	Apr. 4, 1956	28	59.9	.713	9.72	59.7	9.69
1957	1507	358	Apr. 26, 1957	30	58.5	.696	9.46	61.2	9.89
1958	1557	244	Nov. 14, 1957	27	47.5	.565	7.67	42.8	6.92
1959	1627	1,310	May 20, 1959	27	64.7	.770	10.44	74.1	11.96
1960	1707	499	Apr. 4, 1960	36	85.9	1.02	13.93	-	-

\* Not previously published.

## 1385. Au Gres River near National City, Mich.

Location.--Lat 44°10'45", long 83°44'15", in NW¼ sec.32, T.21 N., R.6 E., on left bank 20 ft downstream from highway bridge, 1½ miles upstream from Elm Creek, 4 miles southwest of National City, 12½ miles southwest of Tawas City, and 15½ miles upstream from mouth.

Drainage area.--169 sq mi. At site used prior to Oct. 1, 1951, 166 sq mi.

Records available.--October 1950 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 710 ft (by barometer). Prior to Oct. 1, 1951, wire-weight gage at site 1.7 miles upstream at different datum.

Average discharge.--10 years (1950-60), 102 cfs.

Extremes.--1950-60: Maximum discharge (revised), 1,970 cfs Apr. 4, 1959 (gage height, 7.87 ft); maximum gage height, 10.5 ft Feb. 21, 1953 (ice jam); minimum discharge, 8.4 cfs Aug. 26, 1957.

Remarks.--Records of water temperatures for the period October 1951 to September 1959 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*41.1	*39.1	106	51.5	118	290	350	136	56.4	51.7	23.5	25.3	*107
1952	83.9	132	113	119	84.5	338	486	75.1	22.9	59.7	43.0	40.7	133
1953	26.5	47.0	74.6	80.3	128	297	166	239	139	46.8	34.7	23.1	108
1954	32.3	33.9	37.9	28.9	96.4	184	246	120	192	43.8	17.1	22.5	87.5
1955	211	106	91.9	69.8	81.1	366	204	112	49.7	24.9	23.2	18.3	114
1956	27.1	46.4	42.9	28.2	28.4	68.2	290	198	107	71.7	70.4	56.2	86.0
1957	41.1	52.6	69.7	80.1	98.2	148	252	158	131	83.1	23.7	32.1	97.3
1958	42.7	138	114	57.8	43.6	165	148	45.1	23.0	18.4	13.1	16.2	68.9
1959	24.5	34.0	21.7	20.9	23.0	114	*497	266	59.7	19.5	21.0	32.5	*94.5
1960	72.6	121	142	116	85.0	*115	*500	208	103	37.2	22.8	20.0	*128

\* Revised.

\* Not previously published; estimated on basis of records for nearby stations and weather records.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*0.29	*0.26	0.74	0.36	0.74	2.02	2.35	0.94	0.38	0.36	0.16	0.17	*8.77
1952	.57	.87	.77	.81	.54	2.31	3.21	.51	.15	.41	.29	.27	10.71
1953	.18	.31	.51	.55	.79	2.03	1.10	1.63	.92	.32	.24	.15	8.75
1954	.22	.22	.26	.20	.59	1.26	1.63	.82	1.27	.30	.12	.15	7.04
1955	1.44	.70	.63	.48	.50	2.50	1.35	.76	.33	.17	.16	.12	9.14
1956	.18	.31	.29	.19	.18	.47	1.92	1.35	.71	.49	.48	.37	6.94
1957	.28	.35	.48	.55	.60	1.01	1.66	1.08	.86	.57	.16	.21	7.81
1958	.29	.91	.78	.39	.27	1.13	.98	.31	.15	.13	.09	.11	5.54
1959	.17	.22	.15	.14	.14	.78	*3.28	1.81	.39	.13	.14	.21	*7.56
1960	.50	.80	.97	.79	.54	*.78	*3.30	1.42	.68	.25	.16	.13	*10.32

\* Revised.

\* Not previously published; see footnote to preceding table.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	1,500	Apr. 26, 1951	*17	*107	*0.645	*8.77	119	9.69
1952	1237	al,600	Apr. 14, 1952	9.4	133	.787	10.71	118	9.50
1953	1277	1,040	May 3, 1953	14	108	.639	8.73	105	8.43
1954	1337	790	June 26, 1954	13	87.5	.518	7.04	113	9.11
1955	1387	1,490	Mar. 22, 1955	14	114	.675	9.14	89.0	7.15
1956	1437	a920	Apr. 4, 1956	10	86.0	.509	6.94	90.0	7.27
1957	1507	748	Apr. 26, 1957	12	97.3	.576	7.81	108	8.68
1958	1557	600	Nov. 15, 1957	11	68.9	.408	5.54	50.9	4.10
1959	1627	*1,970	Apr. 4, 1959	13	*94.5	*.559	*7.56	*116	*9.29
1960	1707	*1,400	Mar. 31, 1960	15	*128	*.757	*10.32	-	-

\* Revised.

\* Not previously published.

a Maximum daily.

## 1390. Houghton Creek near Lupton, Mich.

Location.--Lat 44°23'50", long 84°02'55", in SE $\frac{1}{4}$  sec.10, T.23 N., R.3 E., on right bank half a mile upstream from mouth, 3 miles downstream from Wilkins Creek, and 3 miles southwest of Lupton.

Drainage area.--27 sq mi, approximately.

Records available.--July 1950 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 860 ft (by barometer).

Average discharge.--10 years (1950-60), 51.8 cfs.

Extremes.--1950-60: Maximum discharge, 955 cfs May 20, 1959 (gage height, 7.15 ft), from rating curve extended above 400 cfs on basis of slope-area measurement of peak flow; minimum, 28 cfs Feb. 1, 1953, result of freezeup.

Remarks.--Occasional regulation at low flow by sawmill on Sandback Creek at Rose City prior to June 1955 and since November 1958. Records of water temperatures for the period July 1950 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	48.2	46.5	53.6	46.0	57.7	86.8	101	50.1	41.7	49.3	37.8	40.4	54.9
1952	53.3	57.2	52.9	59.5	52.7	81.5	115	45.9	38.5	38.3	41.8	38.6	56.2
1953	38.2	45.8	47.5	42.2	48.6	86.0	60.2	69.5	52.0	48.1	45.5	41.2	52.1
1954	42.6	47.4	46.8	41.9	57.5	63.0	85.1	51.7	69.4	41.0	41.1	42.7	52.4
1955	61.0	51.6	50.5	49.4	48.6	90.1	68.3	46.3	41.4	40.9	40.7	39.8	52.4
1956	41.0	42.5	46.4	43.5	42.9	47.6	94.9	55.4	42.2	49.8	43.8	42.7	49.4
1957	43.4	43.7	43.9	44.2	43.2	51.2	69.1	61.9	55.6	46.4	41.3	42.3	48.9
1958	44.8	59.8	52.5	39.1	41.3	61.3	55.1	41.1	39.5	38.5	38.5	38.9	45.9
1959	42.3	44.5	38.3	35.4	39.3	59.5	126	85.6	44.6	37.8	39.9	42.1	53.8
1960	46.1	49.7	52.4	44.5	42.0	51.5	102	65.5	45.6	41.3	41.8	38.0	51.7

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2.06	1.92	2.29	1.96	2.23	3.70	4.18	2.14	1.72	2.11	1.61	1.67	27.59
1952	2.27	2.36	2.26	2.54	2.10	3.48	4.75	1.96	1.60	1.64	1.79	1.60	28.35
1953	1.63	1.90	2.03	1.80	1.87	3.68	2.49	2.96	2.15	2.05	1.95	1.71	26.22
1954	1.82	1.96	1.99	1.79	2.22	2.69	3.51	2.20	2.87	1.75	1.75	1.76	26.31
1955	2.61	2.13	2.16	2.11	1.87	3.85	2.82	1.97	1.71	1.74	1.74	1.64	26.35
1956	1.75	1.75	1.98	1.86	1.72	2.03	3.92	2.36	1.74	2.12	1.87	1.76	24.86
1957	1.86	1.81	1.88	1.89	1.67	2.19	2.86	2.64	2.30	1.98	1.76	1.75	24.59
1958	1.91	2.47	2.24	1.67	1.59	2.62	2.28	1.75	1.63	1.65	1.65	1.61	23.07
1959	1.81	1.84	1.64	1.51	1.52	2.54	5.21	4.08	1.84	1.61	1.71	1.74	27.05
1960	1.97	2.05	2.24	1.90	1.68	2.20	4.22	2.80	1.89	1.76	1.79	1.57	26.07

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	400	Apr. 26, 1951	33	54.9	2.03	27.59	56.1	28.21
1952	1237	460	Apr. 14, 1952	31	56.2	2.08	28.35	53.5	27.02
1953	1277	231	May 31, 1953	34	52.1	1.93	26.22	52.6	26.43
1954	1337	430	June 26, 1954	36	52.4	1.94	26.31	54.6	27.44
1955	1387	281	Mar. 22, 1955	37	52.4	1.94	26.35	49.6	24.93
1956	1437	575	Apr. 4, 1956	35	49.4	1.83	24.86	49.4	24.93
1957	1507	199	Apr. 25, 1957	38	48.9	1.81	24.59	51.0	25.66
1958	1557	190	Nov. 15, 1957	34	45.9	1.70	23.07	43.2	21.74
1959	1627	955	May 20, 1959	33	53.8	1.99	27.05	55.7	28.02
1960	1707	248	Mar. 31, 1960	35	51.7	1.91	26.07	-	-

## STREAMS TRIBUTARY TO LAKE HURON

1395. Rifle River at "The Ranch" near Lupton, Mich.

Location.--Lat 44°23'35", long 84°02'15", in SW $\frac{1}{4}$  sec.11, T.23 N., R.3 E., on left bank a quarter of a mile downstream from Houghton Creek and 3 miles southwest of Lupton.

Drainage area.--54 sq mi, approximately.

Records available.--July 1950 to September 1960.

Gage.--Water-stage recorder and wooden control. Altitude of gage is 850 ft (by barometer).

Average discharge.--10 years (1950-60), 91.5 cfs.

Extremes.--1950-60: Maximum discharge, 1,330 cfs May 20, 1959 (gage height, 10.10 ft); minimum, 48 cfs Oct. 8, 1952.

Remarks.--Occasional regulation by dams above station. Records of water temperatures for the period July 1950 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	74.1	75.8	97.1	80.3	100	154	188	90.4	68.2	85.3	63.6	66.6	95.2
1952	88.7	94.5	89.5	105	95.1	132	205	82.6	69.0	71.5	74.5	66.5	97.7
1953	60.6	80.9	87.3	79.2	89.4	150	107	126	99.8	86.5	79.7	70.4	93.2
1954	70.4	76.6	81.9	72.2	91.5	103	151	94.9	130	69.1	64.8	72.1	89.5
1955	117	97.8	88.3	84.0	82.8	143	131	89.8	72.9	68.1	68.8	67.5	92.6
1956	73.6	88.9	81.8	77.1	74.7	85.5	171	105	76.2	89.4	85.2	78.7	90.5
1957	70.7	76.3	77.4	75.8	78.2	101	138	102	82.8	82.2	69.8	68.2	85.1
1958	73.0	109	97.9	79.7	74.7	103	102	71.9	69.9	69.7	63.7	68.2	81.8
1959	70.9	77.5	67.1	61.3	74.2	106	255	183	73.0	63.1	67.4	67.6	95.5
1960	83.5	90.6	94.4	85.5	76.4	86.5	198	126	78.5	72.5	71.0	64.4	93.9

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.58	1.57	2.07	1.71	1.93	3.28	3.90	1.93	1.41	1.82	1.36	1.38	23.94
1952	1.89	1.95	1.91	2.24	1.90	2.81	4.24	1.76	1.43	1.52	1.59	1.37	24.61
1953	1.29	1.67	1.87	1.70	1.73	3.20	2.21	2.69	2.06	1.84	1.71	1.45	23.42
1954	1.50	1.58	1.75	1.54	1.76	2.20	3.12	2.03	2.69	1.48	1.38	1.50	22.53
1955	2.50	2.02	1.89	1.80	1.59	3.06	2.71	1.91	1.51	1.45	1.46	1.40	23.30
1956	1.57	1.84	1.74	1.65	1.49	1.82	3.54	2.24	1.57	1.91	1.82	1.63	22.82
1957	1.51	1.57	1.65	1.61	1.51	2.16	2.86	2.18	1.71	1.75	1.49	1.41	21.41
1958	1.56	2.25	2.09	1.71	1.44	2.20	2.11	1.53	1.44	1.49	1.36	1.41	20.59
1959	1.51	1.61	1.43	1.31	1.43	2.26	4.85	3.91	1.51	1.35	1.44	1.40	24.01
1960	1.79	1.87	2.02	1.82	1.52	1.84	4.10	2.69	1.62	1.54	1.51	1.33	23.65

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	510	Apr. 26, 1951	57	95.2	1.76	23.94	97.3	24.47
1952	1237	550	Apr. 14, 1952	57	97.7	1.81	24.61	94.1	23.69
1953	1277	395	May 31, 1953	51	93.2	1.73	23.42	93.2	23.42
1954	1337	658	June 26, 1954	61	89.5	1.66	22.53	95.8	24.11
1955	1387	415	Mar. 22, 1955	64	92.6	1.71	23.30	87.6	22.04
1956	1437	750	Apr. 4, 1956	66	90.5	1.68	22.82	88.9	22.40
1957	1507	320	Apr. 26, 1957	53	85.1	1.58	21.41	89.7	22.58
1958	1557	282	Nov. 15, 1957	56	81.8	1.51	20.59	76.5	19.24
1959	1627	1,330	May 20, 1959	58	95.5	1.77	24.01	100	25.14
1960	1707	370	Apr. 18, 1960	61	93.9	1.74	23.65	-	-

1400. Prior Creek near Selkirk, Mich.

Location.--Lat 44°20'10", long 84°04'00", in SE $\frac{1}{4}$  sec.33, T.23 N., R.3 E., on right bank a quarter of a mile upstream from mouth, half a mile downstream from Ammond Creek, and  $\frac{1}{2}$  miles north of Selkirk.

Drainage area.--19 sq mi, approximately.

Records available.--September 1950 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 840 ft (by barometer).

Average discharge.--10 years (1950-60), 16.6 cfs.

Extremes.--1950-60: Maximum discharge, 584 cfs May 20, 1959 (gage height, 5.64 ft); minimum, 3.8 cfs Sept. 10, 1950.

Remarks.--Records of water temperatures for the period October 1950 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	9.73	9.96	20.8	8.74	18.3	43.5	48.1	14.4	9.18	14.3	6.83	7.61	17.6
1952	17.7	20.1	21.4	21.2	19.2	41.4	49.5	13.4	7.72	8.68	7.41	7.02	19.5
1953	6.94	10.6	12.2	12.8	18.4	45.9	27.1	31.0	15.5	10.1	11.3	7.09	17.4
1954	8.16	11.2	12.0	9.87	15.0	23.7	36.0	20.0	33.1	7.34	5.75	6.90	15.7
1955	26.8	17.4	12.6	11.0	11.1	42.6	26.3	15.2	7.85	6.12	6.99	6.30	15.9
1956	7.80	9.80	7.50	6.10	6.60	10.0	43.7	26.7	13.3	16.7	21.0	12.5	15.1
1957	9.94	12.1	15.7	11.7	13.4	21.5	32.0	22.1	18.9	12.2	7.17	8.03	15.2
1958	8.78	19.2	20.1	11.4	11.1	27.4	21.6	8.71	8.48	7.25	5.89	7.81	13.1
1959	8.59	10.3	7.61	7.08	8.70	21.3	66.2	39.7	9.79	6.83	6.99	7.53	18.7
1960	14.6	19.8	23.7	14.9	11.6	23.8	67.1	31.3	11.9	8.00	7.15	7.41	20.1

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.59	0.58	1.26	0.53	1.00	2.64	2.83	0.87	0.54	0.87	0.41	0.45	12.57
1952	1.07	1.18	1.30	1.29	1.09	2.51	2.91	.81	.45	.53	.45	.41	14.00
1953	.42	.62	.74	.78	1.01	2.79	1.60	1.88	.91	.61	.69	.42	12.47
1954	.49	.66	.73	.60	.82	1.44	2.11	1.21	1.94	.44	.35	.40	11.19
1955	1.63	1.02	.76	.67	.61	2.58	1.54	.92	.46	.37	.42	.37	11.35
1956	.47	.58	.46	.37	.37	.61	2.57	1.63	.78	1.01	1.28	.73	10.86
1957	.60	.71	.95	.71	.73	1.30	1.87	1.34	.99	.74	.43	.47	10.84
1958	.53	1.13	1.22	.69	.61	1.66	1.27	.53	.50	.44	.36	.46	9.40
1959	.51	.60	.46	.43	.48	1.29	3.88	2.41	.57	.41	.42	.44	11.90
1960	.89	1.16	1.44	.90	.66	1.44	3.94	1.90	.70	.49	.43	.44	14.39

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	1207	-	-	-	-	-	-	-	-	-
1951	1207	145	Apr. 28, 1951	5.8	17.6	0.926	12.57	19.2	13.69	
1952	1237	155	Apr. 13, 1952	5.5	19.5	1.03	14.00	17.1	12.23	
1953	1277	130	Mar. 19, 1953	5.2	17.4	.918	12.47	17.6	12.57	
1954	1337	174	May 31, 1954	5.1	15.7	.826	11.19	17.8	12.72	
1955	1387	186	Mar. 22, 1955	5.2	15.9	.837	11.35	13.2	9.45	
1956	1437	186	Apr. 4, 1956	5	15.1	.795	10.86	16.2	11.61	
1957	1507	128	Apr. 6, 1957	5.9	15.2	.800	10.84	16.1	11.46	
1958	1557	125	Apr. 6, 1958	5.2	13.1	.689	9.40	11.3	8.09	
1959	1627	584	May 20, 1959	5.0	16.7	.879	11.90	19.4	13.82	
1960	1707	325	Mar. 31, 1960	5.7	20.1	1.06	14.39	-	-	

## 1405. Rifle River at Selkirk, Mich.

Location.--Lat 44°18'50", long 84°04'00", in NE $\frac{1}{4}$  sec.9, T.22 N., R.3 E., on left bank at upstream side of highway bridge at Selkirk,  $1\frac{1}{2}$  miles downstream from Prior Creek.

Drainage area.--110 sq mi.

Records available.--September 1950 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 828.47 ft above mean sea level, datum of 1929.

Average discharge.--10 years (1950-60), 144 cfs.

Extremes.--1950-60: Maximum discharge, 2,760 cfs May 20, 1959 (gage height, 6.76 ft); minimum, 55 cfs Aug. 19, 1958.

Remarks.--Some regulation from dams above station. Records of water temperatures for the period October 1950 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	101	106	153	119	161	289	354	149	103	141	83.3	93.2	154
1952	144	172	153	173	159	253	417	128	93.2	99.5	100	95.0	165
1953	89.2	117	130	119	143	290	187	235	163	122	114	90.6	150
1954	95.0	110	114	97.1	149	172	253	167	258	97.0	80.1	90.1	140
1955	180	142	126	118	122	289	221	145	91.2	81.3	85.5	82.4	140
1956	96.7	117	103	97.1	97.1	121	344	189	122	151	151	118	142
1957	88.0	113	127	115	116	160	230	182	139	113	83.1	95.0	130
1958	108	155	141	112	103	180	174	106	93.2	85.5	77.7	89.6	119
1959	104	120	105	95.3	86.8	154	464	365	104	83.9	88.9	89.4	155
1960	124	142	151	136	110	132	388	230	122	94.6	88.0	86.2	150

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.06	1.08	1.61	1.24	1.52	3.03	3.59	1.57	1.04	1.48	0.87	0.94	19.03
1952	1.51	1.74	1.60	1.81	1.56	2.65	4.23	1.34	.94	1.04	1.05	.96	20.43
1953	.94	1.18	1.36	1.24	1.35	3.04	1.90	2.47	1.65	1.28	1.20	.92	18.53
1954	.97	1.12	1.20	1.02	1.41	1.80	2.57	1.75	2.62	1.02	.84	.91	17.23
1955	1.89	1.44	1.33	1.23	1.16	3.03	2.24	1.52	.92	.85	.90	.84	17.35
1956	1.01	1.18	1.08	1.02	.95	1.27	3.49	1.98	1.24	1.58	1.58	1.19	17.57
1957	.92	1.15	1.33	1.19	1.09	1.67	2.33	1.90	1.41	1.19	.87	.94	15.99
1958	1.13	1.57	1.48	1.18	.97	1.89	1.76	1.11	.94	.90	.81	.91	14.65
1959	1.09	1.22	1.10	1.00	.82	1.61	4.71	3.83	1.05	.88	.93	.91	19.15
1960	1.30	1.44	1.58	1.43	1.08	1.38	3.94	2.41	1.24	.99	.92	.87	18.58

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	1,020	Apr. 26, 1951	73	154	1.40	19.03	163	20.13
1952	1237	1,400	Apr. 14, 1952	74	165	1.50	20.43	154	19.06
1953	1277	745	Mar. 19, 1953	69	150	1.36	18.53	149	18.34
1954	1337	1,020	June 26, 1954	74	140	1.27	17.23	151	18.60
1955	1387	800	Mar. 23, 1955	70	140	1.27	17.35	129	15.96
1956	1437	1,680	Apr. 4, 1956	85	142	1.29	17.57	143	17.70
1957	1507	512	Apr. 6, 1957	64	130	1.18	15.99	136	16.77
1958	1557	439	Apr. 7, 1958	56	119	1.08	14.65	113	13.88
1959	1627	2,760	May 20, 1959	70	155	1.41	19.15	162	20.06
1960	1707	695	Apr. 4, 1960	75	150	1.36	18.58	-	-

1410. South Branch Shepards Creek near Selkirk, Mich.

Location.--Lat 44°18'25", long 84°05'10", in SE $\frac{1}{4}$  sec.8, T.22 N., R.3 E., on right bank 200 ft upstream from mouth and 1 mile southwest of Selkirk.

Drainage area.--1.20 sq mi.

Records available.--October 1951 to September 1960.

Gage.--Water-stage recorder and V-notch sharp-crested weir. Altitude of gage is 845 ft (by barometer).

Average discharge.--9 years (1951-60), 0.558 cfs.

Extremes.--1951-60: Maximum discharge, 181 cfs Apr. 3, 1956 (gage height, 4.42 ft), from rating curve extended above 40 cfs by logarithmic plotting; no flow at times each year, except 1956.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	0.590	0.654	0.447	0.712	0.604	4.47	2.34	0.142	0.038	0.097	0.081	0.067	0.855
1953	.054	.214	.364	.377	.809	3.02	.911	1.02	.196	.086	.323	.037	.619
1954	.070	.139	.134	.079	.829	1.50	1.06	.479	.915	.034	.010	.061	.438
1955	1.16	.440	.153	.100	.108	2.73	.748	.426	.074	.014	.039	.022	.506
1956	.069	.156	.132	.078	.075	.629	2.45	1.37	.177	.249	.324	.091	.483
1957	.072	.193	.199	.246	.241	.561	.982	.599	.259	.112	.014	.039	.293
1958	.125	.521	.615	.123	.115	1.44	.847	.073	.046	.015	.010	.021	.331
1959	.058	.193	.064	.055	.062	2.53	4.39	1.85	.039	.023	.047	.040	.781
1960	.362	.746	.662	.235	.137	1.84	3.40	.950	.122	.079	.044	.044	.718

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	0.57	0.61	0.43	0.68	0.54	4.29	2.18	0.14	0.04	0.09	0.08	0.06	9.71
1953	.05	.20	.35	.36	.70	2.90	.85	.98	.18	.08	.31	.05	6.99
1954	.07	.13	.13	.08	.72	1.44	.99	.46	.85	.03	.01	.06	4.97
1955	1.11	.41	.15	.10	.09	2.63	.70	.41	.07	.01	.04	.02	5.74
1956	.07	.14	.13	.07	.07	.60	2.28	1.31	.17	.24	.31	.08	5.47
1957	.07	.18	.19	.24	.21	.54	.91	.58	.24	.11	.01	.04	3.32
1958	.12	.48	.59	.12	.10	1.38	.79	.07	.04	.01	.01	.02	3.73
1959	.06	.18	.06	.05	.05	2.43	4.08	1.78	.04	.02	.04	.04	8.83
1960	.35	.69	.64	.23	.12	1.76	3.16	.91	.11	.08	.04	.04	8.13

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1337,1557	126	Apr. 13, 1952	0	0.855	0.712	9.71	0.767	8.70
1953	1337	29	Mar. 19, 1953	0	.619	.516	6.99	.595	6.72
1954	1337,1557	74	June 25, 1954	0	.438	.365	4.97	.557	6.31
1955	1367,1557	110	Oct. 3, 1954	0	.506	.422	5.74	.389	4.41
1956	1557	181	Apr. 3, 1956	.02	.483	.402	5.47	.492	5.57
1957	1557	14	May 15, 1957	0	.293	.244	3.32	.360	4.07
1958	1557	16	Apr. 6, 1958	0	.331	.276	3.73	.251	2.84
1959	1627	125	May 20, 1959	0	.781	.651	8.83	.903	10.21
1960	1707	63	Mar. 30, 1960	.01	.718	.598	8.13	-	-

## 1415. West Branch Rifle River near Selkirk, Mich.

Location.--Lat 44°15'40", long 84°06'30", in NE $\frac{1}{4}$  sec.31, T.22 N., R.3 E., on left bank half a mile downstream from Campbell Creek,  $\frac{3}{4}$  miles upstream from mouth, 4 miles southwest of Selkirk, and  $6\frac{1}{2}$  miles southeast of town of West Branch.

Drainage area.--52 sq mi, approximately.

Records available.--October 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 796 ft (by barometer).

Average discharge.--9 years (1951-60), 61.6 cfs.

Extremes.--1952-60: Maximum discharge, 1,160 cfs Apr. 4, 1956 (gage height, 8.80 ft), from rating curve extended above 660 cfs by logarithmic plotting; minimum, 19 cfs Aug. 3, 1953.

Remarks.--Occasional regulation from mill about 7 miles upstream. Records of water temperatures for the period May 1952 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	+64.8	+76.8	+76.8	+87.9	85.2	152	140	47.5	33.1	46.4	36.5	32.7	+73.1
1953	31.5	45.9	52.5	45.7	65.0	145	80.6	85.9	47.9	38.6	39.6	34.1	59.4
1954	36.6	44.5	45.3	39.3	63.7	86.7	100	68.5	86.2	31.9	27.9	36.3	55.4
1955	105	59.3	50.6	46.1	48.0	166	89.8	65.0	36.4	28.1	31.4	31.6	63.3
1956	38.0	44.8	39.2	31.5	33.0	58.4	168	96.0	55.2	45.0	58.2	40.9	58.9
1957	40.1	47.3	51.5	49.3	54.1	77.0	103	78.1	58.6	50.9	30.8	36.0	56.4
1958	40.9	76.4	70.0	45.7	43.6	86.8	75.5	36.0	33.2	30.4	27.4	32.7	49.9
1959	38.0	51.9	35.3	33.1	30.3	74.8	257	116	38.0	34.2	36.6	36.0	65.0
1960	68.9	80.5	89.7	63.6	51.1	71.4	192	98.9	50.3	36.9	36.0	34.4	72.8

\* Not previously published; estimated on basis of records for nearby stations and weather records.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	+1.44	+1.65	+1.71	+1.95	1.73	3.37	3.00	1.05	0.71	1.03	0.81	0.70	+19.15
1953	.70	.99	1.16	1.01	1.30	3.22	1.73	1.90	1.03	.86	.88	.73	15.51
1954	.81	.96	1.00	.87	1.27	1.92	2.14	1.52	1.85	.71	.62	.78	14.45
1955	2.33	1.27	1.12	1.02	.96	3.68	1.93	1.44	.78	.62	.70	.68	16.53
1956	.84	.96	.87	.70	.68	1.29	3.60	2.13	1.18	1.00	1.29	.88	15.42
1957	.89	1.02	1.14	1.09	1.08	1.71	2.21	1.73	1.26	1.13	.68	.77	14.71
1958	.91	1.64	1.56	1.01	.87	1.92	1.62	.80	.71	.67	.61	.70	13.02
1959	.84	1.11	.78	.73	.81	1.66	5.51	2.57	.82	.76	.81	.77	16.97
1960	1.52	1.73	1.98	1.41	1.06	1.58	4.12	2.19	1.08	.82	.80	.74	19.03

\* Not previously published; see footnote to preceding table.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	810	Mar. 21, 1952	+24	+73.1	+1.41	+19.15	+65.7	+17.20
1953	1277	480	Mar. 19, 1953	24	59.4	1.14	15.51	59.1	15.43
1954	1337	470	May 29, 1954	26	55.4	1.07	14.45	62.9	16.40
1955	1387	905	Oct. 3, 1954	25	63.3	1.22	16.53	55.5	14.48
1956	1437	1,160	Apr. 4, 1956	28	58.9	1.13	15.42	60.4	15.80
1957	1507	388	Apr. 6, 1957	27	56.4	1.08	14.71	60.4	15.77
1958	1557	468	Apr. 6, 1958	22	49.9	.960	13.02	44.7	11.64
1959	1627	1,150	Apr. 3, 1959	26	65.0	1.25	16.97	74.6	19.47
1960	1707	662	Dec. 28, 1959	30	72.8	1.40	19.03	-	-

\* Not previously published.



1420. Rifle River at Michigan Highway 70, near Sterling, Mich.

Location.--Lat 44°04', long 84°02', in SW $\frac{1}{4}$  sec. 5, T.19 N., R.4 E., on left bank 30 ft downstream from bridge on State Highway 70, 3 miles north of Sterling, and 18 miles upstream from mouth.

Drainage area.--320 sq mi, approximately.

Records available.--October 1936 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Altitude of gage is 641 ft (by barometer). Jan. 13, 1937, to June 7, 1938, chain gage and June 8, 1938, to Jan. 10, 1939, wire-weight gage, at same site and datum.

Average discharge.--24 years (1936-60), 309 cfs.

Extremes.--1936-60: Maximum discharge, 5,340 cfs Mar. 28, 1950 (gage height, 13.74 ft), from rating curve extended above 3,800 cfs; minimum, 87 cfs Dec. 2, 1946, result of freezeup.

Remarks.--Occasional regulation from dams above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	174	195	308	222	467	763	798	312	237	266	153	173	338
1952	302	371	351	386	358	694	1,058	275	175	261	192	191	384
1953	155	226	272	247	311	722	454	600	377	218	209	159	329
1954	175	204	213	182	346	466	634	380	493	178	142	168	297
1955	431	295	255	230	262	844	518	355	206	155	154	150	322
1956	174	207	178	152	150	234	789	533	282	291	282	210	290
1957	185	217	227	218	250	378	608	440	299	290	160	174	287
1958	198	377	356	235	213	462	419	197	169	145	133	146	254
1959	175	210	165	155	150	328	1,160	696	206	160	172	166	312
1960	277	358	409	310	278	337	1,106	570	315	197	171	158	373

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.63	0.68	1.11	0.80	1.52	2.74	2.78	1.12	0.83	0.96	0.55	0.60	14.32
1952	1.09	1.29	1.27	1.40	1.21	2.50	3.69	.99	.61	.94	.69	.67	16.35
1953	.56	.79	.98	.89	1.01	2.61	1.58	2.17	1.32	.79	.75	.55	14.00
1954	.63	.71	.77	.66	1.12	1.68	2.21	1.37	1.72	.64	.51	.59	12.61
1955	1.56	1.03	.92	.83	.85	3.04	1.81	1.28	.72	.56	.55	.52	13.67
1956	.63	.72	.64	.55	.51	.84	2.76	1.92	.98	1.05	1.02	.73	12.35
1957	.67	.76	.82	.79	.81	1.36	2.12	1.59	1.04	1.04	.58	.61	12.19
1958	.71	1.32	1.28	.85	.69	1.66	1.46	.71	.59	.52	.48	.51	10.78
1959	.63	.73	.59	.56	.49	1.18	4.04	2.51	.72	.58	.62	.58	13.23
1960	1.00	1.25	1.48	1.12	.94	1.21	3.86	2.05	1.10	.71	.62	.55	15.89

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	334	14.20
1951	1207	2,410	Apr. 26, 1951	138	338	1.06	14.32	367	15.55
1952	1237	2,960	Apr. 14, 1952	126	384	1.20	16.35	353	15.03
1953	1277	1,810	Mar. 19, 1953	136	329	1.03	14.00	324	13.78
1954	1357	1,690	Mar. 26, 1954	130	297	.928	12.61	350	14.01
1955	1387	2,260	Mar. 22, 1955	125	322	1.01	13.67	286	12.15
1956	1437	3,260	Apr. 4, 1956	130	290	.906	12.35	296	12.61
1957	1507	1,470	Apr. 26, 1957	139	287	.897	12.19	312	13.25
1958	1557	1,330	Apr. 7, 1958	118	254	.794	10.78	222	9.42
1959	1627	3,760	May 21, 1959	130	312	.975	13.23	353	15.01
1960	1707	2,200	Mar. 31, 1960	138	373	1.17	15.89	-	-

## 1435. North Branch Kawkawlin River near Kawkawlin, Mich.

Location.--Lat 43°40'05", long 83°58'15", in SE $\frac{1}{4}$  sec.27, T.15 N., R.4 E., on left bank 50 ft upstream from bridge on Beaver Road,  $1\frac{1}{4}$  miles northwest of Kawkawlin, and  $2\frac{1}{2}$  miles upstream from mouth.

Drainage area.--101 sq mi.

Records available.--March 1951 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 586.00 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Sept. 27, 1951, staff gage at site 70 ft downstream at same datum.

Average discharge.-- 9 years (1951-60), 60.6 cfs.

Extremes.--1951-60: Maximum discharge, 1,540 cfs Apr. 1, 1960 (gage height, 8.32 ft); no flow at times in each year.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	240	67.1	23.4	2.22	0	0	-
1952	5.29	70.6	44.2	237	174	297	255	12.0	5.16	10.5	8.41	.07	93.0
1953	0	0	14.9	15.8	47.8	151	63.1	112	78.90	12.1	32.2	0	38.3
1954	0	.03	2.05	.83	108	163	140	80.9	285	16.5	0	.06	65.6
1955	58.6	40.5	31.0	35.2	16.9	348	83.5	67.0	47.8	.95	.44	.03	61.4
1956	1.12	2.12	6.51	1.27	.59	127	182	288	13.4	1.13	8.21	2.89	53.1
1957	.14	.17	1.68	3.40	30.7	63.4	130	95.9	18.2	82.9	.50	1.88	35.7
1958	21.1	147	82.9	27.9	16.7	262	93.1	13.6	.08	0	.01	.01	55.6
1959	.47	1.96	.02	0	0	178	312	91.4	6.21	.07	.01	.02	49.2
1960	22.3	154	172	92.8	56.8	100	411	99.1	14.3	.22	0	0	93.2

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	2.66	0.77	0.26	0.03	0	0	-
1952	0.06	0.78	0.50	2.71	1.86	3.39	2.82	.14	.06	.12	.10	0	12.54
1953	0	0	.17	.18	.49	1.72	.70	1.28	.98	.14	.37	0	6.03
1954	0	.0003	.02	.009	1.11	1.86	1.54	.92	3.15	.19	0	.0006	8.80
1955	.67	.45	.35	.40	.17	3.97	.92	.76	.53	.01	.005	.0004	8.24
1956	.01	.02	.07	.01	.006	1.45	2.01	3.28	.15	.01	.09	.03	7.14
1957	.002	.002	.02	.04	.32	.72	1.43	1.10	.20	.95	.006	.02	4.81
1958	.24	1.65	.95	.32	.17	2.99	1.03	.16	.0008	0	.0001	.0001	7.49
1959	.005	.02	.0002	0	0	2.03	3.45	1.04	.07	.0007	.0001	.0002	6.62
1960	.25	1.70	1.96	1.06	.61	1.14	4.54	1.13	.16	.002	0	0	12.55

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	520	Apr. 27, 1951	0	93.0	10.921	12.54	84.3	11.37
1953	1277	506	Apr. 15, 1952	0	38.3	.379	6.03	37.2	5.88
1954	1337	1,090	June 22, 1954	0	65.6	.650	8.80	76.3	10.25
1955	1387	1,100	Mar. 13, 1955	0	61.4	.608	8.24	51.3	6.87
1956	1437	855	May 8, 1956	0	53.1	.526	7.14	52.5	7.06
1957	1507	415	Apr. 8, 1957	0	35.7	.353	4.81	56.5	7.61
1958	1557	714	Mar. 6, 1958	0	55.6	.550	7.49	34.9	4.70
1959	1627	1,220	Apr. 3, 1959	0	49.2	.487	6.62	78.2	10.50
1960	1707	1,540	Apr. 1, 1960	0	93.2	.923	12.55	-	-

† Corrected.

## 1440. Shiawassee River at Byron, Mich.

Location.--Lat 42°49'25", long 83°56'45", on line between secs. 14 and 23, T.5 N., R.4 E., on upstream side of highway bridge at Byron, a quarter of a mile downstream from mill-dam which is just upstream from South Branch Shiawassee River.

Drainage area.--368 sq mi.

Records available.--October 1947 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight and crest-stage gages. Datum of gage is 811.54 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--13 years (1947-60), 286 cfs.

Extremes.--1947-60: Maximum discharge, 2,900 cfs Apr. 1, 1960; maximum gage height, 12.58 ft May 15, 1956, Apr. 1, 1960; minimum discharge observed, 25 cfs Sept. 4, 1956; minimum gage height, 3.55 ft Sept. 16, 1960.

Remarks.--Low flow slightly regulated at times by mills above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	175	241	469	591	775	624	617	375	175	86.7	89.2	81.2	356
1952	156	277	248	592	402	582	674	300	153	75.5	76.9	79.3	301
1953	73.2	170	206	189	159	460	351	305	169	71.5	85.5	50.7	191
1954	56.4	69.8	104	112	576	472	448	194	332	107	71.0	52.2	222
1955	349	194	222	402	349	687	285	137	112	76.8	63.3	51.7	244
1956	74.6	156	124	103	157	860	404	1,582	335	145	213	93.3	339
1957	80.6	102	147	118	248	316	394	502	162	539	97.5	88.0	233
1958	149	241	358	166	147	309	215	90.7	99.5	171	63.4	42.5	171
1959	59.3	95.9	76.3	76.0	149	852	600	274	133	56.6	140	229	229
1960	453	429	375	411	359	352	929	327	196	71.5	65.8	48.3	334

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.55	0.73	1.47	1.85	2.19	1.95	1.87	1.17	0.53	0.27	0.28	0.24	13.10
1952	.49	.84	.78	1.85	1.18	1.82	2.04	.94	.46	.24	.24	.24	11.12
1953	.23	.51	.64	.59	.45	1.44	1.07	.95	.51	.22	.26	.15	7.02
1954	.18	.21	.33	.35	1.63	1.79	1.36	.61	1.01	.33	.22	.16	8.18
1955	1.09	.59	.70	1.26	.99	2.15	.86	.43	.34	.24	.20	.16	9.01
1956	.23	.47	.39	.32	.46	2.70	1.23	4.33	1.02	.46	.67	.28	12.56
1957	.25	.31	.46	.37	.70	.99	1.19	1.57	.49	1.69	.31	.27	8.60
1958	.47	.73	1.12	.52	.42	.97	.65	.28	.30	.54	.20	.13	6.33
1959	.19	.29	.24	.24	.42	2.67	1.82	.86	.40	.18	.44	.70	8.45
1960	1.42	1.30	1.17	1.29	1.05	1.10	2.82	1.03	.60	.22	.21	.15	12.36

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	430	15.87	
1951	1207	2,270	Feb. 21, 1951	55	356	0.967	13.10	338	12.46	
1952	1237	1,880	Apr. 15, 1952	54	301	.818	11.12	281	10.39	
1953	1277	860	Mar. 6, 1953	34	191	.619	7.02	173	6.36	
1954	1337	1,620	Feb. 18, 1954	38	222	.603	8.18	267	9.84	
1955	1387	1,290	Mar. 6, 1955	32	244	.663	9.01	209	7.72	
1956	1437	2,840	May 15, 1956	26	339	.921	12.56	337	12.49	
1957	1507	1,410	July 15, 1957	31	233	.633	8.60	268	9.90	
1958	1557	848	Dec. 22, 1957	28	171	.465	6.33	128	4.75	
1959	1627	1,550	Mar. 18, 1959	30	229	.622	8.45	315	11.62	
1960	1707	2,900	Apr. 1, 1960	32	334	.908	12.36	-	-	

## STREAMS TRIBUTARY TO LAKE HURON

## 1445. Shiawassee River at Owosso, Mich.

Location.--Lat 43°00'54", long 84°10'52", in SW $\frac{1}{4}$  sec.12, T.7 N., R.2 E., on right bank on grounds of sewage treatment plant, 1 $\frac{1}{2}$  miles north of Owosso.

Drainage area.--538 sq mi.

Records available.--March 1931 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 707.25 ft above mean sea level, datum of 1929. Prior to Oct. 15, 1933, at site 1 $\frac{1}{2}$  miles upstream at datum 5.46 ft higher.

Average discharge.--29 years (1931-60), 331 cfs.

Extremes.--1931-60: Maximum discharge, 6,240 cfs Apr. 6, 1947 (gage height, 10.35 ft); minimum, 0.2 cfs July 27, 1934 (gage height, 1.12 ft); minimum daily, 2.0 cfs July 28, 1934.

Remarks.--Flow regulated below about 800 cfs by powerplant at Shiawassee town prior to February 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	203	359	708	878	1,058	884	902	476	236	118	104	99.4	499
1952	161	414	359	956	581	947	1,101	393	196	95.0	82.2	90.0	449
1953	74.7	192	244	262	238	699	494	441	198	94.9	107	67.5	260
1954	64.9	76.2	111	123	819	791	623	236	385	134	79.7	60.5	288
1955	370	239	273	525	449	953	407	179	124	80.1	69.6	53.5	310
1956	82.1	178	146	117	170	1,182	589	1,950	425	182	344	130	461
1957	90.3	120	166	167	382	454	616	838	221	816	139	111	344
1958	165	327	484	234	214	459	278	119	154	236	84.4	69.2	236
1959	67.7	104	87.3	87.7	174	1,102	815	359	157	73.1	152	264	287
1960	523	581	580	584	515	650	1,300	469	286	100	79.8	62.6	476

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.44	0.74	1.52	1.88	2.05	1.89	1.87	1.02	0.49	0.25	0.22	0.21	12.58
1952	.39	.86	.77	2.05	1.16	2.03	2.28	.84	.41	.20	.18	.19	11.36
1953	.16	.40	.52	.56	.46	1.50	1.02	.95	.41	.20	.23	.14	6.55
1954	.14	.16	.24	.26	1.58	1.69	1.29	.50	.80	.29	.17	.13	7.25
1955	.79	.50	.59	1.12	.87	2.04	.84	.38	.26	.17	.15	.11	7.82
1956	.18	.37	.31	.25	.34	2.53	1.22	4.18	.88	.39	.74	.27	11.66
1957	.19	.25	.36	.36	.74	.97	1.28	1.80	.46	1.75	.30	.23	8.69
1958	.35	.68	1.04	.50	.41	.98	.58	.26	.32	.51	.18	.14	5.95
1959	.15	.22	.19	.19	.34	2.36	1.69	.77	.33	.16	.33	.55	7.28
1960	1.12	1.20	1.24	1.25	1.03	1.39	2.70	1.01	.59	.21	.17	.13	12.04

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	625	15.78
1951	1207	3,320	Feb. 19, 1951	63	499	0.928	12.58	472	11.90
1952	1237	2,850	Apr. 13, 1952	34	449	.835	11.36	412	10.42
1953	1277	1,460	Mar. 4, 1953	44	260	.483	6.55	238	6.01
1954	1337	2,850	Feb. 17, 1954	28	288	.535	7.25	341	8.59
1955	1387	1,880	Mar. 4, 1955	37	310	.576	7.82	270	6.80
1956	1437	4,100	May 14, 1956	52	461	.857	11.66	459	11.60
1957	1507	2,550	July 12, 1957	77	344	.639	8.69	394	9.96
1958	1557	1,030	Dec. 21, 1957	59	236	.439	5.95	176	4.44
1959	1627	2,190	Apr. 4, 1959	51	287	.533	7.28	407	10.28
1960	1707	4,210	Apr. 1, 1960	51	476	.885	12.04	-	-

## 1450. Shiawassee River near Fergus, Mich.

Location.--Lat 43°15'17", long 84°06'20", in sec.22, T.10 N., R.3 E., on downstream hand-rail of highway bridge, 1.2 miles east of Fergus and 1 $\frac{1}{4}$  miles upstream from Bear Creek.

Drainage area.--637 sq mi.

Records available.--October 1939 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight gage. Datum of gage is 587.80 ft above mean sea level, datum of 1929.

Average discharge.--21 years (1939-60), 443 cfs.

Extremes.--1939-60: Maximum discharge, 7,500 cfs Apr. 6, 1947 (includes overflow bypassing gage); maximum gage height, 13.44 ft Mar. 29, 1960, affected by ice; minimum discharge observed, 29 cfs Aug. 31, 1946.

Remarks.--Some regulation at low stages by powerplant above Owosso prior to February 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	275	562	934	953	1,345	1,017	1,004	557	264	133	101	88.7	581
1952	196	512	405	1,339	920	1,191	1,439	458	242	101	79.0	79.5	578
1953	68.7	194	272	302	285	872	548	514	191	107	119	67.4	296
1954	79.0	93.9	129	142	1,026	1,016	740	377	422	156	90.7	69.9	357
1955	359	264	289	617	510	1,151	464	214	140	88.9	71.7	63.3	353
1956	80.7	160	143	114	166	1,624	708	2,532	453	252	396	141	569
1957	95.5	143	200	200	462	611	802	1,093	314	1,079	162	124	441
1958	173	546	513	281	249	585	341	155	186	296	93.1	78.5	275
1959	79.6	118	104	102	221	1,571	1,098	418	197	69.1	127	296	569
1960	608	736	743	721	609	785	1,691	610	352	118	93.1	66.8	593

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.50	0.63	1.69	1.72	2.20	1.84	1.76	1.01	0.46	0.24	0.18	0.16	12.39
1952	.35	.90	.73	2.42	1.56	2.16	2.52	.83	.42	.18	.14	.14	12.35
1953	.12	.34	.49	.55	.47	1.58	.96	.93	.33	.19	.21	.12	6.29
1954	.14	.16	.23	.26	1.68	1.84	1.30	.68	.74	.28	.16	.12	7.59
1955	.65	.46	.52	1.12	.83	2.08	.81	.39	.24	.16	.13	.11	7.50
1956	.15	.28	.26	.21	.28	2.94	1.24	4.58	.79	.46	.72	.25	12.16
1957	.17	.25	.36	.76	1.11	1.40	1.98	.55	1.95	.29	.22	.22	9.40
1958	.31	.61	.93	.51	.41	1.05	.60	.28	.33	.54	.17	.14	5.88
1959	.14	.21	.19	.19	.36	2.84	1.92	.76	.34	.16	.23	.52	7.86
1960	1.10	1.29	1.34	1.30	1.03	1.42	2.96	1.10	.62	.21	.17	.12	12.66

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	735	15.66
1951	1207	4,000	Feb. 20, 1951	70	581	0.912	12.39	542	11.55
1952	1237,1627	3,870	Apr. 14, 1952	56	578	.907	12.35	530	11.32
1953	1277	1,900	Mar. 4, 1953	56	296	.465	6.29	276	5.87
1954	1337,1627	3,710	Feb. 19, 1954	60	357	.560	7.59	408	8.69
1955	1387	2,200	Mar. 5, 1955	51	353	.554	7.50	308	6.56
1956	1437	5,200	May 14, 1956	52	569	.893	12.16	573	12.25
1957	1507,1627	4,080	July 12, 1957	86	441	.692	9.40	491	10.47
1958	1557	1,380	Dec. 21, 1957	62	275	.432	5.88	214	4.57
1959	1627	3,590	Apr. 3, 1959	52	369	.579	7.86	519	11.05
1960	1707	5,390	Mar. 30, 1960	52	593	.931	12.66	-	-

\* Not previously published.

1455. Bad River near Brant, Mich.

Location.--Lat 43°17'50", long 84°13'45", in NW¼ sec.3, T.10 N., R.2 E., on downstream side of highway bridge, 2½ miles north of Brant and 6 miles upstream from South Fork.

Drainage area.--89 sq mi, approximately.

Records available.--December 1948 to September 1959.

Gage.--Wire-weight and crest-stage gages. Datum of gage is 591.21 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--10 years (1949-59), 62.9 cfs.

Extremes.--1948-59: Maximum discharge, 2,900 cfs May 6, 1956 (gage height, 15.18 ft), from rating curve extended above 1,400 cfs by logarithmic plotting; no flow at times.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	6.59	21.5	126	79.3	264	186	221	27.8	18.8	0.86	1.65	7.96	78.8
1952	122	175	88.7	259	134	239	168	22.9	5.26	14.1	7.88	.73	103
1953	.15	12.6	52.2	25.7	40.4	143	52.9	71.2	2.86	2.43	1.40	0	33.9
1954	0	.16	.94	.82	138	144	137	40.2	72.1	3.15	.05	0	45.8
1955	57.1	44.1	41.9	93.9	80.8	283	51.9	41.8	127	2.14	.21	1.75	68.8
1956	3.39	21.7	21.9	1.93	2.18	311	279	333	38.5	23.4	22.0	1.81	88.8
1957	.17	1.13	3.18	3.06	63.7	44.8	101	65.2	38.0	218	.53	1.71	45.0
1958	11.5	115	70.6	17.1	17.4	125	33.7	6.80	10.7	14.2	1.72	2.45	35.6
1959	27.0	43.5	5.26	1.95	2.15	237	247	25.4	2.82	.91	.41	.23	49.6
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.09	0.27	1.64	1.03	3.09	2.41	2.77	0.36	0.24	0.01	0.02	0.10	12.03
1952	1.59	2.19	1.15	3.36	1.63	3.10	2.10	.30	.07	.18	.10	.009	15.78
1953	.002	.16	.68	.33	.47	1.86	.66	.92	.04	.03	.02	0	5.17
1954	0	.002	.01	.01	1.61	1.86	1.71	.52	.90	.04	.0006	0	6.66
1955	.74	.55	.54	1.22	.94	3.66	.65	.54	1.59	.03	.003	.02	10.48
1956	.04	.27	.28	.02	.03	4.03	3.49	4.32	.48	.30	.28	.02	13.56
1957	.002	.01	.04	.04	.75	.58	1.27	.84	.48	2.82	.007	.02	6.86
1958	.15	1.44	.91	.22	.20	1.62	1.42	.09	.13	.18	.02	.03	5.41
1959	.35	.54	.07	.03	.03	3.07	3.10	.33	.04	.01	.005	.003	7.58
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	89.4	13.85
1951	1207	al,500	Feb. 20, 1951	0	78.8	0.885	12.03	98.0	14.96
1952	1237	1,930	Jan. 18, 1952	0	103	1.16	15.78	76.4	11.69
1953	1277	710	Mar. 16, 1953	0	33.9	.381	5.17	28.5	4.34
1954	1337	1,140	Feb. 22, 1954	0	43.8	.492	6.66	55.7	8.48
1955	1387	850	Mar. 11 or 12	0	68.8	.773	10.48	60.7	9.24
1956	1437	2,900	May 6, 1956	0	88.8	.998	13.56	85.3	13.02
1957	1507	1,390	July 9, 1957	0	45.0	.506	6.86	61.1	9.31
1958	1557	730	Nov. 16, 1957	0	35.6	.400	5.41	25.5	3.87
1959	1627	1,640	Mar. 25, 1959	0	49.6	.567	7.58	-	-
1960	-	-	-	-	-	-	-	-	-

a Maximum daily.

## 1460. Farmers Creek near Lapeer, Mich.

Location.--Lat 43°02', long 83°20', in sec.6, T.7 N., R.10 E., on left bank at sewage-treatment plant at Michigan Home and Training School, 2 miles west of Lapeer.

Drainage area.--57 sq mi, approximately.

Records available.--October 1932 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder and concrete control. Datum of gage is 805.79 ft above mean sea level, datum of 1929. Prior to May 25, 1954, staff gage at same site and datum.

Average discharge.--28 years (1932-60), 30.2 cfs.

Extremes.--1932-60: Maximum discharge, 1,280 cfs Apr. 6, 1947 (gage height, 19.87 ft, from floodmark), from rating curve extended above 660 cfs on basis of contracted-opening measurement of peak flow; minimum not determined.

Remarks.--Prior to 1941, occasional regulation by dam above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	29.8	49.1	93.3	92.8	96.6	79.8	76.1	34.3	21.3	6.99	5.75	6.25	49.1
1952	15.9	32.5	25.8	83.8	52.5	89.4	91.4	40.7	11.9	5.88	7.42	8.70	38.8
1953	6.89	20.6	24.6	27.7	25.9	74.1	43.4	39.5	10.8	9.27	9.79	3.55	24.7
1954	5.43	8.24	10.8	10.7	98.6	77.7	54.1	31.2	44.2	7.12	4.27	3.59	29.1
1955	18.4	16.3	19.1	39.9	36.4	86.2	39.0	17.6	8.56	6.76	4.25	5.27	24.8
1956	7.62	13.3	11.2	6.53	11.0	87.1	49.1	188	23.6	10.3	39.4	13.3	38.7
1957	7.85	11.5	18.4	16.3	31.6	39.7	51.3	76.5	20.6	38.5	6.32	8.13	27.2
1958	13.9	26.0	39.1	20.4	17.3	44.8	29.6	9.90	10.4	6.49	5.57	6.43	19.2
1959	4.94	8.34	5.80	7.08	11.2	90.6	94.5	31.8	8.78	2.80	9.35	8.91	23.7
1960	26.4	35.2	40.3	43.3	34.9	58.3	124	41.7	20.2	5.66	4.49	4.87	36.5

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.60	0.96	1.88	1.88	1.76	1.61	1.49	0.69	0.42	0.14	0.12	0.12	11.67
1952	.32	.64	.52	1.70	.99	1.81	1.79	.82	.23	.12	.15	.17	9.26
1953	.14	.40	.50	.56	.47	1.50	.85	.80	.21	.19	.20	.07	5.89
1954	.11	.16	.22	.22	1.80	1.57	1.06	.63	.87	.14	.09	.07	6.94
1955	.37	.32	.39	.81	.67	1.74	.76	.36	.17	.14	.09	.10	5.92
1956	.15	.26	.23	.13	.21	1.76	.96	3.80	.46	.21	.80	.26	9.23
1957	.16	.23	.37	.33	.58	.80	1.00	1.55	.40	.78	.13	.16	6.49
1958	.28	.51	.79	.41	.32	.91	.58	.20	.20	.13	.11	.13	4.56
1959	.10	.16	.12	.14	.21	1.83	1.85	.64	.17	.06	.19	.17	5.64
1960	.53	.69	.82	.88	.66	1.18	2.42	.84	.40	.11	.09	.10	8.72

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	57.7	13.73
1951	1207	388	Jan. 4, 1951	3.2	49.1	0.861	11.67	40.8	9.71
1952	1237, 1337	*388	Mar. 12, 1952	3.7	38.8	.681	9.26	36.9	8.82
1953	1277	282	Mar. 6, 1953	2.3	24.7	.433	5.89	22.4	5.34
1954	1357	635	Feb. 18, 1954	1.6	29.1	.511	6.94	31.6	7.53
1955	1387	194	Mar. 5, 1955	2.8	24.8	.435	5.92	23.0	5.48
1956	1437	515	May 14, 1956	5.5	38.7	.679	9.23	39.1	9.35
1957	1507	198	May 21, 1957	3.2	27.2	.477	6.49	30.7	7.31
1958	1557	106	Dec. 22, 1957	3.2	19.2	.337	4.56	14.1	3.36
1959	1627	350	Apr. 3, 1959	1.4	23.7	.416	5.64	30.7	7.30
1960	1707	612	Mar. 31, 1960	2.0	36.5	.640	8.72	-	-

\* Revised.

## STREAMS TRIBUTARY TO LAKE HURON

## 1465. Flint River at Columbiaville, Mich.

Location.--Lat 43°09'20", long 83°24'40", in sec.33, T.9 N., R.9 E., on downstream side of highway bridge at Columbiaville, 3 miles downstream from South Branch Flint River.

Drainage area.--486 sq mi.

Records available.--January 1948 to September 1952. Gage-height records collected at site a third of a mile upstream January 1932 to July 1933 are contained in reports of U.S. Weather Bureau.

Gage.--Wire-weight gage. Datum of gage is 736.26 ft above mean sea level, datum of 1929.

Extremes.--1948-52: Maximum discharge, 6,690 cfs Mar. 21, 1948 (gage height, 17.10 ft, from graph based on gage readings); minimum, 33 cfs Sept. 5, 6, 8, 1948; minimum gage height observed, 6.26 ft Aug. 28, 1951.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	201	402	723	880	1,060	854	814	293	150	65.6	53.6	62.9	460
1952	164	383	305	817	658	976	897	318	116	78.1	69.0	85.3	403

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.48	0.92	1.71	2.09	2.27	2.03	1.87	0.69	0.34	0.15	0.13	0.14	12.82
1952	.39	.88	.72	1.94	1.42	2.32	2.06	.75	.27	.19	.16	.20	11.30

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	492	13.74		
1951	1207	3,600	Feb. 21, 1951	46	460	0.946	12.82	419	11.70		
1952	1237	2,780	Mar. 13, 1952	40	403	.829	11.30	-	-		

## 1470. Holloway Reservoir near Otisville, Mich.

Location.--Lat 43°07'15", long 83°29'45", in NW $\frac{1}{4}$  sec.11, T.8 N., R.8 E., in gatehouse on left side of Holloway Dam on Flint River, 3 $\frac{1}{2}$  miles southeast of Otisville.

Drainage area.--543 sq mi.

Records available.--March 1954 to September 1960.

Gage.--Water-stage recorder. Datum of gage is at mean sea level, datum of 1929 (levels by city of Flint).

Extremes.--1954-60: Maximum contents, 996,000,000 cu ft Mar. 8, 1956 (elevation, 757.4 ft); minimum, reservoir empty at times during October, November 1954, January, February 1955.

Remarks.--Reservoir is formed by an earthfill dam with concrete spillway completed in 1953. Capacity of reservoir, 1,256,000,000 cu ft at elevation 760.00 ft. The spillway section includes two 90-foot drum gates with minimum crest elevation of 751 ft and maximum of 755 ft, three 20-foot radial gates with sill elevation of 745 ft and two sluices (each 4 by 6 ft), one on each side with valve controls. Entrance elevation of sluiceways is 724 ft. Reservoir is used to regulate flow for water supply and sewage dilution for city of Flint.

Contents, in millions of cubic feet, on last day of month

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1954	-	-	-	-	-	196	94.0	208	228	187	194	198
1955	0	10.0	20.9	0	70.9	266	695	788	761	615	425	258
1956	214	310	425	455	491	523	806	788	788	743	679	455
1957	175	238	449	497	530	509	806	788	779	770	623	537
1958	503	497	523	491	530	497	600	735	770	647	455	335
1959	254	335	355	389	214	544	687	788	719	586	509	290
1960	214	503	551	497	491	752	537	779	752	572	407	270



## 1475. Flint River near Otisville, Mich.

Location.--Lat 43°06'40", long 83°31'10", in SE $\frac{1}{4}$  sec.9, T.8 N., R.8 E., on left bank 20 ft downstream from bridge on State Highway 15, 1 $\frac{1}{2}$  miles downstream from Holloway Reservoir, 3 $\frac{1}{2}$  miles upstream from Powers-Cullen drain, and 3 $\frac{1}{4}$  miles south of Otisville.

Drainage area.--547 sq mi.

Records available.--October 1952 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 721.39 ft above mean sea level, datum of 1929.

Average discharge.--8 years (1952-60), 293 cfs (adjusted for storage since 1954).

Extremes.--1952-60: Maximum discharge, 6,150 cfs Apr. 1, 1960 (gage height, 14.97 ft); minimum, 7.6 cfs Apr. 14, 1955 (gage height, 2.03 ft).

Remarks.--Flow regulated by Holloway Reservoir 1 $\frac{1}{2}$  miles above station (see preceding page).

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	71.7	186	254	286	278	786	428	425	114	126	345	57.0	281
1954	66.0	208	119	97.7	826	883	533	174	231	82.5	40.7	42.3	271
1955	350	192	217	492	339	812	290	102	103	109	123	117	271
1956	88.1	64.4	50.8	56.5	72.3	1,145	370	1,789	204	130	223	194	369
1957	198	78.5	88.6	122	241	419	519	813	352	227	125	122	274
1958	142	210	382	184	148	500	192	44.8	74.8	118	133	128	189
1959	105	48.1	54.5	50.3	175	1,090	984	309	315	128	124	184	297
1960	231	198	444	514	347	436	1,549	303	229	137	144	122	386

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	0.15	0.38	0.54	0.60	0.53	1.66	0.87	0.90	0.23	0.27	0.73	0.12	6.98
1954	.14	.42	.25	.21	1.57	2.01	1.01	.46	.49	.14	.09	.09	6.88
1955	.58	.40	.47	1.02	.70	1.87	.93	.29	.19	.11	.11	.11	6.78
1956	.15	.21	.20	.14	.17	2.44	.98	3.76	.42	.24	.42	.22	9.35
1957	.20	.21	.31	.30	.49	1.87	1.29	1.70	.71	.47	.15	.18	6.88
1958	.27	.42	.83	.36	.31	1.03	.47	.20	.18	.15	.13	.17	4.52
1959	.16	.16	.13	.13	.20	2.56	2.12	.73	.59	.17	.20	.20	7.35
1960	.43	.63	.97	1.04	.68	1.12	2.99	.83	.45	.15	.17	.14	9.60

\* Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-
1953	1277	1,200	Aug. 9, 1953	34	281	-	0.514	6.98	271	-	6.72
1954	1337	3,030	Feb. 20, 1954	25	271	277	.506	6.88	302	303	7.52
1955	1387	1,220	Mar. 7, 1955	59	271	273	.499	6.78	224	237	5.89
1956	1437	4,500	May 13, 1956	32	369	375	.686	9.35	381	382	9.51
1957	1507	1,320	May 23, 1957	40	274	277	.506	6.88	307	309	7.68
1958	1557	939	Mar. 4-5, 1958	28	189	182	.333	4.52	145	139	3.45
1959	1627	3,510	Apr. 5, 1959	45	297	296	.541	7.35	353	360	8.93
1960	1707	6,150	Apr. 1, 1960	53	386	386	.706	9.60	-	-	-

Note.--Records not adjusted for regulation prior to March 1954.

## STREAMS TRIBUTARY TO LAKE HURON

## 1480. Flint River at Genesee, Mich.

Location.--Lat 43°06'25", long 83°37'00", in sec.10, T.8 N., R.7 E., on downstream side of highway bridge in Genesee, three-quarters of a mile downstream from Butternut Creek.

Drainage area.--593 sq mi.

Records available.--October 1930 to September 1952. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight gage. Datum of gage is 695.27 ft above mean sea level, datum of 1929. Prior to Oct. 19, 1932, wire-weight gage at site 500 ft downstream at datum 0.52 ft lower.

Average discharge.--22 years (1930-52), 358 cfs.

Extremes.--1931-52: Maximum discharge, 8,650 cfs Apr. 8, 1947 (gage height, 27.06 ft, from floodmark); minimum, about 10 cfs Aug. 15, 1936.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	257	526	956	1,110	1,325	1,046	1,008	421	211	95.8	75.8	84.1	587
1952	213	502	407	1,030	725	1,231	1,246	477	193	116	111	113	529

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.50	0.99	1.82	2.16	2.32	2.03	1.90	0.82	0.40	0.19	0.15	0.16	13.44
1952	.41	.94	.79	2.00	1.32	2.39	2.34	.93	.36	.23	.22	.21	12.14

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	626	14.31
1951	1207	4,120	Feb. 22, 1951	64	587	0.390	13.44	556	12.26
1952	1237	2,660	Mar. 14, 1952	60	529	.822	12.14	-	-

## 1482. Swartz Creek near Holly, Mich.

Location.--Lat 42°49'40", long 83°37'40", in SW $\frac{1}{4}$  sec.15, T.5 N., R.7 E., on right bank 25 ft downstream from bridge on Elliott Road and 2 $\frac{1}{2}$  miles north of Holly.

Drainage area.--11.9 sq mi.

Records available.--January 1956 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 905 ft (from topographic map).

Extremes.--1956-60: Maximum discharge, 77 cfs May 13, 1956 (gage height, 3.40 ft); minimum, 0.2 cfs Sept. 5, 1959, July 13, 1959.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	-	-	-	2.75	3.91	20.0	17.4	41.5	13.9	3.73	6.18	2.47	-
1957	2.96	3.71	6.24	5.44	7.99	11.3	16.5	18.9	4.96	16.9	2.20	1.93	8.19
1958	3.99	7.21	11.1	5.02	4.90	12.6	7.74	2.59	3.28	2.19	0.955	0.903	5.21
1959	1.45	2.44	1.62	1.92	2.88	17.3	18.0	9.11	2.30	.85	1.83	2.39	5.18
1960	6.91	10.1	10.6	11.6	9.12	10.7	25.0	11.1	7.82	2.31	1.09	2.21	9.20

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	-	-	-	0.27	0.35	1.94	1.63	4.03	1.30	0.36	0.60	0.23	-
1957	0.20	0.35	0.60	.53	.70	1.09	1.54	1.83	.47	1.64	.21	.18	9.34
1958	.39	.68	1.08	.49	.43	1.22	.73	.25	.31	.21	.09	.08	5.96
1959	.14	.23	.16	.19	.25	1.68	1.69	.88	.22	.08	.18	.22	5.92
1960	.86	.95	1.02	1.13	.83	1.03	2.35	1.08	.73	.22	.11	.21	10.52

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1956	1437	77	May 13, 1956	-	-	-	-	10.4	11.86
1957	1507	54	July 13, 1957	1.2	8.19	0.688	9.34	9.05	10.34
1958	1557	a30	Feb. 28, Mar. 1	.3	5.21	.438	5.96	3.80	4.34
1959	1627	48	Apr. 3, 1959	.4	5.18	.435	5.92	7.21	8.22
1960	1707	74	Mar. 31, 1960	.6	9.20	.773	10.52	-	-

a Maximum daily.

## 1485. Flint River near Flint, Mich.

Location.--Lat 43°02'20", long 83°46'10", in SW $\frac{1}{4}$  sec.4, T.7 N., R.6 E., on left bank on grounds of sewage-treatment plant, 1 mile upstream from Firmie Creek, 2 miles downstream from Flint, and 5 miles downstream from Swartz Creek.

Drainage area.--927 sq mi.

Records available.--September 1903 to March 1904 (gage heights only), August 1932 to September 1960. Gage-height records for flood seasons collected in this vicinity 1911-28, are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 678.80 ft above mean sea level (levels by U.S. Weather Bureau and city of Flint).

Average discharge.--28 years (1932-60), 566 cfs (adjusted for storage since 1954).

Extremes.--1932-60: Maximum discharge, 14,900 cfs Apr. 6, 1947 (gage height, 16.35 ft); minimum, 9.0 cfs Aug. 7, 1934.

Remarks.--Some regulation by reservoirs above station. City of Flint diverts water above station for municipal and industrial use, but sewage from city is included in flow at station.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	410	899	1,452	1,499	1,778	1,607	1,658	645	403	141	110	132	889
1952	330	760	635	1,559	1,103	1,784	1,887	680	248	153	138	154	785
1953	116	329	433	494	472	1,398	827	770	214	192	466	76.7	484
1954	88.3	257	186	154	1,532	1,665	1,007	354	414	127	66.2	58.5	485
1955	458	294	377	917	730	1,662	607	196	144	128	167	161	487
1956	151	155	119	96.9	163	2,055	783	3,575	433	227	577	292	724
1957	256	143	167	217	544	780	1,095	1,599	569	1,009	172	176	561
1958	251	398	709	331	339	848	409	110	169	180	204	184	345
1959	160	109	108	117	256	2,123	1,855	587	398	201	370	308	550
1960	473	610	927	912	700	1,046	2,718	629	400	192	217	165	747

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.51	1.08	1.81	1.86	2.00	2.00	2.00	0.80	0.49	0.18	0.14	0.16	13.03
1952	.41	.91	.79	1.94	1.28	2.22	2.27	.85	.30	.19	.17	.19	11.52
1953	.14	.40	.54	.61	.53	1.74	1.00	.96	.28	.24	.58	.09	7.09
1954	.11	.31	.23	.19	1.72	2.16	1.17	.49	.51	.14	.09	.07	7.19
1955	.48	.36	.47	1.13	.85	2.16	.93	.29	.16	.09	.12	.12	7.16
1956	.14	.23	.20	.13	.21	2.57	1.07	4.44	.52	.26	.69	.25	10.71
1957	.19	.20	.31	.29	.63	.96	1.46	1.98	.68	1.25	.15	.17	8.27
1958	.30	.48	.89	.40	.40	1.04	.54	.20	.22	.17	.16	.17	4.97
1959	.16	.17	.14	.16	.21	2.79	2.30	.78	.45	.19	.42	.27	8.04
1960	.55	.87	1.18	1.11	.81	1.42	3.17	.89	.47	.16	.19	.13	10.95

Note.--Adjusted for change in contents in Holloway Reservoir.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Observed				Adjusted		Observed		Adjusted	
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	1,080	-	-	15.90
1951	1207	5,140	Dec. 3, 1950	63	889	-	0.959	13.03	701	-	11.74
1952	1237	4,640	Apr. 14, 1952	80	785	-	.847	11.52	714	-	10.49
1953	1277	3,490	Mar. 4, 1953	68	484	-	.522	7.09	454	-	6.66
1954	1337	4,940	Feb. 16, 1954	48	485	491	.530	7.19	535	536	7.85
1955	1387	3,760	Mar. 4, 1955	81	487	489	.528	7.16	426	439	6.42
1956	1437	8,270	May 13, 1956	85	724	730	.787	10.71	737	738	10.84
1957	1507	3,960	May 20, 1957	93	561	564	.608	8.27	628	630	9.24
1958	1557	1,820	Dec. 20, 1957	60	345	339	.366	4.97	263	257	3.77
1959	1627	5,310	Apr. 3, 1959	78	550	549	.592	8.04	688	694	10.17
1960	1707	8,800	Mar. 31, Apr. 1	70	747	746	.805	10.95	-	-	-

Note.--Figures not adjusted for change in contents in Holloway Reservoir prior to March 1954.

## STREAMS TRIBUTARY TO LAKE HURON

## 1490. Flint River near Fosters, Mich.

Location.--Lat 43°17'56", long 83°55'58", on west line of sec.6, T.10 N., R.5 E., on downstream side of bridge on Sheridan Road, 1 mile west of Fosters, 1½ miles upstream from Birch Run, and 4 miles downstream from Silver Creek.

Drainage area.--1,120 sq mi, approximately.

Records available.--October 1939 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-20, 1922-27 are contained in reports of U.S. Weather Bureau.

Gage.--Wire-weight gage. Datum of gage is 582.22 ft above mean sea level, unadjusted (levels by U.S. Weather Bureau). Prior to August 1943, chain gage at same site and datum.

Average discharge.--21 years (1939-60), 740 cfs.

Extremes.--1939-60: Maximum discharge, 19,000 cfs Apr. 7, 1947 (including flow bypassing gage); maximum gage height, 18.2 ft Mar. 7, 1956, from graph based on gage readings; minimum discharge observed, 27 cfs Aug. 6, 1941 (gage height, 3.67 ft).

Maximum stage known, about 18.4 ft (from U.S. Weather Bureau data) in March 1904.

Remarks.--Some regulation by reservoirs above Flint.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	507	1,074	1,842	1,879	2,280	2,203	2,246	794	463	169	131	164	1,139
1952	460	1,050	750	1,973	1,299	2,259	2,580	728	295	192	166	173	975
1953	127	371	518	588	541	1,609	904	933	238	199	490	94.1	553
1954	98.9	266	221	185	1,717	1,878	1,096	407	443	148	78.4	77.1	543
1955	419	341	426	980	843	1,861	676	217	175	141	168	142	532
1956	146	176	140	107	192	2,311	967	4,160	538	274	730	345	848
1957	276	160	209	260	620	891	1,254	1,959	722	1,470	221	212	688
1958	289	490	845	416	416	1,019	492	166	190	191	202	190	410
1959	164	124	111	118	288	2,615	2,379	694	483	215	379	348	661
1960	579	762	1,154	1,159	817	1,151	3,145	826	434	211	230	185	886

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.52	1.07	1.90	1.93	2.12	2.27	2.24	0.82	0.46	0.17	0.14	0.16	13.80
1952	.47	1.05	.77	2.03	1.25	2.33	2.37	.75	.29	.20	.17	.17	11.85
1953	.13	.37	.53	.61	.50	1.66	.90	.96	.24	.20	.50	.09	6.69

Note.--Runoff affected by storage in Holloway Reservoir after 1953.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches		Mean	Runoff in inches
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	1,346	16.32
1951	1207	6,000	Feb. 20, 1951	92	1,139	1.02	13.80		1,040	12.60
1952	1237	5,340	Apr. 15, 1952	108	975	.871	11.85		872	10.59
1953	1277	3,940	Mar. 4, 1953	81	553	.494	6.69		517	6.26
1954	1337	6,080	Feb. 17, 1954	54	543	†.485	†6.58		593	†7.19
1955	1387	4,270	Mar. 4, 1955	110	532	†.475	†6.45		471	†5.71
1956	1437	9,700	May 13, 1956	100	848	†.757	†10.30		863	†10.49
1957	1507	5,400	July 9, 1957	123	688	†.614	†8.34		770	†9.33
1958	1557	2,520	Dec. 21, 1957	110	410	†.366	†4.96		306	†3.71
1959	1627	6,700	Apr. 4 or 5	100	661	†.590	†8.01		837	10.15
1960	1707	9,200	Mar. 31, 1960	127	886	†.791	10.76		-	-

† Not previously published.

1500. East Branch Cass River near Cass City, Mich.

Location.--Lat 43°34'10", long 83°06'30", in NW $\frac{1}{4}$  sec. 7, T.13 N., R.12 E., on left bank  $1\frac{1}{2}$  miles downstream from bridge on State Highway 53, 3 miles upstream from confluence with North Branch, and 4 miles southeast of Cass City.

Drainage area.--251 sq mi; at site used prior to Nov. 8, 1952, 247 sq mi.

Records available.--October 1948 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 719.5 ft above mean sea level, datum of 1929. Prior to Nov. 8, 1952, wire-weight gage at site  $1\frac{1}{2}$  miles upstream at different datum.

Average discharge.--12 years (1948-60), 137 cfs.

Extremes.--1948-60: Maximum discharge, 4,940 cfs Mar. 28, 1950 (gage height, 23.07 ft, from graph based on gage readings, site and datum then in use); minimum, 0.2 cfs Sept. 20-23, 1955, Aug. 19, 20, 1958.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	21.5	111	408	263	619	529	450	44.9	42.0	6.21	4.57	3.03	206
1952	13.0	125	105	455	592	654	485	78.0	10.1	67.9	17.5	9.39	200
1953	2.03	13.1	58.2	56.7	65.5	418	179	265	45.0	92.7	133	5.28	110
1954	6.57	8.57	20.8	14.3	641	648	180	65.3	37.3	18.7	2.83	1.08	134
1955	104	118	168	289	201	586	181	28.0	10.3	10.3	2.58	1.08	142
1956	3.48	5.44	7.29	6.08	6.34	620	230	808	46.3	16.2	9.85	3.64	148
1957	5.15	7.55	10.1	13.1	79.8	114	377	202	72.3	50.0	2.75	3.63	77.6
1958	6.68	22.4	131	30.6	27.9	214	55.2	14.8	6.46	7.25	3.20	4.55	44.0
1959	3.99	8.27	2.47	2.39	2.77	527	542	142	47.7	9.23	11.8	12.0	110
1960	18.5	120	311	196	110	322	852	191	88.5	9.21	4.60	2.46	185

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.10	0.50	1.90	1.23	2.61	2.47	2.03	0.21	0.19	0.03	0.02	0.01	11.30
1952	.06	.58	.49	2.11	1.71	3.05	2.19	.36	.05	.32	.08	.04	11.02
1953	.009	.08	.18	.26	.27	1.92	.80	1.21	.20	.43	.61	.02	5.97
1954	.03	.04	.10	.07	2.66	2.98	.80	.30	.17	.09	.01	.005	7.26
1955	.48	.52	.77	1.33	.83	2.89	.81	.13	.05	.05	.01	.005	7.68
1956	.02	.02	.03	.03	.03	2.85	1.02	3.71	.21	.07	.04	.02	8.05
1957	.02	.03	.05	.06	.33	.52	1.67	.93	.32	.23	.01	.02	4.19
1958	.03	.10	.60	.14	.12	.98	.25	.07	.03	.03	.02	.02	2.39
1959	.02	.04	.01	.01	.01	2.42	2.41	.65	.21	.04	.05	.05	5.92
1960	.09	.53	1.43	.90	.47	1.48	3.69	.88	.39	.04	.02	.01	9.93

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	242	13.33
1951	1207	2,920	Feb. 26, 1951	0.8	206	0.834	11.30	181	9.91
1952	1237	2,600	Mar. 11 or 12, 1952	1.8	200	.810	11.02	184	10.16
1953	1277	1,750	Mar. 16, 1953	1.6	110	.438	5.97	109	5.89
1954	1337	2,970	Mar. 26, 1954	.8	134	.534	7.26	164	8.86
1955	1387	2,130	Mar. 11, 1955	.2	142	.566	7.68	110	5.98
1956	1437	2,650	Mar. 7, 1956	1.9	148	.590	8.05	149	8.08
1957	1507	1,350	Apr. 7, 1957	.9	77.6	.309	4.19	89.2	4.82
1958	1557	8800	Mar. 4, 1958	.2	44.0	.175	2.39	31.7	1.73
1959	1627	2,920	Apr. 2, 1959	1.3	110	.438	5.92	146	7.90
1960	1707	4,890	Mar. 31, 1960	.9	183	.729	9.93	-	-

a Maximum daily.

## 1505. Cass River at Cass City, Mich.

Location.--Lat 43°35'10", long 83°10'35", in NE $\frac{1}{4}$  sec. 4, T.13 N., R.11 E., on left bank 500 ft downstream from highway bridge, half a mile downstream from confluence of North Branch and East Branch, and 1 mile south of Cass City.

Drainage area.--370 sq mi, approximately.

Records available.--October 1947 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 697.92 ft above mean sea level, datum of 1929. Prior to Nov. 14, 1952, wire-weight gage at site 500 ft upstream at same datum.

Average discharge.--13 years (1947-60), 220 cfs.

Extremes.--1948-60: Maximum discharge, 8,460 cfs (revised) Mar. 20, 1948 (gage height, 15.80 ft, from graph based on gage readings); minimum, 0.5 cfs Sept. 26, 1948.  
Revisions.--The maximum discharge for the water year 1948, published in WSP 1307, has been revised to 8,460 cfs.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	32.6	244	549	504	970	916	738	106	52.2	10.7	9.43	6.59	341
1952	23.4	224	197	840	585	956	821	188	25.7	139	30.4	25.4	337
1953	6.61	32.0	73.1	98.9	129	682	289	429	60.6	146	201	7.48	181
1954	11.2	23.8	49.6	31.0	982	1,021	344	125	133	23.3	3.73	4.63	224
1955	162	212	296	465	312	973	293	54.2	26.1	19.6	8.56	5.53	236
1956	12.6	26.1	24.9	17.9	18.6	905	429	1,131	76.8	24.5	39.5	12.2	229
1957	12.8	22.0	34.2	28.6	152	239	542	323	90.7	92.2	6.03	11.0	129
1958	23.0	72.1	238	80.3	69.0	410	108	27.5	16.2	12.4	6.02	7.79	89.8
1959	6.71	14.8	6.26	5.16	6.36	690	814	230	69.0	16.0	18.4	21.3	159
1960	32.0	222	453	373	210	448	1,296	360	204	19.5	10.9	4.60	302

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.10	0.73	1.71	1.57	2.73	2.85	2.23	0.33	0.16	0.03	0.03	0.02	12.49
1952	.07	.67	.61	2.62	1.71	2.98	2.48	.59	.08	.43	.09	.08	12.41
1953	.02	.10	.23	.30	.36	2.13	.87	1.34	.18	.45	.63	.02	6.63
1954	.03	.07	.15	.10	2.76	3.18	1.04	.39	.40	.07	.01	.01	8.21
1955	.51	.64	.92	1.45	.88	3.03	.88	.17	.08	.06	.03	.02	8.67
1956	.04	.08	.08	.06	.05	2.82	1.29	3.52	.23	.08	.12	.04	8.41
1957	.04	.07	.11	.09	.43	.74	1.63	1.01	.27	.29	.02	.03	4.73
1958	.07	.22	.74	.25	.19	1.28	.33	.09	.05	.04	.02	.02	3.30
1959	.02	.04	.02	.02	.02	2.14	2.46	.72	.21	.05	.06	.06	5.82
1960	.10	.67	1.41	1.16	.61	1.40	3.90	1.12	.61	.06	.03	.01	11.08

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	*367	*13.46
1951	1207	4,150	Feb. 27, 1951	2.4	341	0.922	12.49	308	11.30	
1952	1237	3,300	Mar. 11, 1952	4.6	337	.911	12.41	310	11.41	
1953	1277	2,510	May 3, 1953	4.0	181	.489	6.63	178	6.53	
1954	1337	4,240	Mar. 26, 1954	.7	224	.605	8.21	274	10.03	
1955	1387	2,990	Mar. 11, 1955	3.5	256	.638	8.67	185	6.60	
1956	1437	3,710	Mar. 7, 1956	4.8	229	.619	8.41	229	8.43	
1957	1507	1,710	Apr. 7, 1957	3.0	129	.349	4.73	151	5.54	
1958	1557	1,280	Mar. 5, 1958	1.3	89.8	.243	3.30	64.0	2.35	
1959	1627	3,900	Apr. 4, 1959	1.3	159	.430	5.82	216	7.92	
1960	1707	6,810	Mar. 31, 1960	1.6	302	.816	11.08	-	-	*

\* Revised.

## 1510. Cass River at Vassar, Mich.

Location.--Lat 43°22'10", long 83°34'55", in SW $\frac{1}{4}$  sec. 7, T.11 N., R.8 E., on downstream side of bridge on State Highway 15 in Vassar,  $1\frac{1}{4}$  miles upstream from Goodings Creek.

Drainage area.--700 sq mi, approximately.

Records available.--October 1948 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

Gage.--Wire-weight and crest-stage gages above concrete dam. Datum of gage is 612.376 ft above mean sea level, datum of 1929 (levels by U.S. Weather Bureau).

Average discharge.--12 years (1948-60), 427 cfs.

Extremes.--1948-60: Maximum discharge, 11,400 cfs Apr. 1, 1960 (gage height, 16.70 ft); minimum observed, 15 cfs Oct. 10, 1955.

A stage of 20.8 ft occurred on Mar. 20, 1948, from U.S. Weather Bureau records (discharge, 18,000 cfs, from rating curve extended above 12,000 cfs by logarithmic plotting).

Remarks.--Some regulation by dam at Michigan Sugar Co. 10 miles above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	142	610	1,084	957	1,642	1,513	1,489	287	149	54.7	48.7	51.3	662
1952	109	444	350	1,177	885	1,601	1,503	417	96.1	231	101	81.7	582
1953	42.9	129	227	276	303	1,268	699	841	149	243	459	51.3	395
1954	63.9	88.8	168	112	1,668	1,736	727	512	254	61.7	37.4	37.3	431
1955	326	446	469	733	545	1,664	595	140	90.6	53.6	36.1	25.7	428
1956	33.0	86.4	83.0	59.6	72.2	1,619	801	1,992	235	102	91.4	50.0	439
1957	39.2	62.1	97.0	87.0	331	460	868	644	264	220	38.7	54.8	263
1958	80.5	195	419	149	112	708	235	89.4	64.6	49.5	29.4	38.9	182
1959	30.6	57.3	43.5	39.0	46.0	1,462	1,629	486	178	65.7	74.0	72.5	350
1960	102	409	951	726	419	817	2,192	702	292	76.4	42.0	33.9	563

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.23	0.97	1.79	1.58	2.44	2.49	2.37	0.47	0.24	0.09	0.08	0.08	12.83
1952	.18	.71	.58	1.94	1.36	2.64	2.40	.69	.15	.38	.17	.13	11.33
1953	.07	.21	.37	.45	.45	2.09	1.11	1.38	.24	.40	.76	.08	7.61
1954	.11	.14	.28	.18	2.48	2.86	1.16	.51	.40	.10	.06	.06	8.34
1955	.54	.71	.77	1.21	.81	2.74	.95	.23	.14	.09	.06	.04	8.29
1956	.05	.14	.14	.10	.11	2.67	1.28	3.28	.37	.17	.15	.08	8.54
1957	.06	.10	.16	.14	.49	.76	1.38	1.06	.42	.36	.06	.09	5.08
1958	.13	.31	.69	.25	.17	1.16	.37	.15	.10	.08	.05	.06	3.52
1959	.05	.09	.07	.06	.07	2.41	2.60	.80	.28	.11	.12	.12	6.78
1960	.17	.65	1.57	1.20	.65	1.35	3.49	1.15	.47	.13	.07	.05	10.95

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	699	13.55
1951	1207	7,830	Feb. 21, 1951	33	662	0.946	12.83	583	11.31
1952	1237	6,060	Mar. 12, 1952	39	582	.832	11.33	541	10.53
1953	1277	5,150	May 3, 1953	25	393	.561	7.61	386	7.49
1954	1337	7,100	Mar. 26, 1954	25	431	.616	8.34	508	9.83
1955	1387	4,340	Mar. 12, 1955	19	428	.611	8.29	340	6.60
1956	1437	6,620	Mar. 8, 1956	15	439	.627	8.54	439	8.53
1957	1507	2,560	Apr. 8, 1957	28	263	.376	5.08	305	5.89
1958	1557	1,940	Mar. 6, 1958	24	182	.260	3.52	134	2.60
1959	1627	7,400	Apr. 4, 1959	25	350	.500	6.78	462	8.96
1960	1707	11,400	Apr. 1, 1960	28	563	.804	10.95	-	-

## 1515. Cass River at Frankenmuth, Mich.

Location.--Lat 43°19'35", long 83°44'50", in sec.27, T.11 N., R.6 E., on right bank half a mile west of Frankenmuth, 3.4 miles upstream from Dead Creek, and 5.4 miles downstream from Perry Creek.

Drainage area.--848 sq mi.

Records available.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 583.96 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). February 1908 to March 1909 staff gage at site half a mile upstream at datum 1.81 ft lower. July 18 to Sept. 11, 1935, wire-weight gage and Sept. 12, 1935, to Sept. 30, 1936, and June 20, 1939, to Sept. 30, 1949, water-stage recorder, at site half a mile downstream at datum 0.04 ft higher than present datum.

Average discharge.--22 years (1935-36, 1939-60), 485 cfs.

Extremes.--1908-9, 1935-36, 1939-60: Maximum discharge, 17,700 cfs Mar. 18, 1942 (gage height, 20.88 ft) site and datum then in use; maximum gage height, 22.44 ft Feb. 17, 1954 (ice jam); minimum daily discharge, about 1.5 cfs Aug. 6, 1944.

Remarks.--Occasional regulation by dams above station. Prior to 1950, regulation at low and medium flows by mill above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	183	778	1,275	1,188	2,000	1,701	1,656	393	170	61.4	54.2	66.2	785
1952	169	628	457	1,474	1,118	*1,964	1,845	496	124	329	144	111	*737
1953	58.1	181	291	366	380	1,540	856	1,042	186	308	523	63.4	485
1954	73.0	110	202	141	1,991	2,126	916	582	293	78.6	45.0	40.5	523
1955	412	436	529	901	660	1,965	639	173	102	60.9	41.5	30.9	497
1956	34.0	89.5	95.3	71.8	87.1	1,909	942	2,650	258	146	127	67.2	544
1957	43.6	64.2	113	103	417	627	995	865	408	284	52.8	66.8	335
1958	94.6	237	550	250	186	946	307	121	104	87.7	43.0	49.8	246
1959	42.4	76.8	52.7	45.1	55.6	1,765	1,980	546	224	71.8	75.4	95.7	421
1960	137	516	961	813	536	917	2,592	781	424	97.7	59.0	48.5	655

\* Revised.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.25	1.02	1.73	1.62	2.46	2.31	2.18	0.53	0.22	0.08	0.07	0.09	12.56
1952	.23	.83	.62	2.00	1.42	*2.68	2.43	.67	.16	.45	.20	.15	*11.84
1953	.08	.24	.40	.50	.47	2.09	1.13	1.42	.24	.42	.71	.08	7.78
1954	.10	.14	.27	.19	2.45	2.89	1.20	.52	.39	.11	.06	.05	8.37
1955	.56	.57	.72	1.22	.81	2.67	.84	.24	.13	.08	.06	.04	7.94
1956	.05	.12	.13	.10	.11	2.60	1.24	3.60	.34	.20	.17	.09	8.75
1957	.06	.08	.15	.14	.51	.85	1.30	1.18	.54	.39	.07	.09	5.36
1958	.13	.31	.72	.31	.23	1.29	.40	.16	.14	.12	.06	.07	3.94
1959	.06	.10	.07	.06	.07	2.40	2.62	.74	.29	.10	.10	.13	6.74
1960	.19	.68	1.30	1.11	.68	1.24	3.41	1.06	.56	.13	.08	.06	10.50

\* Revised.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	871	13.94
1951	1207	8,000	Feb. 21, 1951	38	785	0.926	12.56	702	11.24
1952	1237	*7,100	Mar. 12, 1952	59	*737	*.869	*11.84	*677	*10.88
1953	1277	5,900	May 3, 1953	45	485	.572	7.78	473	7.57
1954	1337	8,000	Mar. 26, 1954	30	523	.617	8.37	607	9.71
1955	1387	4,800	Mar. 12, 1955	23	497	.586	7.94	399	6.39
1956	1437	8,000	Mar. 8, 1956	18	544	.642	8.75	545	8.74
1957	1507	3,400	Feb. 27, 1957	36	335	.395	5.36	390	6.23
1958	1557	2,760	Mar. 5, 6, 1958	32	246	.290	3.94	188	3.01
1959	1627	8,560	Apr. 3, 1959	30	421	.496	6.74	542	8.68
1960	1707	11,900	Apr. 1, 1960	40	655	.772	10.50	-	-

\* Revised.



## 1525. Tobacco River at Beaverton, Mich.

Location.--Lat 43°52'45", long 84°28'25", in sec.7, T.17 N., R.1 W., on left bank 15 ft downstream from highway bridge, 1 mile downstream from powerplant at Beaverton, and 2 miles upstream from Venison Creek.

Drainage area.--487 sq mi.

Records available.--July 1948 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 683.27 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--12 years (1948-60), 373 cfs.

Extremes.--1948-60: Maximum discharge, 7,680 cfs July 9, 1957 (gage height, 12.95 ft); minimum, 5.6 cfs July 12, 13, 14, 1959; minimum daily, 5.9 cfs July 12, 13, 1959.

Remarks.--Regulation at all stages by powerplant 1 mile upstream.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	199	202	317	259	631	690	766	376	234	207	202	232	357
1952	434	458	381	464	483	995	919	311	210	450	259	237	467
1953	218	320	356	291	590	775	533	630	321	293	235	201	396
1954	228	246	236	215	495	617	773	358	535	202	174	204	355
1955	514	322	296	307	287	946	549	345	327	209	190	168	373
1956	222	255	253	203	208	581	1,021	860	268	320	315	198	393
1957	196	245	255	237	322	363	529	411	379	1,028	197	217	365
1958	261	446	382	277	278	593	499	204	206	165	148	186	304
1959	204	255	200	193	232	631	1,359	393	200	193	228	194	356
1960	420	526	493	413	286	464	1,119	569	362	215	200	198	438

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.47	0.46	0.75	0.61	1.35	1.63	1.75	0.89	0.54	0.49	0.48	0.53	9.95
1952	1.03	1.05	.90	1.10	1.07	2.36	2.11	.74	.48	1.06	.61	.54	13.05
1953	.52	.73	.84	.69	1.26	1.83	1.22	1.49	.74	.89	.56	.46	11.03
1954	.54	.56	.56	.51	1.06	1.46	1.77	.85	1.22	.48	.41	.47	9.89
1955	1.22	.74	.70	.73	.61	2.24	1.26	.82	.75	.49	.45	.39	10.40
1956	.53	.58	.60	.48	.46	1.38	2.34	2.04	.61	.76	.75	.45	10.98
1957	.46	.56	.60	.56	.89	.86	1.22	.97	.87	2.43	.47	.50	10.19
1958	.62	1.02	.90	.66	.59	1.41	1.14	.48	.47	.39	.35	.43	8.46
1959	.48	.58	.47	.46	.50	1.50	3.11	.93	.46	.46	.54	.44	9.93
1960	.99	1.20	1.16	.98	.63	1.10	2.57	1.35	.83	.51	.47	.45	12.24

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	414	11.52
1951	1207	2,270	Apr. 26, 1951	25	357	0.733	9.95	404	11.25
1952	1237	3,790	Mar. 22, 1952	147	467	.959	13.05	435	12.16
1953	1277	3,790	Feb. 21, 1953	109	396	.813	11.03	390	10.60
1954	1337	2,550	Apr. 28, 1954	42	355	.729	9.89	391	10.89
1955	1387	2,980	Mar. 22, 1955	57	373	.766	10.40	339	9.45
1956	1437	5,800	Apr. 4, 1956	126	393	.807	10.98	390	10.89
1957	1507	7,680	July 9, 1957	81	365	.749	10.19	398	11.11
1958	1557	2,420	Apr. 7, 1958	55	304	.624	8.46	268	7.45
1959	1627	5,310	Apr. 4, 1959	5.9	356	.731	9.93	422	11.75
1960	1707	5,720	Mar. 31, 1960	70	438	.899	12.24	-	-

## 1535. Salt River near North Bradley, Mich.

Location.--Lat 43°42'10", long 84°28'15", in SE $\frac{1}{4}$  sec. 7, T.15 N., R.1 W., on right bank 200 ft upstream from bridge on U.S. Highway 10, 0.5 mile upstream from Bluff Creek, and 1.1 miles southeast of North Bradley.

Drainage area.--138 sq mi.

Records available.--June 1934 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 616.01 ft above mean sea level, datum of 1923 (levels by Michigan Department of Conservation). June 4, 1934, to Mar. 26, 1942, staff gage at site 100 ft downstream, Mar. 27, 1942, to July 7, 1954, wire-weight gage at bridge 200 ft downstream, and July 8, 1954, to Sept. 30, 1959, water-stage recorder at present site, at datum 2.00 ft higher.

Average discharge.--26 years (1934-60), 77.7 cfs.

Extremes.--1934-60: Maximum discharge, 8,200 cfs Mar. 20, 1948 (gage height, 14.95 ft, from graph based on gage readings, site and datum then in use), from rating curve extended above 4,400 cfs; minimum observed, 1.1 cfs Aug. 14, 1944 (gage height, 0.21 ft, site and datum then in use).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	11.1	11.6	39.2	58.1	374	282	248	70.2	26.8	8.37	9.94	20.6	94.6
1952	181	180	80.9	283	253	544	279	32.9	14.8	135	45.5	18.8	172
1953	11.3	32.8	87.4	55.2	183	259	143	135	23.6	16.5	49.9	8.25	83.3
1954	11.8	13.5	17.5	14.6	237	190	263	53.0	154	16.5	11.3	7.46	80.8
1955	41.4	30.6	32.0	58.1	38.6	471	83.3	84.2	48.5	15.5	17.2	11.8	78.4
1956	12.5	18.3	23.1	10.9	12.5	201	230	303	16.2	14.1	34.8	9.97	74.2
1957	10.7	14.7	17.7	24.1	83.0	61.8	109	92.7	48.3	497	14.3	13.6	82.6
1958	22.7	126	92.3	40.5	30.4	233	68.9	18.8	15.5	9.78	8.60	11.7	56.7
1959	16.3	23.6	15.2	12.4	12.5	279	483	85.2	16.3	14.7	10.8	8.43	81.4
1960	25.3	95.2	148	89.3	71.9	304	382	124	50.2	20.1	26.6	12.5	112

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.09	0.09	0.33	0.49	2.82	2.36	2.00	0.59	0.22	0.07	0.08	0.17	9.30
1952	1.51	1.45	.68	2.37	1.97	4.63	2.25	.27	.12	1.12	.38	.15	16.90
1953	.09	.26	.73	.46	1.38	2.16	1.16	1.13	.19	.14	.42	.07	8.19
1954	.10	.11	.15	.12	1.79	1.58	2.12	.44	1.24	.14	.09	.06	7.94
1955	.35	.25	.27	.49	.29	3.94	.67	.70	.39	.13	.14	.10	7.72
1956	.10	.15	.19	.09	.10	1.68	1.86	2.53	.13	.12	.29	.08	7.32
1957	.09	.12	.15	.20	.63	.52	.88	.77	.39	4.15	.12	.11	8.13
1958	.19	1.02	.77	.34	.23	1.95	.56	.16	.12	.08	.07	.09	5.58
1959	.14	.19	.13	.10	.09	2.33	3.90	.71	.13	.12	.09	.07	8.00
1960	.21	.77	1.23	.75	.56	2.54	3.09	1.04	.41	.17	.22	.10	11.09

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	*82.1	*8.07
1951	1207	2,240	Feb. 27, 1951	7.2	94.6	0.686	9.30	126	12.44
1952	1237	2,630	Mar. 20, 1952	8.0	172	1.25	16.90	146	14.34
1953	1277	3,030	Feb. 21, 1953	7.4	83.3	.604	8.19	75.8	7.47
1954	1337	1,850	Apr. 28, 1954	6.2	80.8	.586	7.94	86.0	8.45
1955	1387	2,680	Mar. 12, 1955	8.3	78.4	.568	7.72	74.2	7.29
1956	1437	3,160	May 7, 1956	8.4	74.2	.538	7.32	73.3	7.24
1957	1507	6,160	July 9, 1957	9.0	82.6	.599	8.13	99.1	9.75
1958	1557	*729	Nov. 15, 1957	4.4	56.7	.411	5.58	41.2	4.06
1959	1627	2,870	Apr. 3, 1959	6.1	81.4	.590	8.00	99.4	9.75
1960	1707	4,590	Mar. 31, 1960	7.2	112	.812	11.09	-	-

\* Revised.

‡ Not previously published.

## 1540. Chippewa River near Mount Pleasant, Mich.

Location.--Lat 43°37'35", long 84°42'30" on line between secs. 7 and 8, T.14 N., R.3 W., on right bank 12 ft downstream from highway bridge and 4 miles northeast of Mount Pleasant.

Drainage area.--416 sq mi.

Records available.--October 1930 to September 1931, October 1932 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 710.38 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Oct. 21, 1938, chain and wire-weight gage at site 30 ft upstream at same datum.

Average discharge.--29 years (1930-31, 1932-60), 290 cfs.

Extremes.--1930-31, 1932-60: Maximum discharge, 4,960 cfs Mar. 8, 1946 (gage height, 12.78 ft); minimum, 12 cfs Aug. 18, 1945; minimum daily, 19 cfs Aug. 16, 1936; minimum gage height, 2.82 ft Dec. 21, 1944.

Remarks.--Diurnal fluctuation below 750 cfs caused by powerplant at Mount Pleasant.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	160	193	238	276	460	562	605	310	210	166	146	198	292
1952	399	547	556	463	442	691	840	306	189	394	259	193	425
1953	157	261	323	270	503	678	460	472	255	210	235	155	331
1954	176	208	230	181	400	519	716	355	478	234	152	141	315
1955	357	254	251	255	238	692	455	280	246	161	157	145	292
1956	155	211	210	161	170	485	815	791	224	213	302	147	324
1957	157	201	228	206	277	306	419	359	327	690	180	191	295
1958	212	386	311	228	225	436	324	183	183	151	120	177	245
1959	190	234	185	169	173	565	1,114	369	195	160	167	118	303
1960	233	334	340	309	226	368	967	462	322	219	247	153	348

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.44	0.52	0.66	0.76	1.15	1.56	1.62	0.86	0.56	0.46	0.41	0.53	9.53
1952	1.11	1.47	.99	1.28	1.14	1.91	2.25	.85	.51	1.09	.72	.52	13.84
1953	.44	.70	.90	.75	1.26	1.88	1.23	1.31	.68	.58	.65	.42	10.80
1954	.49	.56	.64	.50	1.00	1.44	1.92	1.01	1.28	.65	.42	.38	10.29
1955	.99	.68	.70	.71	.59	1.92	1.22	.78	.66	.45	.43	.39	9.52
1956	.43	.57	.58	.45	.44	1.34	2.19	2.19	.60	.59	.84	.39	10.61
1957	.43	.54	.63	.57	.69	.85	1.13	.99	.88	1.91	.50	.51	9.63
1958	.59	1.04	.86	.63	.56	1.21	.87	.51	.49	.42	.33	.47	7.98
1959	.53	.63	.51	.47	.43	1.57	2.99	1.02	.52	.44	.46	.32	9.89
1960	.65	.90	.94	.86	.59	1.02	2.59	1.28	.86	.61	.68	.41	11.39

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	349	11.38
1951	1207	al, 450	Feb. 21, 1951	109	292	0.702	9.53	352	11.48	-	-
1952	1237	2,160	July 24, 1952	118	423	1.02	13.84	376	12.31	-	-
1953	1277	2,300	Feb. 21, 1953	124	331	.796	10.80	320	10.45	-	-
1954	1337	1,460	Apr. 28, 1954	118	315	.757	10.29	336	10.97	-	-
1955	1387	1,500	Mar. 12, 1955	104	292	.702	9.52	267	8.73	-	-
1956	1437	2,740	Apr. 5, 1956	107	324	.779	10.61	325	10.63	-	-
1957	1507	2,480	July 9, 1957	130	295	.709	9.53	322	10.52	-	-
1958	1557	813	Nov. 15, 1957	92	245	.589	7.98	220	7.16	-	-
1959	1627	2,920	Apr. 3, 1959	88	303	.728	9.69	328	10.71	-	-
1960	1707	2,770	Mar. 31, 1960	113	348	.837	11.39	-	-	-	-

a Maximum daily.

## 1545. Chippewa River near Midland, Mich.

Location.--Lat 43°35'40", long 84°22'10", on line between sec.24, T.14 N., R.1 W., and sec.28, T.14 N., R.1 E., on upstream side of bridge on State Highway 30, 5 miles upstream from Pine River and 6 miles southwest of Midland.

Drainage area.--597 sq mi.

Records available.--October 1947 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Wire-weight gage. Datum of gage is 612.35 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--13 years (1947-60), 445 cfs.

Extremes.--1947-60: Maximum discharge, 8,510 cfs Mar. 20, 1948 (gage height, 9.85 ft, from graph based on gage readings); maximum gage height observed, 12.43 ft Mar. 19, 1948 (ice jam); minimum daily discharge, 44 cfs Aug. 16, 1948.  
Maximum stage known since at least 1904, 15.65 ft in March 1904, from information from Michigan State Highway Department (discharge, 16,000 cfs, from rating curve extended above 9,000 cfs by logarithmic plotting).

Remarks.--Diurnal fluctuation below 750 cfs caused by powerplant at Mount Pleasant.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	177	221	322	383	714	1,039	1,155	471	243	162	157	237	437
1952	620	916	574	607	666	986	1,313	428	243	508	325	231	617
1953	174	339	467	508	646	1,049	553	682	229	200	213	172	426
1954	196	200	216	183	636	778	1,024	455	642	240	146	130	401
1955	406	290	310	326	281	1,181	653	547	495	207	197	192	425
1956	185	238	247	178	200	609	1,208	1,405	215	206	392	169	457
1957	174	210	255	269	404	455	717	607	468	1,215	180	230	432
1958	270	588	465	338	362	922	459	195	225	208	146	227	367
1959	253	313	248	212	216	965	1,867	530	205	161	169	153	441
1960	294	505	569	356	274	694	1,622	744	427	281	314	177	521

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.34	0.41	0.62	0.74	1.25	2.01	2.16	0.91	0.45	0.31	0.30	0.44	9.94
1952	1.20	1.71	1.11	1.17	1.20	1.90	2.45	.83	.45	.98	.63	.43	14.06
1953	.34	.63	.90	.60	1.13	2.03	1.09	1.32	.54	.39	.41	.32	9.70
1954	.38	.37	.42	.35	1.11	1.50	1.91	.88	1.20	.46	.28	.24	9.10
1955	.78	.54	.60	.63	.49	2.28	1.22	1.06	.92	.40	.38	.36	9.66
1956	.36	.44	.48	.34	.36	1.56	2.26	2.71	.40	.40	.76	.35	10.42
1957	.34	.39	.49	.52	.70	1.88	1.34	1.18	.87	2.35	.35	.43	9.84
1958	.52	1.10	.90	.65	.63	1.78	.86	.38	.42	.40	.28	.42	8.34
1959	.49	.58	.48	.41	.38	1.87	3.49	1.02	.38	.31	.32	.29	10.02
1960	.57	.94	1.10	.69	.50	1.34	3.04	1.44	.80	.54	.61	.33	11.90

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	*494	*11.24
1951	1207	2,580	Apr. 26, 1951	-	437	0.732	9.94	554	12.59
1952	1237	3,960	Nov. 14, 1951	126	617	1.03	14.06	523	11.91
1953	1277	3,600	Feb. 22, 1953	112	426	.714	9.70	395	9.00
1954	1337	2,710	Apr. 28, 1954	107	401	.672	9.10	434	9.65
1955	1387	3,820	Mar. 11, 1955	90	425	.712	9.66	397	9.02
1956	1437	4,080	May 7, 1956	120	457	.765	10.42	455	10.36
1957	1507	4,700	July 9, 1957	146	432	.724	9.84	490	11.14
1958	1557	1,570	Nov. 20, 1957	72	367	.615	8.34	325	7.37
1959	1627	5,990	Apr. 3, 1959	80	441	.739	10.02	467	11.08
1960	1707	6,030	Mar. 31, 1960	130	521	.873	11.90	-	-

\* Revised.

## 1550. Pine River at Alma, Mich.

Location.--Lat 43°23', long 84°39', in SE $\frac{1}{4}$  sec.34, T.12 N., R.3 W., on right bank 270 ft downstream from Superior Street Bridge on grounds of Municipal Water Works at Alma.

Drainage area.--288 sq mi.

Records available.--October 1930 to September 1960. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 718.37 ft above mean sea level, datum of 1929. Prior to Dec. 10, 1930, tape gage at Superior Street Bridge at different datum. Dec. 10, 1930, to June 15, 1938, staff gage at site 70 ft downstream from bridge and June 16 to Oct. 25, 1938, wire-weight gage at Superior Street Bridge, at present datum.

Average discharge.--30 years (1930-60), 199 cfs.

Extremes.--1930-60: Maximum discharge, 4,400 cfs Mar. 19, 1948 (gage height, 10.81 ft); minimum daily, 2 cfs July 23, 1938, caused by cofferdam upstream during bridge construction.

Remarks.--Flow affected by regulation at dam half a mile above station and by variable backwater from powerplant at St. Louis  $5\frac{1}{2}$  miles below station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	142	160	261	224	439	497	528	236	149	97.4	143	241	258
1952	393	452	330	427	323	594	545	204	112	184	175	136	323
1953	92.8	189	268	200	316	481	284	313	134	94.7	102	76.5	212
1954	103	117	122	98.3	343	375	482	252	234	118	84.1	72.3	199
1955	241	154	149	188	152	573	326	235	270	101	84.6	112	216
1956	106	152	151	92.7	99.0	388	477	677	176	137	218	107	232
1957	90.8	113	109	104	162	262	363	286	156	299	75.3	120	178
1958	163	336	268	157	165	424	205	120	115	97.6	68.0	100	185
1959	127	181	112	96.5	107	500	824	265	109	70.4	81.3	81.5	213
1960	174	320	303	247	182	331	841	354	249	139	128	91.4	279

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.57	0.62	1.04	0.90	1.59	1.99	2.05	0.94	0.58	0.39	0.57	0.93	12.17
1952	1.57	1.75	1.32	1.71	1.21	2.36	2.11	.82	.45	.74	.70	.53	15.27
1953	.37	.73	1.07	.80	1.14	1.92	1.10	1.25	.52	.38	.41	.30	9.99
1954	.41	.45	.49	.39	1.24	1.50	1.87	1.01	.91	.47	.34	.28	9.36
1955	.97	.60	.60	.75	.55	2.29	1.26	.94	1.05	.41	.34	.43	10.19
1956	.42	.59	.61	.37	.37	1.55	1.85	2.71	.68	.55	.87	.41	10.98
1957	.36	.44	.44	.42	.59	1.05	1.41	1.14	.60	1.20	.30	.47	8.42
1958	.65	1.30	1.07	.65	.60	1.70	.79	.48	.45	.39	.27	.39	8.72
1959	.51	.70	.45	.39	.39	2.01	3.19	1.06	.42	.28	.33	.32	10.05
1960	.70	1.24	1.21	.99	.68	1.33	3.26	1.42	.97	.56	.51	.35	13.22

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	309	14.58
1951	1207	1,320	Feb. 19, 1951	69	258	0.896	12.17	309	14.58	
1952	1237	1,320	(a)	50	323	1.12	15.27	271	12.80	
1953	1277	1,270	Mar. 15, 1953	57	212	.756	9.99	195	9.17	
1954	1337	1,750	Apr. 27, 1954	39	199	.691	9.36	216	10.18	
1955	1387	1,150	Mar. 11, 1955	59	216	.750	10.19	205	9.64	
1956	1437	1,800	May 6, 1956	75	232	.806	10.98	224	10.60	
1957	1507	675	July 12, 1957	40	178	.618	8.42	216	10.20	
1958	1557	723	Nov. 19, 1957	51	185	.642	8.72	156	7.36	
1959	1627	2,400	Apr. 3, 1959	54	213	.740	10.05	244	11.54	
1960	1707	2,480	Mar. 31, 1960	66	279	.969	13.22	-	-	

a Nov. 14, 1951, Apr. 13, 1952.

## 1555. Pine River near Midland, Mich.

Location.--Lat 43°33'50", long 84°22'10", on line between sec.36, T.14 N., R.1 W., and sec.4, T.13 N. R.1 E., on left bank at downstream side of bridge on State Highway 30, 7 miles southwest of Midland and 8 miles upstream from mouth.

Drainage area.--390 sq mi, approximately.

Records available.--May 1934 to September 1938, February 1948 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 623.87 ft above mean sea level (Michigan State Highway Department bench mark). May 31, 1934, to Sept. 30, 1938, tape, staff, or wire-weight gage at same site at datum 5.48 ft lower. Feb. 3, 1948, to Dec. 13, 1951, wire-weight gage, water-stage recorder, or staff gage at present site and datum.

Average discharge.--16 years (1934-38, 1948-60), 282 cfs.

Extremes.--1934-38, 1948-60: Maximum discharge, 6,360 cfs Mar. 20, 1948 (gage height, 10.00 ft, from graph based on gage readings); minimum not determined.

Remarks.--Regulation at low and medium stages by powerplant at St. Louis. Some diversion above station for irrigation.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	163	163	347	363	684	760	716	326	177	100	136	250	346
1952	550	512	443	599	385	876	798	260	164	244	240	224	442
1953	125	207	339	271	414	616	335	397	172	112	136	99.6	268
1954	124	137	137	121	490	513	699	332	289	122	84.4	75.7	258
1955	301	184	203	263	197	811	359	328	441	119	96.3	135	287
1956	139	210	201	125	134	561	659	980	195	155	269	111	313
1957	106	144	176	163	317	295	416	363	211	549	83.3	128	246
1958	185	417	322	205	244	564	259	106	119	110	83.6	111	227
1959	129	208	139	114	130	768	1,129	316	115	87.7	113	98.0	279
1960	190	343	373	291	203	432	1,007	401	255	161	144	96.8	324

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.48	0.47	1.03	1.07	1.83	2.25	2.05	0.96	0.51	0.30	0.40	0.72	12.07
1952	1.62	1.46	1.31	1.77	1.07	2.59	2.28	.77	.47	.72	.71	.64	15.41
1953	.37	.59	1.00	.80	1.11	1.82	.96	1.18	.49	.33	.40	.29	9.34
1954	.37	.39	.41	.36	1.31	1.52	2.00	.98	.63	.36	.25	.22	9.00
1955	.69	.53	.60	.78	.53	2.40	1.03	.97	1.26	.35	.28	.39	10.01
1956	.41	.60	.60	.37	.37	1.66	1.89	2.90	.56	.46	.80	.32	10.94
1957	.31	.41	.52	.48	.85	.87	1.19	1.07	.60	1.63	.25	.37	8.55
1958	.55	1.19	.95	.61	.65	1.67	.74	.31	.34	.33	.25	.32	7.91
1959	.38	.59	.41	.34	.35	2.27	3.22	.93	.33	.26	.33	.28	9.69
1960	.56	.98	1.10	.86	.56	1.28	2.88	1.19	.73	.48	.43	.28	11.33

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	390	15.58
1951	1207	a2,000	Feb. 21, 1951	(b)	346	0.887	12.07	416	14.48
1952	1237	2,500	Apr. 14, 1952	76	442	1.13	15.41	372	12.98
1953	1277	1,550	Mar. 16, 1953	50	268	.687	9.34	245	8.55
1954	1337	2,900	Apr. 27, 1954	44	258	.662	9.00	263	9.85
1955	1387	2,360	Mar. 11, 1955	52	287	.736	10.01	276	9.60
1956	1437	3,100	May 7, 1956	69	313	.803	10.94	302	10.57
1957	1507	2,160	July 11, 1957	15	246	.631	8.55	287	10.00
1958	1557	1,210	Nov. 19, 1957	29	227	.582	7.91	190	6.60
1959	1627	3,440	Apr. 4, 1959	38	279	.715	9.69	315	10.95
1960	1707	4,100	Mar. 31, 1960	44	324	.831	11.33	-	-

a Maximum daily.

b Not determined.

## 1560. Tittabawassee River at Midland, Mich.

Location.--Lat 43°36', long 84°15', in NE¼ sec.28, T.14 N., R.2 E., on right bank half a mile downstream from Dow Chemical Co. powerplant in Midland, 1 mile downstream from Chippewa River, and 1 mile upstream from Bullock Creek.

Drainage area.--2,400 sq mi, approximately.

Records available.--March 1936 to September 1960. Gage-height records for flood seasons collected in this vicinity 1910-26, 1928, and since 1946 are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 580.28 ft above mean sea level, datum of 1929. Prior to Oct. 1, 1955, at datum 10.00 ft higher.

Average discharge.--24 years (1936-60), 1,570 cfs (adjusted for diversion).

Extremes.--1936-60: Maximum discharge, 34,000 cfs Mar. 21, 1948 (gage height, 19.50 ft, datum then in use); minimum, 39 cfs Oct. 12, 1942; minimum daily, 111 cfs Aug. 21, 1949; minimum gage height, -0.96 ft Aug. 19, 1954, datum then in use, caused by bridge construction above station.

Remarks.--Water is diverted from river a short distance above station for industrial use; small part returned to river at gage; small part returned to river a quarter of a mile below station; remainder returned 1 mile below. Extremes and daily discharge not adjusted for diversion. Discharge below 4,000 cfs regulated by dam half a mile above station.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	562	629	1,291	1,164	3,339	4,283	4,445	1,703	959	531	422	763	1,652
1952	1,801	2,785	1,847	3,224	2,677	5,461	5,189	962	502	1,474	897	678	2,289
1953	498	862	1,457	1,064	2,320	4,035	2,422	2,662	895	658	661	383	1,490
1954	474	670	682	532	2,157	2,736	3,977	1,732	2,217	504	364	428	1,361
1955	1,647	1,073	978	1,163	1,013	5,487	2,280	1,935	1,580	426	392	499	1,546
1956	463	730	706	506	526	3,005	4,367	5,573	865	969	1,165	504	1,621
1957	464	625	779	607	1,182	1,599	2,551	1,948	1,117	4,492	453	558	1,369
1958	832	2,260	1,682	877	1,032	3,383	1,771	621	412	328	514	1,190	1,190
1959	578	1,373	614	803	762	4,167	7,408	1,920	535	453	586	443	1,809
1960	1,243	2,154	2,278	2,001	1,277	2,475	7,001	2,554	1,252	741	668	508	2,009

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.31	0.33	0.66	0.61	1.49	2.10	2.11	0.86	0.45	0.30	0.25	0.40	9.87
1952	.91	1.34	.93	1.59	1.24	2.67	2.46	.50	.27	.75	.47	.36	13.49
1953	.28	.44	.74	.55	1.05	1.98	1.17	1.33	.47	.37	.37	.23	8.98
1954	.28	.35	.37	.30	.97	1.35	1.89	.88	1.08	.29	.22	.24	8.22
1955	.84	.54	.51	.60	.48	2.68	1.10	.98	.78	.26	.24	.28	9.29
1956	.27	.39	.38	.29	.28	1.49	2.08	2.72	.45	.52	.61	.28	9.76
1957	.28	.34	.43	.34	.56	.82	1.24	.99	.57	2.21	.28	.32	8.38
1958	.44	1.09	.85	.46	.48	1.66	.86	.33	.30	.24	.19	.27	7.17
1959	.31	.67	.33	.27	.36	2.04	3.48	.96	.29	.26	.33	.25	9.55
1960	.64	1.04	1.13	.99	.60	1.22	3.28	1.26	.62	.39	.36	.27	11.80

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	1,834	1,924	10.87
1951	1207	11,200	Feb. 27, 1951	220	1,652	1,746	0.727	9.87	1,982	2,076	11.75
1952	1237	15,400	Apr. 14, 1952	250	2,289	2,381	.992	13.49	1,988	2,079	11.77
1953	1277	11,200	May 3, 1953	208	1,490	1,590	.662	8.98	1,407	1,507	8.52
1954	1337	12,200	Apr. 28, 1954	172	1,361	1,454	.606	8.22	1,519	1,612	9.11
1955	1387	12,700	Mar. 23, 1955	186	1,546	1,642	.684	9.29	1,394	1,493	8.44
1956	1437	16,000	May 7, 1956	212	1,621	1,725	.719	9.76	1,619	1,725	9.77
1957	1507	22,000	July 10, 1957	199	1,369	1,478	.616	8.38	1,611	1,713	9.71
1958	1557	5,940	Nov. 20, 1957	204	1,190	1,267	.528	7.17	1,005	1,078	6.10
1959	1627	27,300	Apr. 4, 1959	174	1,609	1,688	.703	9.55	1,871	1,953	11.05
1960	1707	24,600	Apr. 1, 1960	294	2,009	2,084	.868	11.80	-	-	-

## 1575. Sebewaing River (State drain) near Sebewaing, Mich.

Location.--Lat 43°43', long 83°26', in sec.16, T.15 N., R.9 E., on right bank 60 ft downstream from highway bridge on Rescue Road, 1½ miles upstream from East Fork, and 1½ miles southeast of Sebewaing.

Drainage area.--62 sq mi, approximately.

Records available.--October 1939 to September 1954. Monthly discharge only for October to December 1939, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 590.0 ft above mean sea level (levels by Corps of Engineers). Prior to Apr. 9, 1941, wire-weight gage at same site and datum.

Average discharge.--15 years (1939-54), 34.7 cfs (corrected).

Extremes.--1939-54: Maximum discharge, 2,660 cfs Mar. 16, 1942 (gage height, 10.36 ft); maximum gage height, 12.81 ft Mar. 9, 1942 (ice jam); no flow for long periods.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	4.36	38.7	84.9	45.8	170	108	118	13.3	13.2	0.56	1.25	0.72	49.0
1952	11.3	63.9	26.4	191	102	194	173	15.9	1.79	24.2	11.1	36.3	68.1
1953	.07	6.28	16.3	22.6	24.3	113	52.9	72.8	5.35	8.10	31.8	.83	29.7
1954	2.53	2.79	24.9	4.61	140	184	56.4	15.4	15.1	.53	.10	.62	56.6

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.08	0.70	1.58	0.85	2.86	2.01	2.12	0.25	0.24	0.01	0.02	0.01	10.73
1952	.21	1.15	.49	3.55	1.77	3.61	3.12	.30	.03	.45	.21	.07	14.96
1953	.001	.11	.30	.42	.41	2.10	.95	1.35	.10	.15	.59	.01	6.49
1954	.05	.05	.46	.09	2.35	3.42	1.01	.29	.27	.01	.002	.01	8.01

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	55.6	12.18
1951	1207	1,000	Feb. 20, 1951	0	49.0	0.790	10.73	46.7	10.22
1952	1237	1,850	Mar. 11, 1952	0	68.1	1.10	14.96	61.6	13.52
1953	1277	1,190	May 1, 1953	0	29.7	.479	6.49	30.4	6.64
1954	1337	2,340	Mar. 25, 1954	0	36.6	.590	8.01	-	-



1580. East Fork Sebewaing River (Columbia drain) near Sebewaing, Mich.

Location.--Lat 43°44', long 83°24', on line between secs. 10 and 11, T.15 N., R.9 E., on right bank 10 ft downstream from highway bridge on Gettel Road,  $2\frac{1}{4}$  miles upstream from mouth, and  $2\frac{1}{2}$  miles southeast of Sebewaing.

Drainage area.--38 sq mi, approximately.

Records available.--January 1940 to September 1954. Monthly discharge only for October to December 1939, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 607.00 ft above mean sea level (levels by Corps of Engineers). Prior to Apr. 1, 1941, wire-weight gage at same site and datum.

Average discharge.--15 years (1939-54), 17.2 cfs.

Extremes.--1939-54: Maximum discharge, 1,720 cfs Mar. 11, 1952 (gage height, 6.12 ft); maximum gage height, 9.70 ft Mar. 15, 1943 (ice jam); no flow for long periods.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.60	13.0	31.6	20.8	72.0	61.5	72.9	4.58	7.14	0.32	0.42	0.44	23.5
1952	4.00	17.3	12.0	69.2	60.9	114	98.1	7.20	.79	8.35	2.34	1.48	32.8
1953	.07	2.56	5.36	7.62	13.1	55.6	21.4	38.9	1.85	.27	9.63	.11	13.1
1954	1.11	1.35	5.33	1.02	83.5	101	22.8	4.63	12.7	.21	.02	.35	19.1

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.05	0.36	0.96	0.63	1.97	1.87	2.14	0.14	0.21	0.01	0.01	0.01	6.38
1952	.12	.51	.36	2.10	1.73	3.45	2.88	.22	.02	.25	.07	.04	11.75
1953	.002	.08	.16	.23	.36	1.69	.63	1.18	.05	.008	.29	.003	4.68
1954	.03	.04	.16	.03	2.28	3.06	.67	.14	.37	.006	.0007	.01	6.80

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	21.8	7.80
1951	1207	1,100	Apr. 25, 1951	0	23.5	0.618	8.38	22.4	7.98
1952	1237	1,720	Mar. 11, 1952	0	32.6	.863	11.75	30.7	11.00
1953	1277	728	May 2, 1953	0	13.1	.345	4.68	13.1	4.67
1954	1337	al,600	Mar. 28, 1954	0	19.1	.503	6.80	-	-

a About.

1585. Pigeon River near Owendale, Mich.

Location.--Lat 43°45'35", long 83°14'45", in SE $\frac{1}{4}$  sec.36, T.16 N., R.10 E., on left bank 600 ft downstream from bridge on county road, 2 miles downstream from confluence of East and West Branches, and  $2\frac{1}{2}$  miles northeast of Owendale.

Drainage area.--55 sq mi, approximately.

Records available.--October 1952 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 645 ft (from topographic map). Prior to June 10, 1954, wire-weight gage at site 600 ft upstream at same datum.

Average discharge.--8 years (1952-60), 33.1 cfs.

Extremes.--1952-60: Maximum discharge, 2,550 cfs Mar. 25, 1954 (gage height, 10.75 ft), from rating curve extended above 1,200 cfs; minimum observed, 0.5 cfs Oct. 11, 1952 (gage height, 1.00 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	2.03	7.13	14.1	28.7	45.4	91.5	38.3	75.4	9.7	5.1	16.5	1.45	27.9
1954	3.95	4.13	21.9	9.81	153	188	51.6	13.4	69.0	5.80	4.91	6.00	43.5
1955	43.5	43.9	47.5	51.0	65.0	143	25.1	11.7	6.99	7.40	4.92	2.07	37.7
1956	5.01	8.83	8.30	6.19	5.93	194	97.8	142	19.6	10.5	5.00	2.45	42.5
1957	2.61	4.19	5.59	5.94	24.2	26.6	48.6	18.2	31.0	26.4	3.34	8.70	16.8
1958	17.2	37.2	47.6	15.8	13.6	110	19.0	7.77	6.66	6.40	2.52	2.76	24.1
1959	2.54	9.54	2.02	2.00	2.11	109	132	39.9	16.6	4.64	10.9	5.75	28.1
1960	6.11	35.8	76.3	45.6	27.1	113	120	66.8	25.1	7.25	2.99	2.21	44.4

## STREAMS TRIBUTARY TO LAKE HURON

Monthly and yearly runoff, in inches, of Pigeon River near Owendale, Mich.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	0.04	0.14	0.30	0.60	0.86	1.92	0.78	1.58	0.20	0.11	0.35	0.03	6.91
1954	.08	.08	.46	.21	2.89	3.94	1.05	.28	1.40	.12	.10	.12	10.73
1955	.91	.89	1.00	1.07	1.23	3.00	.51	.24	.14	.16	.10	.04	9.29
1956	.11	.18	.17	.13	.12	4.07	1.98	2.98	.40	.22	.10	.05	10.51
1957	.05	.08	.12	.12	.46	.56	.99	.38	.63	.55	.07	.14	4.15
1958	.36	.75	1.00	.33	.26	2.31	.38	.16	.14	.13	.05	.06	5.93
1959	.05	.19	.04	.04	.04	2.28	2.68	.84	.34	.10	.23	.12	6.95
1960	.17	.73	1.64	.96	.53	2.36	2.43	1.40	.51	.15	.06	.04	10.98

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	1277	1,130	May 1, 1953	0.8	27.9	0.507	6.91	28.5	7.05
1954	1337	2,550	Mar. 25, 1954	1.3	43.5	.791	10.73	52.3	12.91
1955	1387	1,020	Mar. 11, 1955	1.2	37.7	.685	9.29	28.2	6.95
1956	1437	1,290	May 6, 1956	1.4	42.5	.773	10.51	41.7	10.30
1957	1507	468	June 29, 1957	1.3	16.8	.305	4.15	24.4	6.01
1958	1557	a320	Mar. 6, 1958	1.3	24.1	.438	5.93	16.7	4.10
1959	1627	1,320	Apr. 2, 1959	1.3	28.1	.511	6.95	37.3	9.21
1960	1707	2,000	Mar. 30, 1960	1.2	44.4	.807	10.98	-	-

a Maximum daily.

1590. Pigeon River near Pigeon, Mich.

Location.--Lat 43°48'55", long 83°17'10", in NE¼ sec.15, T.16 N., R.10 E., on upstream side of highway bridge, 0.1 mile downstream from West Branch Extension and 1 mile southwest of Pigeon.

Drainage area.--86 sq mi, approximately.

Records available.--December 1946 to September 1952.

Gage.--Wire-weight gage. Altitude of gage is 607 ft (from county map).

Average discharge.--5 years (1947-52), 62.9 cfs.

Extremes.--1946-52: Maximum discharge observed, 3,700 cfs Mar. 28, 1950; maximum gage height, 14.90 ft about Mar. 19, 1948, from high-water mark (ice jam); no flow for long periods.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	3.02	17.4	59.2	67.6	264	201	208	21.3	20.4	3.58	4.68	1.57	71.1
1952	10.3	59.8	48.3	171	128	394	226	22.9	6.61	39.3	5.91	6.17	93.3

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.04	0.23	0.79	0.91	3.19	2.69	2.69	0.28	0.27	0.05	0.06	0.02	11.22
1952	.14	.78	.65	2.30	1.61	5.29	2.93	.31	.09	.53	.08	.08	14.79

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	72.7	11.49
1951	1207	1,760	Feb. 27, 1951	0.6	71.1	0.827	11.22	74.3	11.22
1952	1237	1,580	Mar. 11, 1952	.4	93.3	1.08	14.79	-	-

1595. Black River near Fargo, Mich.

Location.--Lat 43°06', long 82°37', in NW¼ sec.32, T.8 N., R.16 E., on left bank 20 ft downstream from bridge on Norman Road, 2½ miles southeast of Fargo, 4½ miles upstream from Mill Creek, and 12 miles northwest of Port Huron.

Drainage area.--475 sq mi.

Records available.--February 1944 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 613.75 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to July 9, 1954, wire-weight gage at same site and datum.

Average discharge.--16 years (1944-60), 309 cfs.

Extremes.--1944-60: Maximum discharge, 14,400 cfs Apr. 5, 1947 (gage height, 16.06 ft, from floodmark), from rating curve extended above 10,000 cfs; maximum gage height observed, 18.05 ft Feb. 20, 1951 (ice jam); minimum discharge observed, 1.8 cfs Sept. 18, 19, 1946.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	79.6	509	1,031	783	1,083	1,069	885	93.8	91.3	20.8	16.5	16.9	469
1952	33.6	207	225	1,315	1,147	1,551	1,207	312	47.2	71.4	26.8	19.9	512
1953	16.0	30.0	62.1	88.0	107	694	256	341	107	336	559	25.3	220
1954	21.4	26.7	38.4	37.3	1,855	1,163	433	132	65.9	24.3	18.7	15.8	309
1955	469	185	417	646	656	1,012	436	63.1	32.9	32.1	15.6	11.0	331
1956	15.1	19.8	20.6	16.6	16.8	1,206	446	1,511	97.1	41.0	44.2	18.8	291
1957	13.7	17.9	36.5	49.1	275	325	884	452	75.9	84.2	20.4	18.3	186
1958	22.1	36.5	204	72.7	118	355	101	40.4	31.9	20.9	18.4	19.1	86.9
1959	9.14	14.4	10.3	11.4	15.8	1,500	1,020	287	183	46.8	112	45.4	273
1960	110	338	860	383	263	769	1,540	356	199	33.4	22.4	18.0	407

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.19	1.20	2.50	1.90	2.37	2.59	2.08	0.23	0.21	0.05	0.04	0.04	13.40
1952	.08	.49	.55	3.19	2.60	3.76	2.83	.76	.11	.17	.07	.05	14.66
1953	.04	.07	.15	.21	.23	1.68	.60	.83	.25	.81	1.36	.06	6.29
1954	.05	.06	.09	.09	4.07	2.82	1.02	.32	.15	.06	.05	.04	8.82
1955	1.14	.44	1.01	1.57	1.44	2.46	1.03	.15	.08	.08	.04	.03	9.47
1956	.04	.05	.05	.04	.04	2.93	1.05	3.67	.23	.10	.11	.04	8.35
1957	.03	.04	.09	.12	.60	.79	2.08	1.10	.18	.20	.05	.04	5.32
1958	.05	.09	.50	18.1	.26	.86	.24	.10	.07	.05	.04	.04	2.48
1959	.02	.03	.02	.03	.03	3.64	2.39	.70	.43	.11	.27	.11	7.78
1960	.27	.79	2.09	.93	.60	1.87	3.62	.66	.47	.08	.05	.04	11.67

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	503	14.37
1951	1207	a6,210	Dec. 4, 1950	10	469	0.987	13.40	372	10.63
1952	1237	(b)	-	16	512	1.08	14.66	482	13.80
1953	1277	4,150	Aug. 5, 1953	13	220	.463	6.29	219	6.23
1954	1337	(b)	-	7.1	309	.651	8.82	392	11.21
1955	1387	5,460	Oct. 16, 1954	7.0	331	.697	9.47	245	7.02
1956	1437, 1627	6,980	May 7, 1956	6.5	291	.613	8.35	292	8.37
1957	1507, 1627	4,020	Apr. 28, 1957	10	186	.392	5.32	203	5.80
1958	1557, 1627	1,300	Dec. 21, 1957	9.0	86.9	1.83	2.48	67.4	1.91
1959	1627	7,210	Apr. 3, 1959	6.0	273	.575	7.78	380	10.86
1960	1707	10,100	Mar. 31, 1960	10	407	.857	11.67	-	-

a Maximum observed.

b Not determined (occurred during period of ice effect).

1600. Mill Creek near Abbottsford, Mich.

Location.--Lat 43°03', long 82°37', in NW¼ sec.17, T.7 N., R.16 E., on downstream side of highway bridge, 1 mile upstream from mouth and 2 miles northeast of Abbottsford.

Drainage area.--138 sq mi.

Records available.--May 1947 to September 1960.

Gage.--Wire-weight and crest-stage gages. Datum of gage is 609.80 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Mar. 7, 1950, staff gage at same site and datum.

Average discharge.--13 years (1947-60), 114 cfs.

Extremes.--1947-60: Maximum discharge, 3,070 cfs Mar. 31, 1960 (gage height, 9.18 ft); maximum gage height observed, 10.81 ft Jan. 3, 1951 (ice jam); minimum discharge, 2.7 cfs Sept. 22, 1955; minimum gage height, 2.28 ft Aug. 11, 1949.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	39.1	147	359	283	426	374	291	49.5	30.9	9.27	8.24	9.25	169
1952	24.5	89.2	83.8	276	184	465	379	86.1	22.6	25.0	13.3	15.5	139
1953	7.46	39.0	57.3	91.8	76.4	325	338	152	39.1	44.0	125	10.5	92.6
1954	10.8	15.3	19.1	17.6	512	354	160	56.7	29.0	8.14	7.67	7.22	95.2
1955	161	54.3	113	272	137	458	121	31.5	16.7	9.36	6.98	4.62	116
1956	9.55	15.5	14.5	8.52	20.5	438	160	682	47.3	18.1	27.0	24.2	123
1957	9.72	13.3	28.1	42.3	133	142	297	328	40.6	16.1	6.71	8.61	88.4
1958	13.5	22.7	89.5	34.6	43.4	138	81.4	18.8	21.1	9.54	5.95	8.43	40.6
1959	7.71	10.7	7.23	7.66	10.9	552	381	70.7	148	9.95	13.8	11.8	103
1960	76.4	136	258	168	116	254	736	124	123	17.2	15.2	9.29	169

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.33	1.19	3.00	2.36	3.22	3.12	2.35	0.41	0.25	0.08	0.07	0.07	16.45
1952	.20	.72	.70	2.30	1.44	3.89	3.06	.72	.18	.21	.11	.13	13.66
1953	.06	.32	.48	.77	.58	2.71	1.11	1.27	.32	.37	1.04	.08	9.11
1954	.09	.12	.16	.15	3.86	2.79	1.29	.47	.23	.07	.06	.06	9.35
1955	1.35	.44	.94	2.28	1.03	3.82	.97	.26	.14	.08	.06	.04	11.41
1956	.08	.13	.12	.07	.16	3.66	1.29	5.70	.38	.15	.23	.20	12.17
1957	.08	.11	.23	.35	1.00	1.19	2.40	2.74	.33	.13	.06	.07	8.69
1958	.11	.18	.75	.29	.33	1.15	.66	.16	.17	.08	.05	.07	4.00
1959	.06	.09	.06	.06	.08	4.62	3.08	.59	1.19	.08	.12	.10	10.13
1960	.64	1.10	2.16	1.40	.90	2.13	5.95	1.03	1.00	.14	.13	.08	16.66

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	183	18.03
1951	1207	a1,700	Feb. 27, 1951	6.0	169	1.22	16.45	138	13.55		
1952	1237	*1,530	Mar. 11, 1952	6.4	139	1.01	13.66	131	12.90		
1953	1277	890	Mar. 16, 1953	5.4	92.6	.671	9.11	87.7	8.62		
1954	1337	2,500	Feb. 16, 1954	4.7	95.2	.690	9.35	119	11.71		
1955	1387	1,400	Mar. 4, 1955	3.0	116	.841	11.41	91.6	9.01		
1956	1437	2,080	May 10, 1956	5.1	123	.891	12.17	124	12.26		
1957	1507	1,120	May 20, 1957	4.8	88.4	.641	8.69	94.7	9.31		
1958	1557	528	Dec. 20, 1957	4.5	46	.294	4.00	32.1	3.17		
1959	1627	1,780	Apr. 3, 1959	5.0	103	.746	10.13	140	13.82		
1960	1707	3,070	Mar. 31, 1960	7.0	169	1.22	16.66	-	-		

\* Revised.

a Maximum daily.

## 1608. Sashabaw Creek near Drayton Plains, Mich.

Location.--Lat 42°43'12", long 83°21'13", in SE $\frac{1}{4}$  sec.26, T.4 N., R.9 E., on right bank 25 ft upstream from bridge on Maybee Road, 1.1 miles upstream from mouth, and 2.5 miles northeast of Drayton Plains.

Drainage area.--21.0 sq mi.

Records available.--October 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 970 ft (from topographic map).

Extremes.--1959-60: Maximum discharge, 86 cfs Mar. 30, 1960 (gage height, 3.90 ft); minimum, 0.3 cfs Sept. 9-17, 19, 1960; minimum gage height, 1.59 ft Aug. 1, 2, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	8.74	13.1	17.1	20.0	15.4	17.0	42.3	22.0	10.7	3.14	1.45	0.53	14.3

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.48	0.69	0.94	1.10	0.79	0.93	2.25	1.21	0.57	0.17	0.08	0.03	9.24

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1960	1707	86	Mar. 30, 1960	0.3	14.3	0.681	9.24	-	-

## 1609. Clinton River near Drayton Plains, Mich.

Location.--Lat 42°39'37", long 83°23'25", in NW $\frac{1}{4}$  sec.21, T.3 N., R.9 E., on left bank 14 ft downstream from bridge on State Highway 59, 1 mile downstream from State fish hatchery and 2.0 miles south of Drayton Plains.

Drainage area.--79.5 sq mi.

Records available.--October 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 940 ft (from topographic map).

Extremes.--1959-60: Maximum discharge, 145 cfs Apr. 20 (gage height, 3.48 ft); minimum, 8.6 cfs Sept. 17, 18 (gage height, 1.34 ft).

Remarks.--Some regulation, especially at low and medium flows, by lake level control structures at many lakes above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	4.44	52.9	68.1	66.4	59.8	55.6	128	80.5	40.6	18.9	17.1	11.5	53.6

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.64	0.74	0.99	0.96	0.81	0.81	1.80	1.17	0.57	0.27	0.25	0.16	9.17

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1960	1707	145	Apr. 20, 1960	9.0	53.6	0.674	9.17	-	-

## 1610. Clinton River at Auburn Heights, Mich.

Location.--Lat 42°38'00", long 83°13'28", in NW<sup>1</sup> sec.26, T.3 N., R.10 E., on right bank 30 ft upstream from bridge on State Highway 59, at Auburn Heights, and 2.8 miles upstream from Galloway Creek.

Drainage area.--123 sq mi. At site prior to October 1940, 119 sq mi (revised).

Records available.--May 1935 to June 1939 and February to September 1940 (published as "at Pontiac"), October 1956 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 860 ft (from topographic map). Prior to October 1940, staff gage at site 3.3 miles upstream at datum 876.01 ft above mean sea level.

Average discharge.--7 years (1935-38, 1956-60), 78.3 cfs.

Extremes.--1935-40, 1956-60: Maximum discharge observed, 716 cfs Feb. 12, 1938 (gage height, 5.10 ft, site and datum then in use), from rating curve extended above 150 cfs; minimum observed, 4.8 cfs Sept. 4, 1936, site then in use.

Remarks.--Some regulation by many lakes above station. Flow includes waste from city of Pontiac water supply, most of which is pumped from ground water sources.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	50.5	41.3	74.7	82.8	96.1	120	122	145	126	170	82.9	66.2	98.3
1958	57.1	112	127	120	82.2	91.4	82.2	51.3	51.3	68.0	28.4	28.0	74.9
1959	27.7	42.6	55.4	55.2	75.7	167	233	116	57.8	46.2	50.2	62.9	82.2
1960	94.6	89.0	118	135	125	113	220	144	85.6	52.9	39.4	32.2	104

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	0.47	0.37	0.70	0.78	0.81	1.13	1.11	1.36	1.15	1.60	0.78	0.60	10.86
1958	.54	1.01	1.19	1.12	.70	.86	.75	.48	.47	.64	.27	.25	8.28
1959	.26	.39	.50	.52	.64	1.57	2.11	1.09	.52	.43	.47	.57	9.07
1960	.89	.81	1.11	1.27	1.10	1.06	2.00	1.35	.78	.50	.37	.29	11.53

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1957	1507	503	July 8, 1957	16	98.3	0.799	10.86	109	12.06
1958	1557	425	July 3, 1958	14	74.9	.609	8.28	60.4	6.69
1959	1627	536	Apr. 2, 1959	17	82.2	.668	9.07	97.1	10.73
1960	1707	374	Oct. 6, 1959	21	104	.846	11.53	-	-

## 1611. Galloway Creek near Auburn Heights, Mich.

Location.--Lat 42°40'02", long 83°12'02", in SE<sup>1</sup> sec.18, T.3 N., R.11 E., on right bank 12 ft downstream from wooden bridge on Michigan State University (Oakland Branch) property and 2.7 miles northeast of Auburn Heights.

Drainage area.--17.8 sq mi.

Records available.--October 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 830 ft (from topographic map).

Extremes.--1959-60: Maximum discharge, 184 cfs Mar. 29 (gage height, 5.14 ft); minimum, 0.2 cfs Aug. 20, 23-29, Sept. 5-9; minimum gage height, 0.82 ft Aug. 1.

Remarks.--Records not previously published.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	10.8	13.5	15.9	16.6	13.6	27.0	28.2	9.53	8.35	0.68	0.44	0.35	12.1

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.70	0.85	1.03	1.08	0.83	1.75	1.77	0.62	0.52	0.04	0.03	0.02	9.24

## 1615. Paint Creek near Lake Orion, Mich.

Location.--Lat 42°46'03", long 83°13'12", in NE $\frac{1}{4}$  sec.13, T.4 N., R.10 E., on left bank 100 ft upstream from railroad bridge, 1.6 miles southeast of Lake Orion, and 2.8 miles upstream from Trout Creek.

Drainage area.--38.9 sq mi.

Records available.--September 1955 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 940 ft (from topographic map).

Average discharge.--5 years (1955-60), 23.9 cfs.

Extremes.--1955-60: Maximum discharge, 340 cfs Mar. 6, 1956 (gage height, 3.60 ft), from rating curve extended above 230 cfs by logarithmic plotting; minimum, 1.2 cfs June 28, July 13, 14, 15, 1959.

Remarks.--Occasional regulation by Lake Orion.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	15.4	4.48	10.0	11.0	16.7	65.9	49.4	127	38.3	17.7	21.6	16.1	32.9
1957	10.7	13.2	18.7	17.7	23.3	29.4	35.8	46.9	22.4	39.3	10.7	11.6	23.3
1958	15.7	25.3	33.8	25.9	17.4	29.2	22.7	9.36	12.9	8.26	3.95	24.5	19.1
1959	14.0	2.42	1.95	1.73	9.80	39.1	53.9	24.7	11.3	3.47	10.6	9.72	15.2
1960	27.8	32.5	30.7	32.7	28.9	29.0	85.3	35.6	23.1	10.7	6.10	4.81	28.9

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	0.46	0.13	0.30	0.33	0.46	1.95	1.42	3.76	1.10	0.52	0.64	0.46	11.53
1957	.32	.38	.55	.52	.62	.87	1.03	1.39	.64	1.17	.32	.33	8.14
1958	.46	.73	1.00	.77	.47	.86	.65	.28	.37	.24	.12	.70	6.65
1959	.41	.07	.06	.05	.26	1.16	1.55	.73	.32	.10	.31	.28	5.30
1960	.83	.93	.91	.97	.80	.86	2.45	1.06	.66	.32	.18	.14	10.11

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1956	1437	340	Mar. 6, 1956*	2.6	32.9	0.846	11.53	34.0	11.89		
1957	1507	130	May 22, 1957	3.9	23.3	.599	8.14	26.0	9.08		
1958	1557	61	Dec. 25, 1957	2.2	19.1	.491	6.65	14.3	5.00		
1959	1627	149	Apr. 5, 1959	1.4	15.2	.391	5.30	21.3	7.43		
1960	1707	289	Apr. 1, 1960	2.6	28.9	.743	10.11	-	-		

## 1615.4. Paint Creek at Rochester, Mich.

Location.--Lat 42°41'18", long 83°08'35", in NW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.10, T.3 N., R.11 E., on right bank at upstream side of bridge on Ludlow Street in Rochester, 1.5 miles upstream from mouth.

Drainage area.--71.3 sq mi.

Records available.--October 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 760 ft (from topographic map).

Extremes.--1959-60: Maximum discharge, 480 cfs Mar. 31, 1960, estimated on basis of records for nearby stations; minimum, 10 cfs Sept. 15, 16, 17, 1960; minimum gage height, 1.26 ft Sept. 16, 1960.

Remarks.--Occasional regulation by Lake Orion.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	48.7	60.9	66.1	67.8	52.6	68.2	155	73.5	48.2	23.3	16.6	13.4	57.8

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.79	0.95	1.07	1.10	0.80	1.10	2.42	1.19	0.75	0.38	0.27	0.21	11.03

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1960	1707	480	Mar. 31, 1960	10	57.8	0.811	11.03	-	-		

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

1618. Stony Creek near Washington, Mich.

Location.--Lat 42°42'55", long 83°05'31" in SW $\frac{1}{4}$  sec.31, T.4 N., R.12 E., on left bank 15 ft downstream from bridge on Mount Vernon Road and 2.9 miles west of Washington.

Drainage area.--68.0 sq mi.

Records available.--July 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 772.59 ft above mean sea level, datum of 1929 (levels by Huron-Clinton Metropolitan Authority).

Extremes.--1958-60: Maximum discharge, 400 cfs Mar. 6, 1959; minimum, 4.1 cfs Aug. 29, 1958 (gage height, 2.18 ft).

Remarks.--Occasional diurnal fluctuation caused by mills above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	10.1	8.74	10.2	-
1959	13.1	16.5	13.7	12.5	27.6	159	91.0	35.4	15.8	13.4	17.1	16.1	36.0
1960	36.0	43.8	51.7	53.1	43.6	69.4	123	58.5	36.0	13.0	12.0	10.7	45.9

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	0.17	0.15	0.17	-
1959	0.22	0.27	0.23	0.21	0.42	2.69	1.49	0.60	0.26	.23	.29	.26	7.17
1960	.61	.72	.88	.90	.69	1.18	2.02	.99	.59	.22	.20	.17	9.17

Yearly discharge, in cubic feet per second

Runoff, discharge, in cubic feet per second										
Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1959	1627	400	Mar. 6, 1959	7.3	36.0	0.529	7.17	43.4	8.66	
1960	1707	361	Mar. 30, 1960	8	45.9	.675	9.17	-	-	



## 1625. Bear Creek at Warren, Mich.

Location.--Lat 42°31'23", long 83°01'25", in SW $\frac{1}{4}$  sec.3, T.1 N., R.12 E., on upstream side of bridge on Chicago Road, 0.4 mile upstream from Red Run and 1.3 miles east of Warren.

Drainage area.--17.3 sq mi.

Records available.--January 1954 to September 1957.

Gage.--Wire-weight and crest-stage gages. Datum of gage is 594.24 ft above mean sea level, datum of 1929.

Extremes.--1954-57: Maximum discharge, 649 cfs July 8, 1957 (gage height, 10.1 ft); minimum observed, 1.0 cfs Jan. 17, 1954; minimum gage height, 1.11 ft May 22, 1955.

Remarks.--Some regulation by industrial plants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1954	-	-	-	3.83	13.9	25.8	24.8	4.77	7.55	3.45	4.80	5.19	-
1955	25.7	8.94	12.8	19.1	17.0	27.3	17.2	6.85	6.67	6.90	6.86	5.25	13.4
1956	11.5	13.7	9.48	5.96	25.1	31.4	32.3	51.1	27.3	7.11	15.9	5.25	19.7
1957	5.56	8.15	10.9	10.2	21.2	13.6	39.2	22.7	15.7	56.9	11.1	8.04	18.6

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1954	-	-	-	0.26	0.84	1.72	1.60	0.32	0.49	0.23	0.32	0.33	-
1955	1.71	0.58	0.85	1.27	1.03	1.82	1.11	.46	.43	.46	.46	.34	10.52
1956	.77	.88	.63	.40	1.56	2.09	2.09	3.41	1.76	.47	1.06	.34	15.46
1957	.37	.53	.73	.68	1.27	.91	2.53	1.51	1.01	3.79	.74	.52	14.59

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1954	1337	503	Mar. 25, 1954	1.0	-	-	-	11.8	9.25		
1955	1387	531	Oct. 4, 1954	2.7	13.4	0.775	10.52	12.3	9.66		
1956	1437	583	June 18, 1956	3.8	19.7	1.14	15.46	18.8	14.81		
1957	1507	649	July 8, 1957	3.4	18.6	1.08	14.59	-	-		

## 1629. Big Beaver Creek near Warren, Mich.

Location.--Lat 42°32'31", long 83°02'52", in NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.33, T.2 N., R.12 E., on downstream side of bridge on Mound Road, 1.0 mile north of Warren and 2.0 miles upstream from mouth.

Drainage area.--23.5 sq mi.

Records available.--October 1958 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 610 ft (from topographic map). Prior to Aug. 26, 1960, wire-weight and crest-stage gages at same site and datum.

Extremes.--1958-60: Maximum discharge, 560 cfs Apr. 2, 1959 (gage height, 12.53 ft); minimum, 0.1 cfs all or part of several days in November 1958; July, August, and September, 1959; July, August, and September, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	0.62	1.35	0.42	0.82	8.72	47.6	59.3	11.6	0.92	0.60	7.90	6.41	12.2
1960	14.7	26.0	46.8	25.0	25.5	34.3	38.2	4.89	30.9	.32	.22	.20	20.5

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	0.03	0.06	0.02	0.04	0.39	2.33	2.82	0.57	0.04	0.03	0.39	0.30	7.02
1960	.72	1.24	2.29	1.23	1.17	1.68	1.81	.24	1.47	.02	.01	.01	11.89

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1959	1627	560	Apr. 2, 1959	0.1	12.2	0.519	7.02	19.3	11.16		
1960	1707	527	June 17, 1960	.1	20.5	.872	11.89	-	-		

## 1630. Big Beaver Creek at Warren, Mich.

Location.--Lat 42°31'57", long 83°01'45", in NW¼ sec.3, T.1 N., R.12 E., on downstream side of center pier of bridge on State Highway 53, 0.6 mile upstream from Red Run and 1.0 mile east of Warren.

Drainage area.--25.2 sq mi.

Records available.--January 1954 to September 1958.

Gage.--Staff and crest-stage gages. Altitude of gage is 610 ft (from topographic map).

Extremes.--1954-58: Maximum discharge, 1,060 cfs Apr. 29, 1956 (gage height, 13.9 ft); no flow at times.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1954	-	-	-	0.48	21.5	33.3	32.4	3.15	1.11	0.07	0.05	0.01	-
1955	18.8	6.45	15.0	35.4	19.9	47.9	11.1	1.49	.46	.25	.27	.15	13.1
1956	1.23	8.46	7.42	.72	29.8	60.5	46.6	105	23.2	.55	2.80	.35	23.9
1957	.35	1.48	3.07	4.48	26.4	24.1	60.2	39.3	4.90	48.0	.81	3.22	18.0
1958	6.45	24.7	50.5	4.84	5.58	10.5	10.7	1.37	1.63	4.55	.84	.75	10.2

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1954	-	-	-	0.02	0.89	1.53	1.43	0.14	0.05	0.003	0.002	0.0003	-
1955	0.86	0.29	0.69	1.62	.82	2.19	.49	.07	.02	.01	.01	.007	7.08
1956	.06	.37	.34	.03	1.27	2.77	2.06	4.80	1.03	.03	.13	.02	12.91
1957	.02	.07	.14	.20	1.09	1.10	2.67	1.80	2.22	2.19	.04	.14	9.68
1958	.30	1.09	2.31	.22	.23	.48	.47	.06	.07	.21	.04	.03	5.51

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1954	1337	809	Mar. 25, 1954	0	-	-	-	11.0	5.91
1955	1387	316	Jan. 6, 1955	0	13.1	0.520	7.08	11.2	6.01
1956	1437	1,060	Apr. 29, 1956	0	23.9	.948	12.91	22.9	12.37
1957	1507	701	July 8, 1957	.1	18.0	.714	9.68	24.4	13.15
1958	1557	430	Dec. 20, 1957	.1	10.2	.405	5.51	-	-

1635. Plum Brook near Utica, Mich.

Location.--Lat 42°35'01", long 83°01'49", in SW $\frac{1}{4}$  sec.15, T.2 N., R.12 E., on right bank at downstream side of bridge on State Highway 53, 3.0 miles south of Utica and 3.4 miles upstream from mouth.

Drainage area.--22.9 sq mi.

Records available.--January 1954 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 610 ft (from topographic map).

Average discharge.--6 years (1954-60), 15.1 cfs.

Extremes.--1954-60: Maximum discharge, 980 cfs Apr. 29, 1956 (gage height, 8.60 ft); no flow at times.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	1.74	3.49	39.4	33.1	5.62	3.62	0.52	0.18	0.20	-
1955	12.7	6.22	10.7	23.0	18.1	34.7	9.49	2.95	1.21	.08	.24	.15	9.96
1956	3.53	10.1	7.61	3.05	22.1	57.1	54.1	80.2	14.1	2.12	2.54	2.63	21.6
1957	2.50	3.16	4.53	3.95	17.6	20.3	46.1	34.9	4.36	29.8	.94	4.04	14.3
1958	10.3	20.8	39.9	7.79	10.5	16.0	13.3	2.21	3.15	9.81	1.21	1.32	11.4
1959	1.56	3.60	1.59	1.52	13.9	55.2	52.2	12.8	1.78	.79	5.23	4.73	12.9
1960	17.2	28.7	36.2	25.1	20.2	38.8	39.9	9.68	24.2	1.48	1.50	.53	20.3

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	0.09	1.58	1.98	1.61	0.28	0.18	0.03	0.009	0.01	-
1955	0.64	0.30	0.54	1.16	.82	1.75	.46	.15	.06	.004	.01	.007	5.90
1956	.18	.49	.38	.15	1.04	2.87	2.63	4.04	.69	.11	.13	.13	12.84
1957	.13	.15	.23	.20	.80	1.02	2.24	1.76	.21	1.50	.05	.20	8.49
1958	.52	1.01	2.01	.39	.48	.80	.65	.11	.15	.49	.06	.06	6.73
1959	.08	.18	.08	.08	.63	2.78	2.54	.64	.09	.04	.25	.23	7.63
1960	.86	1.40	1.82	1.26	.95	1.96	1.95	.49	1.18	.08	.08	.03	12.06

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	1337	720	Mar. 25, 1954	0	-	-	-	12.2	7.25
1955	1387	245	Jan. 6, 1955	0	9.96	0.435	5.90	9.24	5.47
1956	1437	980	Apr. 29, 1956	.2	21.6	.943	12.84	20.7	12.30
1957	1507	708	Apr. 25, 1957	.1	14.3	.624	8.49	19.4	11.52
1958	1557	301	Dec. 20, 1957	.3	11.4	.498	6.73	5.96	3.53
1959	1627	357	Apr. 2, 1959	0	12.9	.563	7.63	19.2	11.37
1960	1707	361	June 17, 1960	.3	20.3	.866	12.06	-	-

1640. Clinton River near Fraser, Mich.

Location.--Lat 42°34'40", long 82°57'00", in NW $\frac{1}{4}$  sec. 20, T.2 N., R.13 E., on left bank 800 ft downstream from bridge on Garfield Road, 2 $\frac{1}{4}$  miles north of Fraser, and 4 miles upstream from North Branch.

Drainage area.--445 sq mi (revised).

Records available.--May 1947 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 577.71 ft above mean sea level, datum of 1929. Prior to Nov. 17, 1949, wire-weight gage at site 800 ft upstream at same datum.

Average discharge.--13 years (1947-60), 346 cfs.

Extremes.--1947-60: Maximum discharge, 8,000 cfs May 11, 1948 (gage height, 19.5 ft, from graph based on gage readings), from rating curve extended above 4,000 cfs; minimum, 47 cfs Sept. 6, 1955; minimum gage height, 4.29 ft Sept. 7, 1954.  
Flood of Apr. 5 or 6, 1947, reached a stage of 20 ft, from floodmarks (discharge, 9,000 cfs, from rating curve extended above 4,000 cfs).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	240	326	701	591	849	892	779	471	244	168	113	113	455
1952	214	362	366	917	603	908	787	352	152	115	87.2	106	414
1953	95.6	125	228	219	191	424	422	344	198	157	104	82.1	216
1954	72.3	78.2	116	133	478	657	592	241	202	91.5	69.5	73.3	232
1955	442	244	272	406	365	760	348	179	144	87.1	87.7	89.5	286
1956	136	227	177	104	232	817	671	1,382	545	192	277	140	410
1957	110	141	209	225	365	400	667	642	348	664	158	191	343
1958	220	346	532	260	221	318	259	127	147	165	90.9	125	235
1959	102	130	93.1	116	278	827	853	364	161	124	201	194	286
1960	365	428	534	502	438	520	839	390	442	143	127	94.2	401

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.62	0.82	1.82	1.53	1.99	2.31	1.95	1.22	0.61	0.44	0.29	0.28	13.88
1952	.55	.91	.95	2.38	1.46	2.35	1.97	.91	.38	.30	.23	.27	12.66
1953	.25	.31	.59	.57	.45	1.10	1.06	.89	.50	.41	.27	.21	6.61
1954	.19	.20	.50	.34	1.12	1.70	1.48	.82	.51	.24	.18	.18	7.06
1955	1.14	.61	.71	1.05	.85	1.97	.87	.47	.36	.23	.23	.22	8.71
1956	.35	.57	.46	.27	.56	2.12	1.68	3.58	1.37	.50	.72	.35	12.53
1957	.28	.35	.54	.58	.85	1.04	1.67	1.66	.87	1.72	.41	.48	10.45
1958	.57	.87	1.38	.67	.52	.82	.65	.33	.37	.43	.24	.31	7.16
1959	.27	.33	.24	.30	.65	2.14	2.14	.94	.40	.32	.52	.49	8.74
1960	.94	1.07	1.38	1.30	1.06	1.35	2.10	1.01	1.11	.37	.33	.24	12.26

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	548	16.72
1951	1207	3,430	Dec. 8, 1950	85	455	1.02	13.68	427	13.03
1952	1237	3,340	Mar. 11, 1952	69	414	.930	12.66	373	11.40
1953	1277	1,460	Mar. 4, 1953	63	216	.485	6.61	201	6.15
1954	1337	3,900	Mar. 25, 1954	54	232	.521	7.06	290	8.83
1955	1387	2,290	Oct. 4, 1954	49	286	.643	8.71	250	7.63
1956	1437	5,160	Apr. 29, 1956	65	410	.921	12.53	403	12.32
1957	1507	3,870	July 8, 1957	95	343	.771	10.45	397	12.10
1958	1557	2,000	Dec. 20, 1957	60	235	.528	7.16	170	5.18
1959	1627	2,610	Apr. 3, 1959	70	286	.643	8.74	371	11.29
1960	1707	2,940	June 17, 1960	72	401	.901	12.26	-	-

## 1641. East Pond Creek at Romeo, Mich.

Location.--Lat 42°49'21", long 83°01'13", in NE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.27, T.5 N., R.12 E., on right bank 10 ft upstream from bridge on State Highway 53 and 1.4 miles north of Romeo.

Drainage area.--21.8 sq mi.

Records available.--September 1958 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 780 ft (from topographic map).

Extremes.--1958-60: Maximum discharge, 173 cfs Mar. 30, 1960; maximum gage height, 4.05 ft Mar. 3, 1959; minimum discharge, 1.5 cfs Aug. 29, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	4.28	4.71	2.95	2.89	8.29	53.5	33.6	12.6	4.65	2.55	6.47	5.76	11.9
1960	15.3	15.5	18.3	19.6	15.5	26.2	46.5	19.7	15.4	3.77	3.32	3.04	16.8

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	0.23	0.24	0.16	0.15	0.40	2.83	1.72	0.67	0.24	0.13	0.34	0.29	7.40
1960	.81	.79	.97	1.04	.77	1.39	2.38	1.04	.79	.20	.18	.16	10.52

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	150	Mar. 6, 1959	1.6	11.9	0.546	7.40	15.0	9.34
1960	1707	173	Mar. 30, 1960	2.0	16.8	.771	10.52	-	-

## 1642.5. Tupper Brook at Ray Center, Mich.

Location.--Lat 42°45'42", long 82°54'04", in NW $\frac{1}{4}$  sec.23, T.4 N., R.13 E., on right bank at downstream side of bridge on 29 Mile Road at Ray Center, 3.7 miles northeast of Davis.

Drainage area.--8.62 sq mi.

Records available.--Water year 1959 (annual maximum and occasional low-flow measurements), October 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 640 ft (from topographic map). Nov. 6, 1958, to Sept. 30, 1959, crest-stage and staff gages at same site and datum.

Extremes.--1958-60: Maximum discharge, 187 cfs Apr. 25, 1960 (gage height, 4.73 ft), from rating curve extended above 130 cfs; maximum gage height, 4.77 ft Mar. 28, 1960; no flow at times.

Remarks.--Records not previously published.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	1.92	6.12	10.6	5.62	5.92	15.8	14.7	2.97	0.90	0	0	0	5.37

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.26	0.79	1.41	0.75	0.74	2.11	1.91	0.40	0.12	0	0	0	8.49

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	-	140	Apr. 2, 1959	-	-	-	-	-	-
1960	-	187	Apr. 25, 1960	0	5.37	0.623	8.49	-	-

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

1643. East Branch Coon Creek at Armada, Mich.

Location.--Lat 42°50'45", long 82°53'06", in NE $\frac{1}{4}$  sec.23, T.5 N., R.13 E., on right bank 10 ft downstream from bridge on Prospect Street in Armada.

Drainage area.--13.0 sq mi.

Records available.--October 1958 to September 1960.

Gage.--Water-stage recorder and concrete control. Altitude of gage is 735 ft (from topographic map).

Extremes.--1958-60: Maximum discharge, 376 cfs Apr. 2, 1959 (gage height, 5.17 ft); maximum gage height, 5.20 ft Mar. 15, 1959 (backwater from ice); minimum discharge, 0.03 cfs Nov. 23, 1958; July 4, 7-12, 14-16, 1959; Aug. 25, 26, 1960 (gage height, 1.19 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	0.142	0.204	0.121	0.141	1.08	25.0	17.9	1.35	0.372	0.165	0.481	0.314	3.96
1960	4.65	9.68	17.7	8.71	9.21	26.9	30.1	8.24	4.02	.200	.087	.097	9.79

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	0.01	0.02	0.01	0.01	0.09	2.22	1.53	0.12	0.03	0.01	0.04	0.03	4.12
1960	.41	.83	1.57	.77	.76	2.38	2.58	.55	.34	.02	.01	.01	10.23

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1959	1627	376	Apr. 2, 1959	0.03	3.96	0.305	4.12	6.61	6.89		
1960	1707	338	Mar. 29, 1960	.05	9.79	.753	10.23	-	-		

1644.5. McBride drain near Macomb, Mich.

Location.--Lat 42°41'14", long 82°55'14", in NE $\frac{1}{4}$  sec.16, T.3 N., R.13 E., on left bank at downstream side of bridge on 24 Mile Road, 2.2 miles southeast of Macomb.

Drainage area.--5.79 sq mi.

Records available.--October 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 605 ft (from topographic map).

Extremes.--1959-60: Maximum discharge, 147 cfs Mar. 27, 1960 (gage height, 6.73 ft), from rating curve extended above 90 cfs; no flow at times.

Remarks.--Records not previously published.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	3.54	5.59	8.06	5.48	6.17	8.89	10.7	1.32	1.97	0.07	0	0	4.31

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.70	1.08	1.61	1.09	1.15	1.77	2.07	0.26	0.38	0.01	0	0	10.12

1645. North Branch Clinton River near Mount Clemens, Mich.

Location.--Lat 42°37'45", long 82°53'25", in NW $\frac{1}{4}$  sec.2, T.2 N., R.13 E., on left bank 30 ft upstream from bridge on State Highway 59, 2 miles north of Mount Clemens, and  $\frac{3}{4}$  miles upstream from mouth.

Drainage area.--199 sq mi (revised).

Records available.--May 1947 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 576.38 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Nov. 15, 1949, wire-weight gage at same site and datum.

Average discharge.--13 years (1947-60), 127 cfs.

Extremes.--1947-60: Maximum discharge, 5,830 cfs Apr. 30, 1956, from rating curve extended above 3,300 cfs; maximum gage height, 17.5 ft Apr. 4 or 5, 1950, from high-water mark in gage well (backwater from Clinton River); minimum discharge, 0.2 cfs Sept. 13, 14, 1954 (gage height, 3.12 ft).

Flood of Apr. 5 or 6, 1947, reached a stage of 20.0 ft, from floodmark.

Remarks.--Some regulation at times by mill above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	159	261	424	317	604	388	238	62.0	35.5	16.8	8.30	12.3	208
1952	40.9	120	117	429	262	499	349	68.7	19.4	9.98	7.01	11.2	161
1953	10.3	27.2	46.9	62.7	63.6	232	157	131	34.5	21.8	15.1	6.95	67.7
1954	12.1	11.3	15.3	22.8	335	311	235	55.8	49.1	14.0	5.48	6.54	87.6
1955	42.1	36.8	66.6	178	195	353	90.2	31.5	13.9	3.44	2.14	3.13	84.2
1956	13.1	33.2	31.7	11.8	50.6	513	356	790	67.3	38.6	75.5	38.2	169
1957	11.1	23.8	55.6	69.9	171	191	377	300	48.0	72.5	8.99	23.6	112
1958	57.3	131	313	48.2	66.2	148	117	25.9	27.6	12.1	3.80	5.53	79.9
1959	7.08	11.8	5.63	6.89	17.6	330	320	68.7	15.4	6.76	23.6	21.2	69.7
1960	114	188	273	195	180	314	521	122	83.1	11.9	7.41	4.71	167

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.92	1.46	2.46	1.84	3.16	2.25	1.34	0.36	0.20	0.10	0.05	0.07	14.21
1952	.24	.67	.68	2.48	1.42	2.89	1.96	.40	.11	.06	.04	.06	11.01
1953	.06	.15	.27	.36	1.33	1.35	.88	.76	.19	.13	.09	.04	4.61
1954	.07	.06	.09	.13	1.75	1.80	1.32	.32	.28	.08	.03	.04	5.97
1955	.24	.21	.39	1.03	1.02	2.04	.51	.18	.08	.02	.01	.02	5.75
1956	.08	.18	.18	.07	.27	2.97	1.99	4.58	.38	.22	.44	.21	11.57
1957	.06	.13	.32	.40	.90	1.10	2.11	1.74	.27	.42	.05	.13	7.63
1958	.33	.73	1.81	.28	.35	.86	.66	.15	.15	.07	.02	.03	5.44
1959	.04	.07	.03	.04	.09	1.91	1.79	.40	.09	.04	.14	.12	4.76
1960	.66	1.05	1.58	1.13	.97	1.82	2.92	.70	.47	.07	.04	.03	11.44

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	254	17.33
1951	1207	2,960	Dec. 4, 1950	3.6	208	1.05	14.21	160	10.96
1952	1237	2,460	Mar. 12, 1952	2.0	161	.809	11.01	145	9.90
1953	1277	1,120	Mar. 5, 1953	.6	67.7	.340	4.61	63.8	4.35
1954	1337	3,900	Feb. 17, 1954	.2	87.6	.440	5.97	96.6	6.59
1955	1387	1,270	Feb. 28, 1955	.5	84.2	.423	5.75	78.5	5.35
1956	1437	5,830	Apr. 30, 1956	6.7	169	.849	11.57	170	11.64
1957	1507	3,220	May 20, 1957	2.0	112	.563	7.63	147	9.99
1958	1557	1,600	Dec. 20, 1957	1.2	79.9	.402	5.44	39.7	2.71
1959	1627	1,820	Apr. 3, 1959	.8	69.7	.350	4.76	116	7.91
1960	1707	2,530	Mar. 29, 1960	2.8	167	.839	11.44	-	-

## STREAMS TRIBUTARY TO LAKE ST. CLAIR

## 1652. Gloede ditch near Waldenburg, Mich.

Location.--Lat 42°37'39", long 82°57'10", in SW $\frac{1}{4}$  sec. 32, T.3 N., R.13 E., on right bank 15 ft upstream from private bridge, 200 ft east of intersection of State Highway 59 with Garfield Road, and 2.2 miles south of Waldenburg.

Drainage area.--16.0 sq mi.

Records available.--Water year 1959 (annual maximum, and occasional low-flow measurements), September 1959 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 595 ft (from topographic map). Oct. 28, 1958, to Sept. 15, 1959, crest-stage gage at site 50 ft downstream at same datum.

Extremes.--1958-60: Maximum discharge, 351 cfs Mar. 27, 1960 (gage height, 16.20 ft), from rating curve extended above 250 cfs; no flow at times.

Remarks.--Records not previously published.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	10.2	21.0	29.0	20.0	14.1	28.8	32.1	8.93	12.6	0.65	0.39	0.13	14.8

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.73	1.46	2.09	1.44	0.95	2.08	2.24	0.64	0.88	0.05	0.03	0.01	12.60

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	-	241	Apr. 2, 1959	-	-	-	-	-	-
1960	-	351	Mar. 27, 1960	0	14.8	0.925	12.60	-	-

## 1655. Clinton River at Mount Clemens, Mich.

Location.--Lat 42°35'45", long 82°54'35", on left bank 20 ft downstream from bridge on Moravian Drive, a quarter of a mile downstream from North Branch, and half a mile west of Mount Clemens.

Drainage area.----734 sq mi (revised)

Records available.--May 1934 to September 1960. Monthly discharge only for May 1934, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 570.43 ft above mean sea level, datum of 1929. May 10, 1934, to May 7, 1935, chain gage and May 8, 1935, to Jan. 11, 1939, wire-weight gage, at same site and datum. Auxiliary water-stage recorder at site on right bank 2 miles downstream from base gage, at same datum. Mar. 15, 1938, to Jan. 3, 1952, auxiliary wire-weight gage  $1\frac{1}{2}$  miles downstream from base gage.

Average discharge.--26 years (1934-60), 496 cfs.

Extremes.--1934-60: Maximum discharge, 21,200 cfs Apr. 6, 1947 (gage height, 23.55 ft, from floodmark); minimum not determined; minimum gage height, 2.90 ft Oct. 15, 1934.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	362	477	1,065	993	1,670	1,456	1,111	535	330	200	136	178	703
1952	302	594	574	1,714	1,595	1,324	461	183	142	105	126		679
1953	121	188	319	344	296	745	877	566	291	232	140	106	336
1954	97.4	104	152	182	686	1,072	918	359	261	123	86.6	92.8	357
1955	543	321	378	685	593	1,313	504	243	183	103	103	108	423
1956	165	302	236	128	322	1,553	1,277	2,621	684	262	377	203	680
1957	139	182	299	328	611	681	1,225	1,056	443	861	190	251	522
1958	340	594	1,065	354	327	543	410	184	188	212	109	142	372
1959	119	153	109	137	353	1,428	1,304	466	171	152	237	229	405
1960	522	715	957	794	666	949	1,571	544	616	175	152	114	647

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.57	0.72	1.67	1.56	2.37	2.29	1.69	0.84	0.50	0.31	0.21	0.27	13.00
1952	.47	.90	.90	2.69	1.52	2.50	2.01	.72	.28	.22	.16	.19	12.56
1953	.19	.29	.50	.54	.42	1.17	1.03	.89	.44	.36	.22	.16	6.21
1954	.15	.16	.24	.29	1.26	1.68	1.40	.56	.40	.19	.14	.14	6.61
1955	.85	.49	.59	1.08	.84	2.06	.77	.38	.28	.16	.16	.16	7.82
1956	.26	.46	.37	.20	.47	2.44	1.94	4.12	1.04	.41	.59	.31	12.61
1957	.22	.28	.47	.52	.87	1.07	1.87	1.66	.67	1.35	.30	.38	9.65
1958	.55	.90	1.67	.56	.46	.85	.62	.26	.29	.33	.17	.22	6.86
1959	.19	.23	.17	.21	.50	2.24	1.98	.73	.26	.24	.37	.35	7.47
1960	.82	1.09	1.50	1.25	.98	1.49	2.39	.85	.94	.28	.24	.17	12.00



Yearly discharge, in cubic feet per second, of Clinton River at Mount Clemens, Mich.

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	1174	-	-	-	-	-	-	880	16.28
1951	1207	7,270	Dec. 8 or 9	105	703	0.958	13.00	666	12.31
1952	1237	*7,040	Mar. 12, 1952	80	679	.925	12.56	609	11.27
1953	1277	2,600	Mar. 4, 1953	80	336	.458	6.21	313	5.78
1954	1337	*6,930	Mar. 26, 1954	65	357	.486	6.61	432	7.99
1955	1387	2,970	Mar. 1, 1955	60	423	.576	7.82	377	6.98
1956	1437	13,400	Apr. 30, 1956	80	680	.926	12.61	673	12.49
1957	1507	6,570	May 20, 1957	110	522	.711	9.85	637	11.78
1958	1557	4,740	Dec. 21, 1957	70	372	.507	6.86	235	4.35
1959	1627	5,130	Apr. 3, 1959	73	405	.552	7.47	557	10.29
1960	1707	5,210	Mar. 31, 1960	90	647	.881	12.00	-	-

\* Revised.

## STREAMS TRIBUTARY TO DETROIT RIVER

1660. River Rouge at Birmingham, Mich.

Location.--Lat 42°32'45", long 83°13'25", in NW¼ sec.36, T.2 N., R.10 E., on left bank in Birmingham, 25 ft downstream from mouth of Quarton Lake Outlet and 100 ft upstream from bridge on West Maple Road.

Drainage area.--36.9 sq mi (revised).

Records available.---June 1950 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 720 ft (by barometer).

Average discharge.---10 years (1950-60), 17.0 cfs.

Extremes.---1950-60: Maximum discharge, 700 cfs Apr. 29, 1956 (gage height, 5.38 ft), from rating curve extended above 340 cfs by logarithmic plotting; minimum, 0.4 cfs Sept. 1, 3, 4, 6-8, 1954; minimum gage height, 1.27 ft Sept. 16, 1955, Sept. 14, 1960.

Remarks.---Occasional regulation by Quarton Lake above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	9.04	16.5	39.1	31.9	58.7	52.2	48.2	28.8	10.4	5.84	3.77	4.36	25.5
1952	10.0	16.2	15.1	44.9	35.5	66.4	52.5	21.8	5.62	3.65	2.50	2.33	23.0
1953	3.54	6.27	8.48	9.20	6.35	17.2	19.5	18.1	10.6	6.07	2.82	2.09	9.21
1954	2.40	3.16	4.10	3.64	2.8	28.5	31.0	10.9	9.48	1.75	1.58	1.48	9.97
1955	17.7	9.71	10.7	18.1	19.3	42.8	20.9	8.58	4.91	2.29	2.24	1.44	13.2
1956	6.33	13.0	8.87	3.95	16.8	45.2	42.0	98.1	33.2	7.45	8.93	4.19	24.0
1957	8.29	7.21	10.4	9.42	16.6	21.0	29.4	35.7	12.2	41.6	5.04	8.31	17.1
1958	13.3	20.6	36.7	13.0	11.8	19.4	14.0	5.82	6.78	8.39	3.48	3.90	13.1
1959	4.48	6.80	4.16	5.19	12.0	55.4	53.1	18.1	5.65	2.97	7.83	4.52	15.0
1960	11.0	18.1	24.2	24.8	22.9	37.7	46.4	15.6	25.2	4.65	3.38	2.41	19.6

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.28	0.50	1.22	1.00	1.66	1.63	1.46	0.90	0.31	0.18	0.12	0.13	9.39
1952	.31	.49	.47	1.40	1.04	2.07	1.59	.68	.17	.11	.08	.07	8.48
1953	.11	.19	.26	.29	.18	.54	.59	.57	.32	.19	.09	.06	3.39
1954	.07	.10	.13	.11	.65	.89	.94	.34	.29	.05	.05	.04	3.66
1955	.55	.29	.34	.57	.54	1.34	.63	.27	.15	.07	.07	.04	4.86
1956	.20	.39	.28	.12	.49	1.41	1.27	3.06	1.00	.23	.28	.13	8.86
1957	.26	.22	.32	.29	.47	.66	.89	1.12	.37	1.30	.16	.25	6.31
1958	.41	.62	1.15	.41	.33	.60	.42	.18	.20	.26	.11	.12	4.81
1959	.14	.21	.13	.16	.34	1.73	1.60	.57	.17	.09	.24	.14	5.52
1960	.34	.55	.75	.78	.67	1.18	1.40	.49	.76	.15	.11	.07	7.25

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	320	Dec. 7, 1950	1.9	25.5	0.691	9.39	23.6	8.66
1952	1237	370	Mar. 11, 1952	1.2	23.0	.623	8.48	21.1	7.77
1953	1277	92	Mar. 4, 1953	.8	9.21	.250	3.39	8.49	3.13
1954	1337	244	Mar. 25, 1954	.4	9.97	.270	3.66	12.4	4.54
1955	1387	170	Oct. 3, 1954	.6	13.2	.358	4.86	12.4	4.55
1956	1437	700	Apr. 29, 1956	1.5	24.0	.650	8.86	23.9	8.79
1957	1507	488	July 8, 1957	3.0	17.1	.463	6.31	20.9	7.69
1958	1557	193	Dec. 20, 1957	2.0	15.1	.355	4.81	18.7	3.11
1959	1627	446	Mar. 6, 1959	1.0	15.0	.407	5.52	18.2	6.68
1960	1707	313	Mar. 28, 1960	1.7	19.6	.531	7.25	-	-

## 1661. River Rouge at Southfield, Mich.

Location.--Lat 42°26'52", long 83°17'52", in SW $\frac{1}{4}$  sec.32, T.1 N., R.10 E., on right bank at downstream side of bridge on Beech Road at Southfield, 4.2 miles east of Farmington.

Drainage area.--88.0 sq mi.

Records available.--April 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 609.62 ft above mean sea level, datum of 1929 (city of Southfield bench mark). Prior to Sept. 30, 1958, wire-weight gage at same site and datum.

Extremes.--1958-60: Maximum discharge, 1,200 cfs Mar. 6, 1959 (gage height, 11.90 ft); minimum, 4.4 cfs July 11, 1959 (gage height, 1.49 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	44.6	19.6	24.0	31.6	15.4	19.8	-
1959	17.3	27.0	16.7	20.8	48.6	222	180	63.2	19.3	12.7	31.4	20.6	56.7
1960	47.1	75.8	97.9	95.2	84.8	127	167	53.2	103	18.6	14.7	10.5	74.4

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	0.57	0.26	0.30	0.41	0.20	0.25	-
1959	0.23	0.34	0.22	0.27	0.58	2.91	2.29	.83	.24	.17	.41	.26	8.75
1960	.62	.96	1.28	1.25	1.04	1.66	2.11	.70	1.31	.25	.19	.13	11.50

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	1,200	Mar. 6, 1959	6.2	56.7	0.644	8.75	70.1	10.82
1960	1707	1,140	June 17, 1960	8.0	74.4	.845	11.50	-	-

## 1662. Evans ditch at Southfield, Mich.

Location.--Lat 42°27'28", long 83°16'03", in SE $\frac{1}{4}$  sec.28, T.1 N., R.10 E., on right bank at Southfield, 20 ft upstream from bridge on Ninemile Road, 1.6 miles upstream from mouth, and  $5\frac{1}{2}$  miles east of Farmington.

Drainage area.--9.49 sq mi.

Records available.--September 1958 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 615.07 ft above mean sea level, datum of 1929 (city of Southfield bench mark).

Extremes.--1958-60: Maximum discharge, 370 cfs June 14, 1960 (gage height, 9.23 ft), from rating curve extended above 220 cfs; minimum, 0.4 cfs July 15, 1959, Sept. 19, 1960; minimum gage height, 5.09 ft Oct. 6, Nov. 2, 1958.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	3.20	-
1959	1.11	2.23	1.12	1.45	5.01	22.6	21.2	6.22	1.68	1.80	5.09	2.18	5.97
1960	7.12	11.4	13.3	12.2	9.59	12.0	20.5	5.03	19.6	1.65	1.35	.67	9.51

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	0.38	-
1959	0.14	0.26	0.14	0.18	0.55	2.74	2.49	0.76	0.20	0.22	0.62	.26	8.56
1960	.86	1.35	1.62	1.49	1.09	1.46	2.41	.61	2.30	.20	.16	.08	13.63

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	233	Mar. 6, 1959	0.6	5.97	0.629	8.56	8.27	11.85
1960	1707	370	June 14, 1960	.5	9.51	1.00	13.63	-	-

## 1663. Upper River Rouge at Farmington, Mich.

Location.--Lat 42°27'52", long 83°22'11", in NW $\frac{1}{4}$  sec.27, T.1 N., R.9 E., on left bank 800 ft downstream from bridge on Shiawassee Road at Farmington.

Drainage area.--17.5 sq mi.

Records available.--March 1958 to September 1960.

Gage.--Water-stage recorder and concrete control. Altitude of gage is 695 ft (from topographic map).

Extremes.--1958-60: Maximum discharge, 277 cfs Apr. 2, 1959; maximum gage height, 6.00 ft Feb. 15, 1959 (ice jam); minimum discharge, 1.2 cfs July 8, 10, Sept. 12, 1959.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	9.64	4.15	5.59	6.28	2.87	3.07	-
1959	3.48	5.49	3.48	3.92	9.48	45.2	34.2	11.5	3.52	2.64	4.74	2.29	10.8
1960	7.68	11.0	14.7	18.0	17.9	24.3	29.7	11.1	16.9	4.35	2.83	2.22	13.3

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	0.61	0.27	0.36	0.41	0.19	0.20	-
1959	0.23	0.35	0.23	0.26	0.56	2.98	2.18	.76	.22	.17	.31	.15	8.40
1960	.51	.70	.97	1.18	1.10	1.60	1.89	.73	1.08	.29	.19	.14	10.38

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	277	Apr. 2, 1959	1.4	10.8	0.617	8.40	12.6	9.77
1960	1707	252	June 16, 1960	1.8	13.3	.760	10.38	-	-

## 1665. River Rouge at Detroit, Mich.

Location.--Lat 42°22'20", long 83°15'20", in SW $\frac{1}{4}$  sec.27, T.1 S., R.10 E., on right bank 500 ft upstream from bridge on Plymouth Road in Detroit and 4 miles upstream from Middle River Rouge.

Drainage area.--185 sq mi (revised). At site used prior to Oct. 16, 1948, 187 sq mi (revised).

Records available.--October 1930 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 584.00 ft above mean sea level, datum of 1929. Prior to Aug. 11, 1943, chain gage and Aug. 11, 1943, to Oct. 15, 1948, wire-weight gage, at site 1 mile downstream at datum 4.6 ft lower.

Average discharge.--30 years (1930-60), 111 cfs.

Extremes.--1930-60: Maximum discharge, 13,000 cfs Apr. 5, 1947; maximum gage height, 23.0 ft Apr. 6, 1947, from floodmark, site and datum then in use; minimum discharge observed, 2.7 cfs Aug. 11 1934 (gage height, 3.50 ft, site and datum then in use).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	38.4	79.0	245	200	438	316	276	139	48.8	36.7	23.8	23.5	154
1952	72.0	161	126	419	219	387	318	126	31.1	33.6	12.5	10.2	160
1953	21.7	34.7	59.0	67.7	42.4	151	156	129	79.1	57.0	23.9	12.6	69.7
1954	14.8	16.3	22.2	30.8	23.3	295	273	74.6	67.9	16.5	16.0	17.8	87.1
1955	250	84.8	107	192	159	299	134	59.5	27.8	12.9	12.6	8.00	112
1956	45.6	86.6	59.1	27.7	180	303	336	642	143	28.4	111	25.0	166
1957	27.9	51.6	73.7	82.1	184	152	306	233	69.4	385	26.5	46.6	136
1958	101	140	258	82.9	76.6	114	85.8	29.8	45.7	48.6	42.0	34.2	88.4
1959	28.5	52.9	24.9	31.4	94.3	391	328	105	32.2	24.1	82.9	38.3	101
1960	96.3	150	189	204	182	221	282	92.4	250	33.7	22.6	14.9	144

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.24	0.48	1.53	1.25	2.47	1.97	1.66	0.87	0.29	0.23	0.15	0.14	11.28
1952	.45	.97	.79	2.61	1.28	2.41	1.92	.79	.19	.21	.08	.08	11.76
1953	.14	.21	.37	.42	.24	1.94	.94	.80	.48	.36	.15	.08	5.13
1954	.09	.10	.14	.19	1.20	1.84	1.65	.46	.41	.10	.11	.09	6.39
1955	1.56	.51	.67	1.20	.89	1.87	.81	.37	.17	.08	.08	.05	8.26
1956	.28	.52	.37	.17	1.05	1.89	2.03	4.00	.86	.18	.69	.15	12.19
1957	.17	.31	.46	.51	1.04	.95	1.85	1.45	.42	2.40	.16	.28	10.00
1958	.63	.85	1.61	.52	.43	.71	.52	.19	.28	.30	.26	.21	6.51
1959	.18	.32	.16	.20	.53	2.44	1.98	.66	.19	.15	.39	.23	7.43
1960	.60	.91	1.18	1.27	1.06	1.58	1.70	.58	1.51	.21	.14	.09	10.63

Yearly discharge, in cubic feet per second, of River Rouge at Detroit, Mich.

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	206	15.13
1951	1207	1,880	Dec. 8, 1950	14	154	0.832	11.28	153	11.24
1952	1237	2,040	Mar. 11, 1952	4.2	160	.865	11.76	139	10.27
1953	1277	960	May 31, 1953	8.1	69.7	.377	5.13	64.4	4.74
1954	1337	3,080	Mar. 28, 1954	6.6	87.1	.471	6.39	120	8.80
1955	1387	1,510	Oct. 4, 1954	4.0	112	.605	8.26	91.1	6.69
1956	1437	4,240	Apr. 29, 1956	5.8	166	.897	12.19	163	11.96
1957	1507	4,030	July 9, 1957	12	136	.735	10.00	165	12.15
1958	1557	1,380	Dec. 20, 1957	10	88.4	.478	6.51	55.3	4.08
1959	1627	1,880	Mar. 6, 1959	7.0	101	.546	7.43	129	9.46
1960	1707	2,140	June 17, 1960	8.3	144	.778	10.63	-	-

1670. Middle River Rouge near Garden City, Mich.

Location.--Lat 42°20'55", long 83°18'45", in W $\frac{1}{2}$  sec.6, T.2 S., R.10 E., on right bank 200 ft downstream from bridge on Inkster Road, 1.8 miles northeast of Garden City, and 6.0 miles upstream from mouth.

Drainage area.--104 sq mi (revised).

Records available.--June 1947 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 600.95 ft above mean sea level, datum of 1929. Prior to Oct. 18, 1948, wire-weight gage at site 200 ft upstream at same datum.

Average discharge.--13 years (1947-60), 75.2 cfs.

Extremes.--1947-60: Maximum discharge, 2,150 cfs May 10, 1948 (gage height, 10.50 ft, from floodmark); minimum, 0.9 cfs Aug. 16, 1956.

Remarks.--Occasional regulation by reservoirs above station since 1956.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	28.4	56.3	164	117	269	192	154	99.1	39.4	33.3	20.5	23.9	98.7
1952	45.9	102	88.9	289	134	230	199	82.8	35.2	21.3	17.6	18.2	104
1953	19.8	29.0	35.3	46.5	36.6	97.9	85.7	66.1	52.3	34.0	23.7	15.8	45.3
1954	16.1	18.6	25.1	26.2	127	175	168	59.6	53.5	24.0	17.6	18.7	60.2
1955	124	63.5	71.3	126	106	180	88.2	47.8	22.3	10.5	9.93	6.52	71.3
1956	19.7	39.1	25.6	11.3	85.4	163	162	310	66.9	27.7	83.8	16.8	84.5
1957	23.5	20.5	43.3	47.3	107	86.7	182	107	42.2	179	22.4	35.6	74.4
1958	52.3	77.7	156	51.4	41.9	72.2	47.3	21.9	19.2	22.1	19.6	15.3	49.9
1959	12.9	21.6	11.8	15.8	45.1	197	164	57.3	17.8	15.9	17.7	15.0	49.1
1960	42.7	79.0	79.2	117	109	100	120	50.4	136	28.5	17.7	11.8	73.9

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.32	0.60	1.82	1.30	2.70	2.12	1.65	1.10	0.42	0.37	0.23	0.26	12.89
1952	.51	1.09	.99	2.99	1.39	2.55	2.13	.92	.38	.24	.20	.20	13.59
1953	.22	.51	.39	.52	.37	1.09	.92	.73	.56	.38	.26	.17	5.92
1954	.18	.20	.28	.29	1.27	1.94	1.80	.66	.57	.27	.20	.20	7.86
1955	1.37	.68	.79	1.39	1.06	2.00	.95	.53	.24	.12	.11	.07	9.31
1956	.22	.42	.28	.13	.89	1.81	1.74	3.44	.72	.31	.93	.18	11.07
1957	.26	.22	.48	.52	1.07	.96	1.95	1.18	.45	1.98	.25	.38	9.70
1958	.58	.83	1.73	.57	.42	.60	.51	.24	.21	.25	.22	.18	6.52
1959	.14	.23	.13	.19	.45	2.18	1.76	.63	.19	.15	.20	.16	6.40
1960	.47	.85	.98	1.30	1.13	1.11	1.29	.56	1.46	.32	.20	.13	9.70

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	125	16.27
1951	1207	1,060	Dec. 8, 1950	14	98.7	0.949	12.89	97.5	12.74
1952	1237	1,060	Mar. 11, 1952	14	104	1.00	13.59	91.0	11.92
1953	1277	470	Mar. 4, 1953	11	45.3	.436	5.92	43.3	5.66
1954	1337	1,720	Mar. 25, 1954	11	60.2	.579	7.86	76.9	10.04
1955	1387	615	Jan. 6, Feb. 28	2.9	71.3	.698	9.31	56.6	7.39
1956	1437	1,840	Apr. 29, 1956	5.8	84.5	.812	11.07	84.9	11.11
1957	1507	1,210	July 8, 1957	3.2	74.4	.715	9.70	91.1	11.88
1958	1557	814	Dec. 20, 1957	4.2	49.9	.480	6.52	29.7	3.88
1959	1627	1,090	Mar. 7, 1959	3.8	49.1	.472	6.40	62.0	8.10
1960	1707	1,040	June 17, 1960	7.6	73.9	.711	9.70	-	-

## 1680. Lower River Rouge at Inkster, Mich.

Location.--Lat 42°18'00", long 83°18'00", in  $\frac{3}{4}$  sec.19, T.2 S., R.10 E., on right bank 10 ft downstream from bridge on John Daly Road, 0.6 mile northeast of Inkster, and  $\frac{4}{5}$  miles upstream from mouth.

Drainage area.--82.9 sq mi (revised).

Records available.--June 1947 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 593.14 ft above mean sea level, datum of 1929. Prior to Oct. 20, 1948, wire-weight gage at same site and datum.

Average discharge.--13 years (1947-60), 53.0 cfs.

Extremes.--1947-60: Maximum discharge, 3,120 cfs Apr. 4, 1950 (gage height, 12.42 ft); minimum, 0.2 cfs Sept. 13, 1955.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	6.46	29.7	125	68.0	262	165	95.4	75.6	12.8	14.8	4.15	4.24	7.07
1952	22.6	97.2	71.0	294	96.7	179	158	29.8	4.62	5.34	2.00	1.86	80.2
1953	8.12	8.61	11.8	19.1	10.7	85.4	55.9	25.7	11.6	10.5	12.1	3.45	22.0
1954	2.48	3.28	5.58	8.58	110	174	120	23.8	19.3	5.60	1.76	4.42	39.2
1955	71.6	20.4	35.2	109	85.9	147	55.4	16.2	5.46	2.40	3.31	2.17	46.1
1956	6.84	18.4	16.3	4.05	85.0	124	146	145	58.0	7.77	33.9	3.54	53.8
1957	3.22	8.09	19.6	21.9	106	52.5	173	70.5	14.2	78.5	4.53	11.0	46.4
1958	39.2	50.6	135	18.8	14.8	33.2	22.2	4.47	5.03	9.77	9.60	5.29	29.1
1959	3.64	10.1	4.53	6.15	62.2	171	144	42.1	5.72	3.52	6.36	7.92	38.7
1960	27.6	68.7	95.0	106	91.6	69.0	69.5	19.2	123	17.6	5.11	2.12	57.7

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.09	0.40	1.73	0.95	3.29	2.29	1.28	1.05	0.17	0.21	0.06	0.06	11.58
1952	.31	1.31	.99	4.09	1.26	2.49	2.12	.41	.06	.07	.03	.03	13.17
1953	.11	.12	.16	.27	.13	1.19	.75	.36	.16	.15	.17	.05	3.62
1954	.03	.04	.08	.12	1.38	2.42	1.61	.33	.26	.05	.02	.06	6.40
1955	1.00	.27	.49	1.51	1.08	2.04	.75	.23	.07	.03	.05	.03	7.55
1956	.10	.25	.23	.06	1.11	1.72	1.97	2.01	.78	.11	.47	.05	8.86
1957	.04	.11	.27	.30	1.33	.73	2.33	.98	.19	1.09	.06	.15	7.58
1958	.55	.68	1.87	.26	.19	.46	.30	.06	.07	.12	.13	.07	4.76
1959	1.05	.14	.06	.09	.78	2.37	1.93	.58	.08	.05	.09	.11	6.33
1960	.38	.92	1.32	1.48	1.19	.96	.93	.27	1.66	.24	.07	.03	9.45

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	101	16.55
1951	1207	1,290	Dec. 8, 1950	1.4	70.7	0.853	11.58	73.1	11.97
1952	1237	1,630	Jan. 20, 1952	1.1	80.2	.967	13.17	66.7	10.95
1953	1277	840	Mar. 4, 1953	1.1	22.0	.265	3.62	20.6	3.38
1954	1337	2,790	Mar. 26, 1954	.8	39.2	.473	6.40	49.0	8.01
1955	1387	1,020	Jan. 6, 1955	.3	46.1	.556	7.55	38.8	6.37
1956	1437	2,460	Apr. 30, 1956	1.3	53.8	.649	8.86	53.0	8.70
1957	1507	964	Apr. 6, 1957	1.1	46.4	.560	7.58	62.7	10.26
1958	1557	949	Dec. 21, 1957	.8	29.1	.351	4.76	11.7	1.91
1959	1627	1,280	Apr. 3, 1959	1.0	38.7	.467	6.33	53.2	8.70
1960	1707	1,010	June 18, 1960	.9	57.7	.696	9.45	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

1690. Hayes Creek at Commerce, Mich.

Location.--Lat 42°35'25", long 83°28'45", on line between NW $\frac{1}{4}$  and SW $\frac{1}{4}$  sec.11, T.2 N., R.8 E., on downstream side of left abutment of highway bridge, 600 ft upstream from mouth and half a mile east of Commerce.

Drainage area.--8 sq mi (revised), approximately. Watershed indeterminate because of lakes and swamps.

Records available.--March 1946 to June 1951.

Gage.--Staff gage. Datum of gage is 909.99 ft above mean sea level, datum of 1929.

Extremes.--1946-51: Maximum discharge, 154 cfs Apr. 7, 1947 (gage height, 4.25 ft, from graph based on gage readings); minimum observed, 2.4 cfs Oct. 1-3, 1946.

Remarks.--Some regulation by dam at outlet of Union Lake operated for lake level control.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	11.8	6.88	15.3	16.3	16.9	19.3	17.5	15.5	8.73	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	15.3	-
1951	1207	26	Mar. 7, 1951	-	-	-	-	-	-

## 1695. Huron River at Commerce, Mich.

Location.--Lat 42°35'25", long 83°29'05", on line between NE $\frac{1}{4}$  and SE $\frac{1}{4}$  sec.10, T.2 N., R.8 E., on downstream left abutment of bridge on Commerce Road, 10 ft upstream from Hayes Creek and 0.2 mile east of Commerce. Records include flow at Hayes Creek.

Drainage area.--51 sq mi, approximately, includes that of Hayes Creek.

Records available.--March 1946 to September 1960.

Gage.--Staff gage. Datum of gage is 910.00 ft above mean sea level, datum of 1929.

Average discharge.--14 years (1946-60), 41.9 cfs.

Extremes.--1946-60: Maximum discharge, 266 cfs Apr. 7, 1947 (gage height, 2.98 ft, from graph based on gage readings); maximum gage height, 3.10 ft May 12, 1948, from graph based on gage readings (backwater from debris); minimum discharge, 6.7 cfs June 25, 1959; minimum gage height, 0.66 ft Sept. 10, 1953.

Remarks.--Some regulation by dams operated for lake level control at outlets of Pontiac, Oxbow, and Union Lakes.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	30.5	35.4	84.4	85.5	91.5	110	78.5	68.7	29.8	17.5	13.6	18.9	55.3
1952	28.2	49.4	57.2	61.7	85.4	80.0	91.7	46.8	30.5	11.4	12.1	17.2	47.4
1953	13.9	22.5	29.1	31.7	26.0	54.1	51.7	49.0	22.2	12.5	9.58	8.48	27.6
1954	9.36	11.7	15.8	15.2	40.1	62.1	67.6	39.0	21.9	14.9	9.82	11.7	26.5
1955	55.8	52.1	42.6	54.7	37.8	61.9	53.1	28.0	21.0	17.1	12.8	12.5	39.0
1956	18.1	23.8	22.7	17.8	21.7	89.7	61.3	147	47.0	18.7	34.9	25.7	44.2
1957	16.2	20.3	28.5	32.0	33.6	52.2	53.4	69.1	43.6	70.5	24.4	24.5	39.1
1958	30.4	54.8	43.2	39.9	27.0	38.4	34.6	17.2	13.5	16.2	8.96	8.15	27.7
1959	8.25	13.0	15.0	15.5	25.5	56.5	96.8	40.7	20.3	9.21	11.3	23.3	27.8
1960	37.2	43.0	49.6	51.6	48.7	46.7	97.5	52.3	27.4	14.6	12.7	12.9	41.1

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.69	0.78	1.91	1.93	1.87	2.49	1.72	1.55	0.65	0.40	0.31	0.41	14.71
1952	.64	1.08	1.29	1.39	1.81	1.81	2.01	1.06	.67	.26	.27	.38	12.67
1953	.31	.49	.66	.72	.53	1.22	1.13	1.11	.48	.28	.22	.19	7.34
1954	.21	.26	.36	.34	.82	1.40	1.48	.88	.48	.34	.22	.26	7.05
1955	1.26	1.14	.96	1.24	.77	1.85	1.16	.59	.46	.39	.29	.27	10.58
1956	.41	.52	.51	.40	.46	2.03	1.34	3.32	1.03	.42	.79	.56	11.79
1957	.37	.44	.64	.72	.69	1.18	1.17	1.56	.95	1.59	.55	.54	10.40
1958	.69	1.20	.98	.90	.55	.87	.76	.39	.30	.37	.20	.18	7.39
1959	.19	.28	.34	.35	.52	1.28	2.12	.92	.44	.21	.26	.51	7.42
1960	.84	.94	1.12	1.17	1.03	1.06	2.13	1.18	.60	.33	.29	.28	10.97

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	61.6	-	16.40	-
1951	1207	135	Mar. 7, 1951	12	55.3	1.08	14.71	53.9	14.34	-	-
1952	1237	121	Apr. 14, 1952	9.6	47.4	.929	12.67	41.6	11.12	-	-
1953	1277	71	Mar. 16, 19, 20	8.0	27.6	.541	7.34	25.2	6.71	-	-
1954	1337	81	Feb. 17, 18	8.0	26.5	.520	7.05	36.0	9.58	-	-
1955	1387	91	Mar. 11, 16, 17	11	39.0	.765	10.38	31.8	8.46	-	-
1956	1437	196	May 13, 16, 17	11	44.2	.867	11.79	44.2	11.80	-	-
1957	1507	102	July 14, 18, 20	14	39.1	.767	10.40	44.4	11.82	-	-
1958	1557	64	Nov. 8, 9, 1957	7.1	27.7	.543	7.39	20.0	5.33	-	-
1959	1627	160	Apr. 4, 1959	6.7	27.8	.545	7.42	35.7	9.51	-	-
1960	1707	107	Apr. 18, 1960	8.8	41.1	.806	10.97	-	-	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

1700. Huron River at Milford, Mich. -

Location.--Lat 42°34'45", long 83°37'35", in SE $\frac{1}{4}$  sec.9, T.2 N., R.7 E., on right bank 200 ft upstream from bridge on General Motors Road, half a mile downstream from Sherwood Creek, and half a mile west of Milford.

Drainage area.--125 sq mi.

Records available.--September 1948 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 880.00 ft above mean sea level, datum of 1929.

Average discharge.--12 years (1948-60), 105 cfs.

Extremes.--1948-60: Maximum discharge, 645 cfs Apr. 5, 1950 (gage height, 8.25 ft); minimum daily, 8.3 cfs Sept. 17, 1949.

Remarks.--Flow below about 300 cfs regulated by powerplant  $1\frac{1}{2}$  miles above station prior to May 20, 1957; occasional regulation for lake level control since.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	93.1	115	218	200	226	255	224	178	86.5	81.1	61.2	57.5	149
1952	79.9	117	133	177	194	225	239	134	74.4	45.1	41.8	56.4	126
1953	47.8	67.9	84.6	79.7	73.3	131	131	112	68.8	45.1	35.5	32.1	75.8
1954	38.1	44.5	54.7	47.4	116	153	153	89.0	78.3	47.7	34.8	35.8	74.0
1955	141	117	106	131	102	194	131	74.8	59.1	52.0	36.2	35.0	98.4
1956	59.4	90.7	65.6	50.1	63.2	203	158	340	131	66.1	99.0	69.4	117
1957	52.6	62.6	76.1	75.5	65.1	112	129	140	106	205	75.7	71.6	99.5
1958	82.5	125	139	103	72.9	103	92.9	53.7	53.1	58.1	36.3	35.8	79.7
1959	37.6	52.3	48.7	50.5	71.6	179	219	117	59.5	37.2	43.8	62.0	81.4
1960	102	104	122	127	122	114	230	129	92.0	52.8	41.7	37.9	106

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.86	1.03	2.01	1.84	1.88	2.35	2.00	1.64	0.77	0.75	0.56	0.51	16.20
1952	.74	1.04	1.22	1.63	1.67	2.07	2.13	1.23	.66	.42	.39	.50	13.70
1953	.44	.61	.78	.74	.61	1.21	1.17	1.04	.61	.42	.33	.29	8.25
1954	.35	.40	.50	.44	.97	1.41	1.36	.82	.70	.44	.32	.32	8.03
1955	1.30	1.05	.98	1.21	.85	1.79	1.17	.69	.53	.48	.33	.31	10.69
1956	.55	.81	.60	.46	.55	1.87	1.41	3.14	1.17	.61	.91	.62	12.70
1957	.49	.56	.70	.70	.71	1.04	1.15	1.29	.95	1.89	.70	.64	10.82
1958	.76	1.12	1.28	.95	.81	.95	.83	.50	.47	.54	.33	.32	8.66
1959	.35	.47	.45	.47	.60	1.65	1.95	1.08	.53	.34	.40	.55	8.84
1960	.94	.93	1.13	1.17	1.05	1.05	2.05	1.19	.82	.49	.38	.34	11.54

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	166	18.07
1951	1207	395	Feb. 20, 1951	21	149	1.19	16.20	141	15.30
1952	1237	358	Apr. 15, 1952	13	126	1.01	13.70	115	12.53
1953	1277	248	Mar. 4, 1953	9.8	75.8	.606	8.25	70.5	7.67
1954	1337	320	Feb. 16, 1954	10	74.0	.592	8.03	93.1	10.11
1955	1387	276	Feb. 28, 1955	12	98.4	.767	10.69	85.9	9.32
1956	1437	545	May 14, 1956	16	117	.936	12.70	115	12.49
1957	1507	438	July 15, 1957	16	99.5	.796	10.82	113	12.23
1958	1557	217	Dec. 21, 1957	9.2	79.7	.638	8.66	62.2	6.77
1959	1627	335	Apr. 6, 1959	10	81.4	.651	8.84	97.3	10.57
1960	1707	301	Mar. 31, 1960	30	106	.848	11.54	-	-



1705. Huron River near New Hudson, Mich.

Location.--Lat 42°30'45", long 83°40'35", in NE $\frac{1}{4}$  sec.1, T.1 N., R.6 E., on right bank 150 ft downstream from Kent Lake Dam, 2 miles upstream from Woodruff Creek, and 3 miles west of New Hudson.

Drainage area.--143 sq mi.

Records available.--August 1948 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 868.00 ft above mean sea level, datum of 1929.

Average discharge.--12 years (1948-60), 119 cfs.

Extremes.--1948-60: Maximum discharge, 1,080 cfs Dec. 29, 1950 (gage height, 5.05 ft), from rating curve extended above 600 cfs by logarithmic plotting; minimum, 3.4 cfs July 18, 1952; minimum gage height, 0.63 ft Mar. 16, 17, 1953.

Remarks.--Occasional regulation by Kent Lake.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	104	153	248	236	252	258	212	187	118	84.6	62.4	73.3	165
1952	132	154	156	194	208	223	237	136	91.6	37.2	49.7	81.3	141
1953	80.1	89.6	110	105	89.2	123	121	110	88.2	49.9	47.3	52.4	88.8
1954	49.9	95.6	79.9	54.5	134	166	142	94.3	89.7	57.7	38.2	40.0	86.4
1955	172	165	126	147	113	216	109	75.9	69.0	68.3	52.6	42.4	115
1956	70.3	134	89.4	59.2	80.7	233	121	379	150	77.7	120	75.9	133
1957	54.0	112	114	91.7	108	128	109	154	126	219	80.8	84.2	115
1958	107	173	157	115	85.2	114	74.5	38.7	48.9	60.8	42.9	40.2	88.1
1959	53.2	112	65.2	64.8	88.7	202	184	122	66.3	39.5	58.5	74.0	94.0
1960	115	140	148	151	142	116	224	127	101	57.6	55.7	44.3	118

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.83	1.20	2.00	1.90	1.84	2.08	1.65	1.51	0.92	0.68	0.50	0.57	15.68
1952	1.07	1.20	1.26	1.57	1.57	1.80	1.85	1.09	.71	.30	.40	.63	13.45
1953	.65	.70	.88	.84	.65	.99	.94	.89	.69	.40	.38	.41	8.42
1954	.40	.75	.64	.44	.98	1.34	1.11	.76	.70	.47	.31	.31	8.21
1955	1.39	1.29	1.02	1.19	.83	1.74	.85	.61	.54	.55	.42	.33	10.76
1956	.57	1.04	.72	.48	.61	1.88	.95	3.06	1.17	.63	.97	.59	12.67
1957	.44	.87	.92	.74	.78	1.03	.85	1.24	.98	1.77	.65	.66	10.93
1958	.86	1.35	1.27	.92	.62	.92	.58	.31	.38	.49	.35	.31	8.36
1959	.43	.88	.55	.52	.65	1.65	1.44	.98	.52	.32	.47	.56	8.95
1960	.93	1.10	1.19	1.22	1.07	.93	1.75	1.02	.79	.46	.45	.35	11.26

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	163	17.41
1951	1207	1,080	Dec. 29, 1950	10	165	1.15	15.68	160	15.18
1952	1237	438	Apr. 16, 1952	7.4	141	.986	13.45	128	12.15
1953	1277	280	Nov. 27, 1952	18	88.8	.621	8.42	84.2	7.98
1954	1337	321	Feb. 17, 18, 1954	20	66.4	.604	8.21	106	10.12
1955	1387	330	Nov. 22, 1954	27	113	.790	10.76	98.9	9.39
1956	1437	590	May 14, 1956	30	133	.930	12.67	132	12.57
1957	1507	488	July 14, 1957	30	115	.804	10.93	128	12.18
1958	1557	389	Nov. 4, 1957	19	88.1	.616	8.36	70.8	6.72
1959	1627	321	Apr. 5, 1959	32	94.0	.657	8.95	109	10.33
1960	1707	313	Nov. 2, 1959	34	118	.825	11.26	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

1710. Davis Creek near Whitmore Lake, Mich.

Location.--Lat 42°27'20", long 83°44'25", in NW $\frac{1}{4}$  sec. 28, T.1 N., R.6 E., on right abutment at upstream side of bridge on Spicer Road, 1 $\frac{1}{2}$  miles upstream from mouth and 2 $\frac{1}{2}$  miles northeast of village of Whitmore Lake.

Drainage area.--70 sq mi, approximately.

Records available.--October 1952 to September 1954.

Gage.--Staff gage. Datum of gage is 850.00 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Extremes.--1952-54: Maximum discharge, 221 cfs Mar. 28 (gage height, 17.65 ft), from rating curve extended above 130 cfs by logarithmic plotting; minimum observed, 4.1 cfs Sept. 11 (gage height, 14.26 ft).

Remarks.--Slight regulation by millpond on Inchwaugh Creek 1 $\frac{1}{2}$  miles above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1953	7.96	13.9	21.9	21.3	19.8	49.2	43.9	50.4	25.5	13.3	14.3	8.62	24.2
1954	5.17	10.1	11.8	11.2	46.4	79.4	94.9	48.2	36.2	13.3	6.87	5.49	30.6

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1953	0.13	0.22	0.36	0.35	0.29	0.81	0.70	0.83	0.41	0.22	0.24	0.14	4.70
1954	.09	.16	.20	.18	.69	1.31	1.51	.69	.58	.22	.11	.09	5.93

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1953	1277	83	May 5, 1953	5.0	24.2	0.346	4.70	22.8	4.44
1954	1337	221	Mar. 28, 1954	4.1	30.6	.437	5.93	-	-

## 1715. Ore Creek near Brighton, Mich.

Location.--Lat 42°29'40", long 83°48'05", in NW $\frac{1}{4}$  sec.12, T.1 N., R.5 E., on downstream side of bridge on Hamburg Road, half a mile upstream from Ore Lake and  $2\frac{1}{2}$  miles southwest of Brighton.

Drainage area.--31 sq mi, approximately.

Records available.--March 1951 to September 1960.

Gage.--Staff or wire-weight gages. Datum of gage is 850.56 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--9 years (1951-60), 24.9 cfs.

Extremes.--1951-60: Maximum discharge, 193 cfs May 13, 1956 (gage height, 16.50 ft); minimum, 1.5 cfs July 16, 1952; minimum gage height, 13.82 ft Oct. 4, 1955.

Remarks.--Occasional regulation by lakes above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	66.0	60.6	56.8	27.3	18.7	12.0	15.0	-
1952	28.0	34.6	31.9	53.1	41.3	50.1	57.8	33.9	23.3	10.5	6.74	9.91	31.7
1953	8.89	20.4	24.4	20.7	18.6	36.1	33.3	29.5	17.6	9.71	8.37	5.69	19.4
1954	6.89	7.68	15.2	11.6	42.4	51.6	49.5	24.4	28.7	17.0	7.35	5.22	22.2
1955	53.3	26.5	25.3	35.7	22.1	60.8	34.8	13.2	15.9	8.61	5.37	3.74	25.5
1956	12.0	23.9	17.4	11.9	17.2	64.2	38.6	101	26.6	16.4	25.7	14.0	30.9
1957	11.5	12.8	17.0	17.2	21.6	30.2	40.6	32.0	27.5	59.1	22.0	14.2	25.5
1958	16.5	25.9	35.4	20.8	15.2	27.3	20.4	8.85	10.9	14.0	15.3	6.74	18.0
1959	7.61	11.8	10.5	11.5	19.9	52.8	53.2	23.4	12.0	3.96	13.0	15.5	19.6
1960	34.9	40.2	35.9	37.7	33.8	27.4	68.0	33.0	29.5	15.3	9.23	9.14	31.1

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	2.45	2.18	2.11	0.98	0.70	0.45	0.54	-
1952	1.04	1.25	1.19	1.97	1.44	1.86	2.08	1.26	.84	.39	.25	.36	13.93
1953	.33	.73	.91	.77	.63	1.34	1.26	1.10	.63	.36	.31	.20	8.51
1954	.26	.28	.57	.43	1.43	1.92	1.78	.91	1.03	.63	.27	.22	9.73
1955	1.98	.95	.94	1.33	.74	2.26	1.25	.49	.57	.32	.20	.13	11.16
1956	.45	.86	.65	.44	.60	2.39	1.39	3.77	.96	.61	.96	.51	13.59
1957	.43	.46	.63	.64	.72	1.12	1.46	1.19	.99	2.20	.82	.51	11.17
1958	.61	.93	1.24	.77	.51	1.01	.74	.33	.39	.52	.57	.24	7.86
1959	.28	.42	.39	.43	.67	1.97	1.92	.87	.43	.15	.48	.56	8.57
1960	1.30	1.45	1.33	1.40	1.18	1.02	2.45	1.23	1.06	.57	.34	.33	13.66

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	a88	Mar. 3, 4, 1951	-	-	-	-	-	-
1952	1237	86	Apr. 15,16,1952	1.5	31.7	1.02	13.93	28.3	12.42
1953	1277	46	Mar. 16-19,1953	2.9	19.4	.626	8.51	17.4	7.65
1954	1337	87	Feb. 17, 1954	4.8	22.2	.716	9.73	28.6	12.49
1955	1387	82	Oct. 15,16,1954	2.0	25.5	.823	11.16	21.1	9.25
1956	1437	193	May 13, 1956	2.3	30.9	.997	13.59	29.9	13.15
1957	1507	88	July 17, 1957	8.6	25.5	.823	11.17	28.4	12.43
1958	1557	57	Dec. 26, 1957	4.5	18.0	.581	7.86	14.1	6.17
1959	1627	b100	Apr. 4,5,1959	2.5	19.6	.632	8.57	26.4	11.56
1960	1707	104	Apr. 3, 1960	4.9	31.1	1.00	13.66	-	-

a Maximum for period March to September.

b Maximum daily.

## 1720. Huron River near Hamburg, Mich.

Location.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., on right bank at downstream side of bridge on Hamburg Road, 1.1 miles north of Hamburg and 3 miles upstream from Strawberry Lake.

Drainage area.--299 sq mi.

Records available.--October 1951 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 850.00 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). Prior to Aug. 12, 1953, staff gage at same site and datum.

Average discharge.--9 years (1951-60), 220 cfs.

Extremes.--1951-60: Maximum discharge, 1,560 cfs May 15, 1956 (gage height, 8.35 ft); minimum, 44 cfs July 18, 1959; minimum gage height, 3.31 ft May 22, 23, 1958.

Remarks.--Occasional regulation by Kent Lake 11 miles above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	176	272	269	465	436	506	545	300	171	87.7	87.3	119	286
1953	127	169	188	179	160	289	282	240	167	97.9	93.1	80.4	169
1954	75.4	125	136	112	309	393	400	248	240	121	79.8	73.7	192
1955	343	275	234	326	224	500	260	154	120	98.9	80.1	65.9	224
1956	130	218	168	105	141	493	294	895	331	165	270	144	281
1957	106	181	196	164	198	260	266	307	232	485	194	157	229
1958	163	263	309	236	157	226	175	92.3	95.7	106	79.6	77.6	165
1959	89.0	168	117	107	182	464	432	254	121	64.5	102	134	186
1960	223	260	265	328	307	242	528	274	216	118	92.9	80.3	244

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	0.68	1.02	1.04	1.79	1.57	1.95	2.03	1.16	0.64	0.34	0.34	0.44	13.00
1953	.49	.63	.72	.69	.56	1.04	.98	.93	.62	.38	.36	.30	7.70
1954	.29	.47	.52	.43	1.08	1.51	1.49	.96	.90	.47	.31	.27	6.70
1955	1.32	1.02	.90	1.26	.78	1.93	.97	.59	.45	.38	.31	.25	10.16
1956	.50	.81	.65	.40	.51	1.90	1.10	3.45	1.24	.64	1.04	.54	12.78
1957	.41	.68	.76	.63	.69	1.00	.99	1.18	.87	1.86	.75	.58	10.40
1958	.63	.98	1.19	.91	.55	.87	.65	.36	.35	.41	.31	.29	7.50
1959	.34	.62	.45	.41	.63	1.79	1.61	.98	.45	.25	.39	.50	8.42
1960	.86	.97	1.02	1.26	1.11	.93	1.97	1.06	.81	.46	.36	.30	11.11

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-
1952	1237	735	Apr. 17, 1952	71	286	0.957	13.00	266	12.10	
1953	1277	368	May 7, 1953	57	169	.565	7.70	157	7.14	
1954	1337	660	Feb. 19, 1954	59	192	.642	8.70	235	10.66	
1955	1387	611	Mar. 5-6, 1955	51	224	.749	10.16	195	8.88	
1956	1437	1,560	May 15, 1956	73	281	.940	12.78	278	12.67	
1957	1507	884	July 16, 1957	100	229	.766	10.40	250	11.35	
1958	1557	478	Dec. 26, 1957	53	165	.552	7.50	134	6.11	
1959	1627	742	Apr. 6, 1959	45	186	.622	8.42	218	9.86	
1960	1707	716	Apr. 1, 1960	69	244	.816	11.11	-	-	

## 1725. Portage Creek near Pinckney, Mich.

Location.--Lat 42°25'40", long 83°57'35", in SW $\frac{1}{4}$  sec.34, T.1 N., R.4 E., on right upstream abutment of bridge on Tipiady Road, 2 miles upstream from Little Portage Lake and  $\frac{2}{3}$  miles southwest of Pinckney.

Drainage area.--79 sq mi, approximately.

Records available.--November 1944 to September 1960.

Gage.--Staff gage. Datum of gage is 860.38 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation).

Average discharge.--16 years (1944-60), 53.6 cfs.

Extremes.--1944-60: Maximum discharge, 529 cfs Apr. 9, 10, 1947 (gage height, 5.72 ft); minimum, 0.6 cfs Oct. 5, 1946 (gage height, 0.56 ft).

Remarks.--Regulation by Hiland Lake  $\frac{2}{3}$  miles above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	44.0	53.2	110	104	113	160	135	108	39.0	18.9	12.2	12.6	75.6
1952	58.9	76.4	66.5	125	110	104	146	80.5	52.9	13.1	9.68	7.95	69.0
1953	10.1	28.3	48.0	39.4	37.1	77.7	72.8	57.4	30.4	15.3	13.5	4.64	36.2
1954	4.53	9.01	16.0	17.2	76.5	123	118	71.7	70.2	38.8	13.2	6.09	46.7
1955	91.9	65.0	56.7	70.3	37.3	116	73.4	34.6	32.3	13.3	3.62	3.23	50.0
1956	13.5	36.5	32.8	18.0	22.6	145	100	210	55.8	16.1	23.9	14.8	57.7
1957	8.53	12.8	29.5	33.9	45.8	72.8	77.8	63.3	38.7	33.1	10.4	12.9	36.6
1958	17.3	51.3	63.5	47.7	28.8	65.4	49.5	18.1	7.03	7.33	5.45	3.94	30.5
1959	11.1	22.3	17.0	16.7	30.3	144	123	55.7	18.5	3.68	15.3	12.4	39.2
1960	45.8	64.9	67.5	82.1	88.2	53.4	165	81.7	55.2	30.6	15.6	6.00	62.8

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	92.5	15.90
1951	1207	230	Feb. 28, Mar. 1	8.0	75.6	0.957	13.00	73.5	12.63
1952	1237	200	Jan. 29, 1952	5.5	69.0	.873	11.88	61.0	10.51
1953	1277	101	Mar. 23, 24, 1953	3.1	36.2	.458	6.23	31.5	5.41
1954	1337	172	Mar. 5, 1954	3.2	46.7	.591	8.04	62.2	10.69
1955	1387	128	Oct. 17, Mar. 16	1.2	50.0	.633	8.58	38.9	6.69
1956	1437	310	May 16, 17, 1956	2.7	57.7	.730	9.94	55.1	9.49
1957	1507	100	Apr. 7, 1957	4.2	36.6	.463	6.28	43.3	7.45
1958	1557	98	Dec. 26-30, 1957	2.0	30.5	.386	5.24	23.6	4.08
1959	1627	205	Mar. 10, 11, 1959	1.2	39.2	.496	6.73	49.9	8.58
1960	1707	214	Apr. 4-7, 1960	2.3	62.8	.795	10.82	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

1730. Huron River near Dexter, Mich.

Location.--Lat 42°23'10", long 83°54'40", in S $\frac{1}{2}$  sec.13, T.1 S., R.4 E., on right bank 20 ft downstream from highway bridge on North Territorial Road, half a mile east of Hudson Mills, 2 miles downstream from Portage Lake Outlet, and 4 miles north of Dexter.

Drainage area.--506 sq mi.

Records available.--August to December 1904 (gage height only), March 1946 to September 1960. Published as "at Dover" 1904.

Gage.--Water-stage recorder. Datum of gage is 837.11 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). August to December 1904 chain gage at site 1 mile upstream at different datum. Mar. 5, 1946, to July 30, 1953, wire-weight gage at present site and datum.

Average discharge.--14 years (1946-60), 400 cfs.

Extremes.--1946-60: Maximum discharge, 3,120 cfs Apr. 9, 1947 (gage height, 8.17 ft, from graph based on gage readings); minimum, 40 cfs July 16, 17, 18, 1959.

Remarks.--Occasional regulation by lake level control operations above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	307	416	740	715	812	1,040	871	743	358	216	145	166	543
1952	319	460	416	701	660	751	881	454	288	124	125	130	441
1953	149	249	348	274	255	444	438	382	241	152	158	87.1	263
1954	91.1	156	199	157	450	663	718	428	410	227	97.4	94.2	306
1955	579	437	385	553	338	795	468	232	200	147	98.5	92.5	361
1956	173	311	241	152	192	839	564	1,500	492	217	343	205	438
1957	149	214	323	266	341	468	475	498	313	512	198	188	329
1958	216	441	467	365	231	382	300	140	134	145	116	108	254
1959	159	226	181	165	284	837	776	415	194	74.7	118	177	299
1960	316	453	444	526	519	574	897	509	404	219	153	119	408

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.70	0.92	1.69	1.63	1.67	2.37	1.92	1.69	0.79	0.49	0.33	0.37	14.57
1952	.75	1.02	.95	1.60	1.41	1.71	1.94	1.03	.64	.28	.28	.29	11.88
1953	.34	.55	.79	.62	.53	1.01	.97	.87	.53	.35	.31	.19	7.06
1954	.21	.34	.45	.36	.93	1.51	1.58	.98	.90	.52	.22	.21	8.21
1955	1.32	.96	.88	1.26	.70	1.81	1.03	.53	.44	.33	.22	.20	9.68
1956	.40	.69	.55	.35	.41	1.91	1.24	3.42	1.08	.49	.78	.45	11.77
1957	.54	.47	.74	.61	.70	1.07	1.05	1.13	.69	1.17	.45	.41	8.83
1958	.49	.97	1.06	.83	.48	.87	.66	.32	.30	.33	.26	.24	6.81
1959	.32	.50	.41	.38	.59	1.91	1.71	.95	.43	.17	.27	.39	8.03
1960	.72	.96	1.01	1.20	1.11	.85	1.98	1.16	.89	.50	.35	.26	10.99

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	639	17.14
1951	1207	1,550	Feb. 25, 1951	113	543	1.07	14.57	520	13.96
1952	1237	1,070	Apr. 17, 18, 1952	105	441	.872	11.88	404	10.86
1953	1277	530	Mar. 24, 1953	74	263	.520	7.06	238	6.38
1954	1337	924	Mar. 30, 31, Apr. 1	74	306	.605	8.21	386	10.37
1955	1387	894	Mar. 5-8, 1955	82	361	.713	9.68	304	8.16
1956	1437	2,330	May 17, 1956	114	438	.866	11.77	435	11.68
1957	1507	880	July 17, 18, 1957	136	329	.650	8.83	366	9.80
1958	1557	704	Dec. 28, 1957	90	254	.502	6.81	205	5.52
1959	1627	1,130	Apr. 9, 1959	42	299	.591	8.03	353	9.49
1960	1707	1,110	Apr. 4, 5, 1960	96	408	.806	10.99	-	-

## 1735. Mill Creek near Dexter, Mich.

Location.--Lat 42°18'00", long 83°53'55", in SW¼ sec.18, T.2 S., R.5 E., on left bank 12 ft downstream from bridge on Parker Road, 2½ miles south of Dexter, and 4 miles upstream from mouth.

Drainage area.--134 sq mi.

Records available.--February 1952 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 850 ft (from topographic map). Prior to May 23, 1958, wire-weight gage at same site and datum.

Average discharge.--8 years (1952-60), 69.2 cfs.

Extremes.--1952-60: Maximum discharge, 1,300 cfs Apr. 29, 1956 (gage height, 12.2 ft, from graph based on gage readings), from rating curve extended above 870 cfs by logarithmic plotting; minimum, 11 cfs Sept. 15, 1958, July 15-17, 1959.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	206	239	111	44.4	25.2	21.6	26.0	-
1953	27.0	52.8	67.2	59.8	56.8	131	91.4	75.7	35.4	30.2	23.9	15.3	55.6
1954	18.1	19.7	28.3	23.8	144	208	212	67.3	91.9	23.3	17.4	16.6	71.8
1955	193	80.2	86.5	133	109	184	96.0	55.4	40.4	25.1	24.2	16.1	87.0
1956	32.8	79.8	45.1	25.5	51.6	210	188	265	64.1	31.2	27.3	18.8	86.8
1957	20.1	23.9	37.5	39.2	73.9	78.0	129	77.6	39.7	35.2	15.8	22.7	49.1
1958	26.7	98.1	192	58.7	52.8	86.8	77.7	29.7	20.9	24.3	17.1	15.6	58.6
1959	21.8	34.4	24.2	25.0	70.4	229	171	67.1	22.5	16.7	18.3	15.6	59.5
1960	34.7	75.7	80.1	139	128	118	151	58.0	123	57.5	33.6	21.5	84.8

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	1.77	1.99	0.96	0.37	0.22	0.19	0.22	-
1953	0.23	0.44	0.58	0.51	0.44	1.12	.76	.65	.29	.26	.21	.13	5.62
1954	.16	.16	.24	.21	1.12	1.79	1.77	.58	.77	.20	.15	.14	7.29
1955	1.66	.67	.74	1.14	.85	1.58	.80	.48	.34	.22	.21	.13	8.82
1956	.28	.66	.39	.22	.42	1.81	1.56	2.28	.53	.27	.24	.16	8.82
1957	.17	.20	.32	.34	.57	.67	1.08	.67	.33	.30	.14	.18	4.97
1958	.25	.82	1.65	.51	.41	.75	.65	.26	.17	.21	.15	.13	5.96
1959	.19	.29	.21	.22	.55	1.97	1.42	.58	.19	.14	.16	.13	6.05
1960	.30	.63	.69	1.20	1.03	1.02	1.26	.50	1.02	.49	.29	.18	8.61

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	1277	510	Mar. 4, 1953	14	55.6	0.415	5.62	48.8	4.93
1954	1337	890	Mar. 25, 1954	13	71.8	.536	7.29	96.6	9.80
1955	1387	a690	Oct. 15, 1954	12	87.0	.649	8.82	69.9	7.08
1956	1437	1,300	Apr. 29, 1956	16	86.8	.648	8.82	80.5	8.18
1957	1507	368	Apr. 6, 1957	12	49.1	.366	4.97	69.1	7.00
1958	1557	528	Dec. 19, 1957	12	58.6	.437	5.96	38.6	3.93
1959	1627	939	Mar. 6, 1959	11	59.5	.444	6.05	68.8	6.98
1960	1707	804	Mar. 28 or 29, 1960	17	84.8	.633	8.61	-	-

a Maximum observed.

1745. Huron River at Ann Arbor, Mich.

Location.--Lat 42°17'10", long 83°44'00", in NW¼ sec.28, T.2 S., R.6 E., on left bank 100 ft upstream from bridge on Wall Street in Ann Arbor, three-quarters of a mile downstream from Argo Dam, and 4 miles upstream from Geddes Dam.

Drainage area.--711 sq mi.

Records available.--February 1904 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

Gage.--Water-stage recorder. Datum of gage is 744.81 ft above mean sea level, datum of 1929 (levels by Michigan Department of Conservation). February 1904 to December 1914 at Geddes Dam, 4 miles downstream, and January 1914 to September 1947, at Barton Dam, 3 miles upstream; flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

Average discharge.--56 years (1904-60), 446 cfs (adjusted for diversion since 1955).

Extremes.--1904-60: Maximum daily discharge, 5,840 cfs Mar. 14, 1918; minimum daily, 4 cfs Aug. 2, Sept. 11, 1931 (plant leakage), but may be doubtful due to change in leakage.

Remarks.--Diversion above station for Ann Arbor municipal supply had negligible effect on natural flow prior to 1955; figures of runoff adjusted since. Flow regulated by powerplants and by occasional lake level control operations above station.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	395	592	1,080	987	1,237	1,301	1,107	952	425	400	225	212	740
1952	431	652	586	1,036	892	1,108	1,281	705	397	189	167	188	636
1953	203	329	444	363	370	657	616	548	314	226	179	130	367
1954	137	179	232	189	631	932	984	557	500	262	125	122	402
1955	895	577	541	781	548	1,067	687	353	276	178	145	103	514
1956	210	421	311	206	248	1,108	828	1,914	582	267	409	245	565
1957	171	249	367	304	436	557	640	604	401	566	205	239	395
1958	265	529	636	443	299	498	410	192	160	175	150	121	324
1959	154	289	244	201	496	1,270	1,030	522	224	102	146	195	404
1960	369	525	555	724	715	558	1,114	582	508	298	177	135	520

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.64	0.93	1.75	1.60	1.81	2.11	1.74	1.54	0.67	0.65	0.37	0.33	14.14
1952	.70	1.02	.95	1.68	1.35	1.80	2.01	1.14	.62	.31	.27	.29	12.14
1953	.33	.52	.72	.62	.54	1.07	.97	.89	.49	.37	.29	.20	7.01
1954	.22	.28	.38	.31	.92	1.51	1.54	.90	.78	.42	.20	.19	7.65
1955	1.46	.91	.88	1.28	.81	1.74	1.09	.59	.45	.30	.25	.18	9.94
1956	.36	.67	.52	.35	.39	1.81	1.31	3.11	.92	.44	.67	.40	10.95
1957	.29	.40	.61	.51	.65	.92	1.02	.99	.64	.93	.35	.38	7.69
1958	.44	.85	1.04	.73	.45	.82	.66	.33	.27	.30	.26	.20	6.35
1959	.26	.47	.41	.34	.74	2.08	1.63	.86	.37	.19	.25	.32	7.92
1960	.61	.84	.91	1.19	1.10	.92	1.76	.96	.81	.50	.30	.23	10.13

Note.--Figures prior to 1955 not adjusted for diversion.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30										Calendar year		
		Observed					Adjusted					Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Mean	Mean	Runoff in inches
		Discharge	Date											
1950	-	-	-	-	-	-	-	-	-	-	-	889	-	16.97
1951	1207	2,750	Feb. 19, 1951	144	740	-	-	1.04	14.14	706	-	-	-	13.49
1952	1237	2,180	Apr. 14, 1952	129	636	-	-	.895	12.14	577	-	-	-	11.04
1953	1277	1,090	May 3, 1953	26	367	-	-	.516	7.01	351	-	-	-	6.32
1954	1337	1,980	Mar. 26, 1954	22	402	-	-	.565	7.65	526	-	-	-	10.14
1955	1387	2,080	Oct. 15, 1954	69	514	521	-	.733	9.94	423	531	432	8.24	
1956	1437	3,120	Apr. 29, 1956	72	565	572	.805	10.95	552	560	10.70			
1957	1507	1,120	Apr. 25, 1957	146	395	403	.567	7.69	449	457	8.72			
1958	1557	1,140	Dec. 21, 1957	84	324	333	.468	6.35	261	270	5.16			
1959	1627	3,290	Mar. 6, 1959	48	404	415	.594	7.92	468	478	9.14			
1960	1707	1,970	Mar. 30, 1960	90	520	530	.745	10.13	-	-	-			

Note.--Figures prior to 1955 not adjusted.



## 1757. River Raisin near Tecumseh, Mich.

Location.--Lat 41°56'35", long 83°56'45", in NE¼ sec.21, T.6 S., R.4 E., on right bank 12 ft downstream from bridge on North Raisin Center Highway, 3.4 miles upstream from South Branch River Raisin, and 4.5 miles south of Tecumseh.

Drainage area.--266 sq mi.

Records available.--September 1956 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 707.0 ft above mean sea level, datum of 1929.

Extremes.--1956-60: Maximum discharge, 1,200 cfs Mar. 7, 1959 (gage height, 10.33 ft); minimum, 15 cfs Aug. 14, 1959 (gage height, 2.90 ft); minimum daily, 17 cfs Aug. 11, 1959.

Remarks.--Diurnal fluctuation caused by powerplant 5.5 miles above gage.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	-	-	-	-	-	-	-	-	-	-	-	56.6	-
1957	54.8	95.7	130	107	171	195	283	158	72.1	84.9	58.1	86.9	124
1958	104	194	266	156	127	218	195	119	61.4	86.7	56.3	60.4	137
1959	101	138	98.7	118	334	516	388	216	77.6	54.5	52.1	50.1	178
1960	134	215	204	320	329	236	324	168	311	179	89.4	63.7	213

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	-	-	-	-	-	-	-	-	-	-	-	0.24	-
1957	0.24	0.40	0.56	0.47	0.67	0.85	1.19	0.68	0.30	0.37	0.25	0.36	6.34
1958	.45	.81	1.15	.68	.50	.95	.82	.51	.26	.38	.24	.25	7.00
1959	.44	.58	.43	.51	1.31	2.24	1.63	.94	.33	.24	.23	.21	9.09
1960	.58	.90	.88	1.39	1.33	1.02	1.36	.73	1.30	.77	.39	.27	10.92

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1957	1507	949	Apr. 27, 1957	26	124	0.466	6.34	148	7.55
1958	1557	781	Dec. 21, 1957	25	137	.515	7.00	118	6.04
1959	1627	1,200	Mar. 7, 1959	17	178	.669	9.09	196	10.00
1960	1707	955	Jan. 14, 1960	42	213	.801	10.92	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

1760. River Raisin near Adrian, Mich.

Location.--Lat 41°54'15", long 83°58'50", in NW¼ sec.5, T.7 S., R.4 E., on right bank 10 ft downstream from bridge on Academy Road, 1.7 miles east of Adrian, and 2.6 miles downstream from South Branch River Raisin.

Drainage area.--455 sq mi.

Records available.--October 1953 to September 1960. Records for October 1930 to August 1931, October 1932 to April 1938, published as "Raisin River" in WSP 714, 744, 759, 784, 804, 824, and 854, have been found to be unreliable and should not be used.

Gage.--Water-stage recorder. Datum of gage is 693.2 ft above mean sea level (datum of 1929).

Average discharge.--7 years (1953-60), 305 cfs.

Extremes.--1953-60: Maximum discharge, 5,580 cfs Apr. 30, 1956 (gage height, 14.87 ft), from rating curve extended above 2,700 cfs by logarithmic plotting; minimum, 24 cfs Sept. 19, 1955 (gage height, 1.71 ft); minimum daily, 28 cfs Sept. 19, 1955.

Remarks.--Diurnal fluctuation caused by powerplant at Tecumseh 11 miles above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	59.5	76.5	101	116	352	656	685	223	186	80.9	60.5	56.3	220
1955	422	251	272	504	372	745	355	217	166	113	124	46.0	299
1956	134	329	211	109	505	915	664	939	293	267	196	90.8	388
1957	84.4	135	189	174	333	346	728	325	166	130	90.8	127	234
1958	164	304	579	267	268	379	291	224	86.6	244	125	126	255
1959	185	304	167	200	629	981	734	379	122	90.1	85.0	76.0	326
1960	246	424	427	701	655	414	644	303	591	353	140	102	415

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	0.15	0.19	0.26	0.29	0.81	1.66	1.68	0.56	0.46	0.20	0.15	0.14	6.55
1955	1.07	.61	.69	1.28	.85	1.89	.87	.55	.41	.29	.31	.11	8.93
1956	.34	.81	.54	.28	1.20	2.32	1.63	2.38	.72	.68	.50	.22	11.62
1957	.21	.33	.48	.44	.76	.88	1.79	.82	.41	.33	.23	.31	6.99
1958	.42	.74	1.47	.68	.61	.96	.71	.57	.21	.62	.32	.51	7.62
1959	.42	.75	.42	.51	1.44	2.48	1.80	.96	.30	.23	.22	.19	9.72
1960	.62	1.04	1.08	1.78	1.55	1.05	1.58	.77	1.45	.90	.35	.25	12.42

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	1337	2,570	Mar. 26, 1954	32	220	0.484	6.55	279	8.32
1955	1387	2,030	Mar. 1, 1955	28	299	.657	8.93	276	8.25
1956	1437	5,580	Apr. 30, 1956	33	388	.853	11.62	366	10.95
1957	1507	2,230	Apr. 28, 1957	59	234	.514	6.99	288	8.60
1958	1557	1,900	Dec. 21 or 22	48	255	.560	7.62	220	6.58
1959	1627	2,330	Mar. 7, 1959	53	326	.716	9.72	364	10.87
1960	1707	2,870	Jan. 14, 1960	74	415	.912	12.42	-	-

## 1765. River Raisin near Monroe, Mich.

Location.--Lat 41°57'40", long 83°31'55", on left bank 0.8 mile downstream from bridge on Ida Maybee Road, 5.0 miles downstream from Saline River, and 7.5 miles west of Monroe, Monroe County.

Drainage area.--1,034 sq mi. At site used prior to Oct. 1, 1953, 1,056 sq mi (revised).

Records available.--September 1937 to September 1960. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

Gage.--Water-stage recorder. Datum of gage is 616.26 ft above mean sea level, datum of 1929. Prior to Oct. 1, 1953, at site 9 miles downstream at datum 46.26 ft lower.

Average discharge.--23 years (1937-60), 720 cfs.

Extremes.--1937-60: Maximum discharge, 12,900 cfs May 19, 1945, Mar. 29, 1950; maximum gage height, 10.7 ft Feb. 1, 1949 (ice jam), site and datum then in use; minimum discharge, about 2 cfs Sept. 4, 1938, Sept. 19, 20, 1941, site then in use.

Remarks.--Prior to Feb. 14, 1954, diurnal fluctuation caused by powerplant at Dundee 11 miles above station. Occasional slight diurnal fluctuation by powerplants further upstream.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	322	841	1,622	1,251	2,846	1,909	1,517	1,784	619	1,453	299	150	1,209
1952	368	1,263	976	3,058	1,488	2,141	1,971	836	347	168	130	106	1,070
1953	126	199	237	254	233	1,071	542	441	161	108	102	84.0	297
1954	71.5	102	128	180	667	1,589	1,331	395	395	122	77.8	70.8	466
1955	662	378	511	1,278	826	1,830	674	441	300	179	211	65.4	614
1956	177	459	315	159	1,064	2,287	1,320	2,639	517	372	370	115	817
1957	99.6	138	253	277	689	578	1,878	643	271	194	112	241	452
1958	608	792	1,662	524	413	860	517	424	134	556	264	321	584
1959	237	716	309	423	1,276	2,506	1,625	971	268	118	125	100	719
1960	561	1,106	1,166	1,826	1,624	790	1,364	491	1,191	666	178	143	921

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.35	0.89	1.77	1.37	2.81	2.08	1.60	1.95	0.65	1.59	0.33	0.16	15.55
1952	.40	1.35	1.07	3.54	1.52	2.34	2.08	.91	.37	.18	.14	.11	13.79
1953	.14	.21	.26	.28	.23	1.17	.57	.48	.17	.12	.11	.09	3.83
1954	.08	.11	.14	.20	.67	1.77	1.98	.44	.43	.14	.09	.08	6.13
1955	.74	.41	.57	1.43	.83	2.04	.73	.49	.32	.20	.23	.07	8.06
1956	.20	.50	.35	.18	1.11	2.55	1.42	2.94	.56	.41	.41	.12	10.75
1957	.11	.15	.28	.31	.69	.76	2.03	.72	.29	.22	.12	.26	5.94
1958	.68	.85	1.74	.58	.42	.96	.56	.47	.14	.62	.29	.35	7.66
1959	.26	.77	.34	.47	1.29	2.79	1.75	1.08	.29	.13	.14	.11	9.42
1960	.63	1.19	1.30	2.04	1.69	.88	1.47	.55	1.29	.74	.20	.15	12.13

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,459	18.75
1951	1207	8,350	Feb. 22, 1951	94	1,209	1.14	15.55	1,193	15.34
1952	1237	6,900	Jan. 18, 1952	52	1,070	1.01	13.79	900	11.80
1953	1277	2,610	Mar. 7, 1953	52	297	.281	3.63	276	3.55
1954	1337	4,790	Mar. 26, 1954	31	466	.451	6.13	571	7.52
1955	1387	4,940	Mar. 1, 1955	33	614	.594	8.06	563	7.39
1956	1437	8,870	May 2, 1956	75	817	.790	10.75	779	10.24
1957	1507	4,390	Apr. 27, 1957	76	452	.437	5.94	660	8.67
1958	1557	4,400	Dec. 21, 1957	64	584	.565	7.66	440	5.76
1959	1627	6,160	Mar. 7, 1959	42	719	.695	9.42	851	11.17
1960	1707	5,590	Jan. 15, 16, 1960	72	921	.891	12.13	-	-

1780. St. Joseph River near Newville, Ind.

Location.--Lat 41°23'10", long 84°48'05", in Ohio, in SW<sup>1</sup> sec.18, T.5 N., R.1 E., on left bank 20 ft downstream from bridge on Ohio State Highway 249 and 3½ miles northeast of Newville.

Drainage area.--614 sq mi.

Records available.--October 1946 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 795.40 ft above mean sea level, datum of 1929. Prior to Oct. 22, 1947, wire-weight gage at same site and datum.

Average discharge.--14 years (1946-60), 556 cfs.

Extremes.--1946-60: Maximum discharge, 9,710 cfs Apr. 6, 1950 (gage height, 17.05 ft); minimum, 16 cfs Sept. 30, 1953 (gage height, 1.45 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	147	525	1,283	1,072	1,976	1,288	1,285	1,158	365	1,045	209	79.8	864
1952	185	616	492	2,399	991	1,451	1,181	787	251	95.1	54.5	41.2	711
1953	41.0	65.2	91.9	148	179	739	501	345	66.1	41.1	187	22.4	201
1954	23.0	39.0	50.7	114	344	1,213	1,571	294	251	144	50.9	27.1	342
1955	877	405	472	1,032	670	1,148	571	182	133	108	96.7	26.7	482
1956	106	468	215	86.2	744	1,757	759	2,499	178	103	223	49.5	601
1957	36.2	61.2	106	195	506	457	1,679	496	248	199	39.8	58.7	337
1958	228	492	1,159	351	388	853	473	149	134	587	394	582	465
1959	147	484	241	536	2,226	1,636	1,265	802	146	72.4	66.8	39.6	627
1960	300	756	709	1,281	1,198	493	1,366	467	1,008	323	85.4	64.2	667

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.28	0.95	2.41	2.01	3.35	2.42	2.33	2.17	0.66	1.96	0.39	0.15	19.08
1952	.35	1.12	.92	4.50	1.74	2.73	2.15	1.48	.42	.18	.10	.07	15.76
1953	.08	.12	.17	.28	.30	1.38	.91	.65	.12	.08	.31	.04	4.44
1954	.04	.07	.10	.21	.58	2.28	2.86	.55	.46	.27	.10	.05	7.57
1955	1.65	.74	.89	2.03	1.14	2.16	1.04	.34	.24	.20	.18	.05	10.66
1956	.20	.85	.40	.16	1.30	3.30	1.38	4.69	.32	.19	.42	.09	13.30
1957	.07	.11	.20	.37	.86	.86	3.05	.93	.45	.37	.07	.11	7.45
1958	.43	.89	2.14	6.66	.66	1.60	.86	.28	.24	.73	.74	1.06	10.29
1959	.28	.88	.45	1.01	3.78	3.07	2.30	1.51	.27	.14	.13	.07	13.69
1960	.56	1.37	1.33	2.41	2.10	.93	2.48	.88	1.83	.61	.16	.12	14.78

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,093	24.18
1951	1207	6,170	Feb. 22, 1951	59	864	1.41	19.08	807	17.83
1952	1237	4,510	Jan. 18, 1952	34	711	1.16	15.76	620	13.74
1953	1277	1,900	Mar. 5, 1953	18	201	1.327	4.44	194	4.28
1954	1337	3,950	Mar. 29, 1954	18	342	.557	7.57	481	10.64
1955	1387	3,250	Jan. 7, 8, 1955	20	482	.785	10.66	399	8.83
1956	1437	9,450	May 1, 1956	29	601	.979	13.30	552	12.23
1957	1507	2,700	Apr. 12, 1957	26	337	.549	7.45	476	10.53
1958	1557	2,960	Dec. 25, 1957	36	465	.757	10.29	381	8.44
1959	1627	4,910	Feb. 15-16, 1959	23	627	1.02	13.69	702	15.54
1960	1707	3,720	Jan. 16, 1960	49	667	1.09	14.78	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

229

1785. St. Joseph River at Hursh, Ind.

Location.--Lat 41°15', long 84°57', in sec.12, T.32 N., R.13 E., near center of span on downstream side of Hursttown Bridge at Hursh, three-quarters of a mile upstream from small tributary, 5½ miles upstream from Cedar Creek and 14 miles northeast of Fort Wayne.

Drainage area.--737 sq mi.

Records available.--May 1950 to September 1954.

Gage.--Wire-weight gage. Datum of gage is 769.68 ft above mean sea level, datum of 1929.

Extremes.--1950-54: Maximum discharge, 7,120 cfs Feb. 23, 1951 (gage height, 13.16 ft); minimum, 20 cfs Oct. 26, 1953; minimum gage height, 3.38 ft Aug. 31, Sept. 1-3, 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	186	616	1,494	1,297	2,415	1,521	1,575	1,386	467	1,212	283	108	1,039
1952	207	722	601	2,892	1,207	1,730	1,401	1,007	297	153	89.9	68.9	865
1953	63.4	83.0	116	211	230	935	574	437	90.6	60.6	200	46.2	255
1954	*29.1	48.3	58.3	136	411	1,473	1,937	374	510	218	122	51.4	*429

\* Revised.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.29	0.93	2.34	2.03	3.42	2.38	2.39	2.17	0.71	1.90	0.44	0.16	19.16
1952	.32	1.09	.94	4.53	1.77	2.71	1.58	.45	.24	.14	.10		15.99
1953	.10	.13	.18	.33	.33	1.46	.87	.68	.14	.09	.31	.07	4.69
1954	*.04	.07	.09	.21	.58	2.31	2.93	.58	.47	.34	.19	.08	*7.89

\* Revised.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1951	1207	7,120	Feb. 23, 1951	81	1,039	1.41	19.16	974	17.95		
1952	1237	5,440	Jan. 20, 1952	56	865	1.17	15.98	760	14.04		
1953	1277	2,690	Mar. 4, 1953	29	255	.346	4.69	*244	4.48		
1954	1337	4,240	Mar. 30, 1954	22	*429	*.582	*7.89	-	-		

\* Revised.

1790. St. Joseph River at Cedarville, Ind.

Location.--Lat 41°12', long 85°01', in SE¼ sec.28, T.32 N., R.13 E., on left bank 500 ft upstream from highway bridge, 0.4 mile south of Cedarville, 0.5 mile upstream from mouth of Cedar Creek, and 2,700 ft downstream from Cedarville Dam.

Drainage area.--783 sq mi.

Records available.--January 1931 to May 1932, October 1955 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 757.94 ft above mean sea level, datum of 1929. Jan. 1, 1931, to May 31, 1932, tape gage on downstream side of highway bridge 500 ft downstream from present site at datum approximately 20 ft lower.

Average discharge.--5 years (1955-60), 656 cfs (revised).

Extremes.--1931-32, 1955-60: Maximum discharge, 10,100 cfs May 1, 1956 (gage height, 18.07 ft, from floodmarks); minimum daily, 1.6 cfs May 22, 27, 1958.

Remarks.--Flow regulated by reservoir above station beginning Sept. 2, 1954.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	*148	*667	253	112	*873	2,134	1,021	3,470	262	141	256	85.1	*786
1957	51.0	87.1	134	224	502	523	2,095	589	335	248	60.4	85.0	408
1958	298	594	1,411	431	401	967	605	165	244	627	585	669	585
1959	171	506	222	575	2,287	1,842	1,585	940	188	95.2	90.1	52.4	701
1960	331	776	894	1,701	1,433	571	1,573	453	1,274	440	109	78.7	798

\* Revised.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	*0.22	*0.95	0.37	0.16	*1.20	3.15	1.45	5.11	0.37	0.21	0.38	0.09	*13.66
1957	.07	.12	.20	.33	.67	.77	2.99	.87	.49	.37	.09	.12	7.08
1958	.44	.85	2.08	.65	.53	1.42	.86	.24	.35	.92	.86	.95	10.13
1959	.25	.72	.33	.85	3.04	2.71	2.25	1.38	.27	.14	.13	.07	12.14
1960	.49	1.11	1.31	2.50	1.97	.84	2.24	.67	1.82	.65	.16	.11	13.87

\* Revised.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1956	1437	10,100	May 1, 1956	9.2	*786	*1.00	*13.66	*720	*12.51		
1957	1507	3,950	Apr. 5, 1957	17	408	.521	7.08	579	10.06		
1958	1557	a3,220	Dec. 26, 1957	1.6	585	.747	10.13	466	8.06		
1959	1627	a4,950	Feb. 16, 1959	43	701	.895	12.14	794	13.75		
1960	1707	a4,760	Jan. 18, 1960	49	798	1.02	13.87	-	-		

\* Revised.

a Maximum daily discharge.

## STREAMS TRIBUTARY TO LAKE ERIE

1795. Cedar Creek at Auburn, Ind.

Location.--Lat 41°21', long 85°03', in SW<sup>1</sup>/<sub>4</sub> sec.29, T.34 N., R.13 E., near center of span on upstream side of Ninth Street Bridge in Auburn, 2 miles upstream from Peckhart ditch.

Drainage area.--93 sq mi, approximately.

Records available.--July 1943 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 847.14 ft above mean sea level (city of Auburn bench mark). Prior to Aug. 28, 1946, staff gage and Aug. 28, 1946, to Sept. 30, 1953, wire-weight gage, at same site and datum.

Average discharge.--17 years (1943-60), 73.4 cfs.

Extremes.--1943-60: Maximum discharge, 1,520 cfs Apr. 5, 1950 (gage height, 9.90 ft); minimum, 0.5 cfs Nov. 12, 1953; minimum gage height, 0.79 ft Sept. 4, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	25.8	93.2	171	165	236	154	153	106	77.7	93.5	37.8	7.98	109
1952	29.7	68.7	64.8	298	132	175	154	106	36.3	16.2	7.05	5.85	91.4
1953	7.83	8.11	17.7	43.5	36.0	101	53.3	63.4	12.9	8.36	14.2	2.89	30.8
1954	1.67	2.44	5.44	13.6	34.2	124	195	35.9	38.0	61.2	24.5	7.83	45.3
1955	203	76.9	79.4	138	108	150	51.8	21.1	27.5	17.3	14.2	3.18	74.3
1956	16.9	84.3	23.5	12.5	127	150	114	258	36.4	28.5	39.0	7.38	74.7
1957	3.85	6.12	13.6	32.1	78.9	53.2	265	71.5	51.3	22.3	5.22	6.75	50.2
1958	14.5	49.9	138	41.5	54.5	68.9	54.6	16.0	29.5	35.3	49.1	99.7	54.3
1959	19.6	58.3	23.9	74.5	316	176	164	66.4	19.8	10.7	15.3	11.3	77.9
1960	51.0	111	113	178	140	88.2	173	78.0	162	21.5	8.53	6.20	93.7

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.32	1.12	2.12	2.05	2.64	1.90	1.84	1.31	0.93	1.16	0.47	0.10	15.96
1952	.37	.82	.80	3.69	1.53	2.17	1.85	1.32	.44	.20	.09	.07	13.35
1953	.10	.10	.22	.54	.40	1.25	.64	.79	.16	.10	.18	.03	4.51
1954	.02	.03	.07	.17	.38	1.53	2.34	.45	.46	.76	.30	.09	6.60
1955	2.51	.92	.98	1.71	1.21	1.86	.62	.26	.33	.21	.18	.04	10.83
1956	.21	1.01	.29	.15	1.48	1.86	1.37	3.19	.44	.35	.48	.09	10.92
1957	.05	.07	.17	.40	.88	.68	3.18	.89	.62	.28	.06	.08	7.34
1958	.18	.60	1.71	.51	.61	.85	.65	.20	.35	.44	.61	1.19	7.90
1959	.24	.70	.30	.92	3.54	2.18	1.96	.82	.24	.13	.19	.14	11.36
1960	.63	1.33	1.41	2.20	1.63	1.09	2.08	.97	1.94	.27	.11	.07	13.73

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	163	23.83
1951	1207	940	Feb. 22, 1951	4.0	109	1.17	15.96	98.7	14.39
1952	1237	900	Mar. 11, 1952	3.4	91.4	.983	13.35	80.4	11.78
1953	1277	471	Mar. 4, 1953	2.0	30.8	.331	4.51	28.8	4.21
1954	1337	707	Mar. 25, 1954	.7	45.3	.487	6.60	74.8	10.89
1955	1387	707	Jan. 6, 1955	1.2	74.3	.799	10.83	54.4	7.93
1956	1437	1,050	Apr. 30, 1956	2.0	74.7	.803	10.92	66.3	9.70
1957	1507	651	Apr. 8, 1957	2.6	50.2	.540	7.34	65.3	9.54
1958	1557	540	Dec. 20, 1957	3.7	54.3	.584	7.90	45.7	6.65
1959	1627	890	Feb. 14, 1959	2.2	77.9	.838	11.36	92.4	13.49
1960	1707	865	Apr. 17, 1960	3.9	93.7	1.01	13.73	-	-

1800. Cedar Creek near Cedarville, Ind.

Location.--Lat 41°13', long 85°05', in NW¼ sec.19, T.32 N., R.13 E., on left bank at downstream side of bridge on State Highway 427, 2½ miles northwest of Cedarville and 4 miles upstream from mouth.

Drainage area.--279 sq mi.

Records available.--October 1946 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 780.09 ft above mean sea level, datum of 1929. Prior to Nov. 4, 1947, wire-weight gage at same site and datum.

Average discharge.--14 years (1946-60), 262 cfs.

Extremes.--1946-60: Maximum discharge, 4,870 cfs Apr. 5, 1950 (gage height, 11.67 ft); minimum, 12 cfs Oct. 3, 1949; minimum gage height, 1.30 ft Sept. 3, Oct. 1, 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	71.2	235	547	532	762	468	562	481	274	424	151	46.8	377
1952	106	260	247	979	470	592	510	360	130	95.5	48.8	39.8	320
1953	33.1	39.1	67.1	148	132	373	209	258	59.5	35.1	42.2	22.3	118
1954	22.7	27.6	29.6	47.8	101	447	640	133	212	203	238	55.5	180
1955	805	248	277	444	352	471	244	96.2	92.5	101	77.7	30.8	270
1956	88.0	330	86.0	51.6	405	498	384	947	112	74.5	73.7	31.2	256
1957	29.1	36.3	45.9	118	209	146	948	205	178	84.4	31.4	36.4	171
1958	83.4	177	524	149	171	218	157	68.6	165	216	187	314	203
1959	76.7	206	99.5	296	1,290	567	599	235	86.2	58.1	42.4	41.6	292
1960	120	299	332	531	450	279	554	300	571	83.7	55.4	43.6	300

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.29	0.94	2.26	2.20	2.84	1.93	2.25	1.99	1.09	1.75	0.62	0.19	18.35
1952	.44	1.04	1.02	4.04	1.82	2.45	2.04	1.49	.52	.39	.20	.16	15.61
1953	.14	.16	.28	.81	.49	1.54	.84	1.07	.24	.14	.17	.09	5.77
1954	.09	.11	.12	.20	.38	1.84	2.56	.55	.85	.84	.98	.22	8.74
1955	3.33	.99	1.14	1.83	1.31	1.95	.98	.40	.37	.42	.32	.12	13.16
1956	.36	1.32	.36	.21	1.56	2.05	1.54	3.91	.45	.31	.30	.12	12.49
1957	.12	.14	.19	.49	.78	.60	3.79	.65	.71	.35	.13	.14	8.29
1958	.34	.71	2.17	.62	.64	.90	.63	.28	.66	.89	.77	1.26	9.87
1959	.32	.82	.41	1.22	4.81	2.34	2.40	.97	.34	.24	.18	.17	14.22
1960	.50	1.19	1.37	2.19	1.74	1.15	2.22	1.24	2.29	.35	.23	.17	14.64

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	514	25.03
1951	1207	3,100	Feb. 22, 1951	38	377	1.35	18.35	357	17.36
1952	1237	2,910	Jan. 27, 1952	31	320	1.15	15.61	280	13.69
1953	1277	1,580	Mar. 4, 1953	18	118	.423	5.77	113	5.51
1954	1337	2,780	Mar. 26, 1954	18	180	.645	8.74	285	13.68
1955	1387	a2,800	Oct. 15, 1954	26	270	.968	13.16	200	9.74
1956	1437	4,660	Apr. 30, 1956	26	256	.918	12.49	224	10.90
1957	1507	2,480	Apr. 6, 1957	25	171	.613	8.29	227	11.06
1958	1557	2,120	Dec. 20, 1957	29	203	.728	9.87	168	8.20
1959	1627	4,100	Feb. 10-11, 1959	26	292	1.05	14.22	323	15.73
1960	1707	3,040	Apr. 18, 1960	35	300	1.08	14.64	-	-

a Maximum daily discharge.

## 1805. St. Joseph River near Fort Wayne, Ind.

Location.--Lat 41°10', long 85°04', in SW $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.4, T.31 N., R.13 E., on right bank at upstream side of bridge on Mayhew Road,  $3\frac{1}{2}$  miles downstream from Cedar Creek and 8 miles northeast of Fort Wayne.

Drainage area.--1,060 sq mi.

Records available.--March 1905 to July 1906, August 1941 to September 1955.

Gage.--Water-stage recorder. Datum of gage is 751.42 ft above mean sea level, datum of 1929. Prior to July 1906, chain gage at bridge approximately  $7\frac{1}{2}$  miles downstream at different datum. Since Sept. 15, 1944, auxiliary water-stage recorder at St. Joseph Dam,  $5\frac{1}{2}$  miles downstream from base gage. Datum of auxiliary gage is 741.42 ft above mean sea level (Port Wayne Water Co. bench mark).

Average discharge.--14 years (1941-55), 967 cfs.

Extremes.--1941-55: Maximum discharge, 12,200 cfs Apr. 7, 1950 (gage height, 17.90 ft); minimum daily, 27 cfs Aug. 21, 1941.

Remarks.--Flow affected at low stages by pumping plant  $5\frac{1}{2}$  miles below station. Flow regulated by reservoir above station beginning Sept. 2, 1954.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	269	899	2,140	1,856	3,296	2,123	2,230	1,962	788	1,708	432	170	1,480
1952	323	1,068	881	3,898	1,788	2,489	2,063	1,469	456	243	144	113	1,245
1953	102	128	205	390	395	1,395	834	717	157	98.2	246	71.6	396
1954	*54.1	79.1	98.4	210	548	1,862	2,806	492	520	438	369	67.5	*610
1955	1,934	741	896	1,851	1,167	1,982	1,001	396	282	215	175	64.9	894

\* Revised.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.29	0.95	2.33	2.02	3.24	2.31	2.35	2.13	0.83	1.86	0.47	0.18	18.96
1952	.35	1.12	.96	4.24	1.82	2.71	2.17	1.60	.48	.26	.16	.12	15.99
1953	.11	.14	.22	.42	.39	1.52	.88	.78	.16	.11	.27	.08	5.08
1954	*.06	.08	.11	.23	.54	2.03	2.74	.53	.55	.48	.40	.07	*7.82
1955	2.10	.78	.97	2.02	1.14	2.16	1.05	.43	.30	.23	.19	.07	11.44

\* Revised.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,921	24.60
1951	1207	8,700	Feb. 23, 1951	129	1,480	1.40	18.96	1,391	17.82
1952	1237,1277	7,350	Jan. 26, 1952	90	1,245	1.17	15.99	1,092	14.03
1953	1277	4,400	Mar. 4, 1953	48	396	.374	5.08	*379	*4.86
1954	1337	6,210	Mar. 26, 1954	36	*610	*.575	*7.82	892	11.42
1955	1387	6,930	Mar. 4, 1955	52	894	.843	11.44	-	-

\* Revised.



## 1815. St. Marys River at Decatur, Ind.

Location.--Lat 40°51', long 84°56', in SW $\frac{1}{4}$  sec.27, T.28 N., R.14 E., on right bank 10 ft downstream from bridge on U.S. Highway 27, half a mile north of city limits of Decatur, and half a mile upstream from Holthouse ditch.

Drainage area.--615 sq mi.

Records available.--October 1946 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected at site half a mile upstream January 1932 to November 1954, and at present site thereafter are contained in reports of U.S. Weather Bureau.

Gage.--Water-stage recorder. Datum of gage is 760.44 ft above mean sea level, datum of 1929. Prior to July 27, 1948, wire-weight gage at same site and datum.

Average discharge.--14 years (1946-60), 543 cfs.

Extremes (revised).--1946-60: Maximum discharge, 11,300 cfs Feb. 10, 11, 1959; maximum gage height, 24.22 ft Feb. 10, 1959 (ice jam); minimum discharge, 8.9 cfs Sept. 12, 1955 (gage height, 1.73 ft).

Remarks.--Flow regulated by Grand Lake (formerly known as Lake St. Marys). Slight diversion from or into Wabash River and into Miami and Erie Canal.

Revisions.--The momentary maximum discharge and two daily discharges for the water year 1950 were revised in WSP 1627; the resulting revised records as summarized herewith supersede those published in WSP 1307.

Month	Mean	Per square mile	Runoff in inches	Momentary maximum	
				Discharge	Date
February 1950.....	2,546	-	-	-	-
Water year 1949-50.....	832	-	-	10,800	Feb. 15, 1950

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	640	800	1,480	1,194	1,663	983	980	806	324	74.5	33.1	42.4	747
1952	26.8	95.4	603	2,098	1,045	1,495	1,228	447	91.3	65.5	28.8	59.8	607
1953	25.1	56.5	251	642	453	1,149	300	379	73.8	48.8	35.2	20.7	287
1954	15.5	18.1	23.3	53.1	103	245	516	179	192	29.6	55.1	37.0	164
1955	866	260	399	915	554	1,872	435	59.7	50.6	*94.5	*42.7	14.2	*466
1956	107	881	98.6	70.0	1,329	1,175	374	258	353	219	69.1	48.9	410
1957	23.5	27.2	102	402	559	361	3,409	1,074	580	1,055	39.2	132	643
1958	276	301	1,667	364	252	427	406	325	1,870	1,110	848	165	671
1959	44.6	745	187	1,456	2,540	977	1,237	975	166	69.0	24.0	21.5	690
1960	99.9	241	578	907	967	458	404	248	314	96.5	24.7	17.1	361

\* Revised.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.20	1.45	2.78	2.24	2.81	1.84	1.77	1.51	0.59	0.14	0.06	0.08	16.47
1952	.05	.17	1.13	3.93	1.83	2.80	2.23	.84	.17	.12	.05	.11	13.43
1953	.05	.10	.47	1.20	.77	2.16	.54	.71	.13	.09	.07	.04	6.33
1954	.03	.03	.04	.10	.17	.46	.94	.34	.35	.06	1.03	.07	3.62
1955	1.63	.47	.75	1.72	.94	3.50	.79	.11	.09	.18	.08	.03	10.29
1956	.20	1.60	.18	.13	2.33	2.20	.68	.48	.64	.41	.13	.09	9.07
1957	.04	.05	.19	.75	.95	.68	6.18	2.02	1.05	1.98	.07	.24	14.20
1958	.52	.55	3.12	.68	.43	.80	.74	.61	3.39	2.08	1.59	.30	14.81
1959	.08	1.35	.35	2.73	4.30	1.83	2.24	1.83	.30	.13	.04	.04	15.22
1960	.19	.44	1.08	1.70	1.69	.86	.73	.46	.57	.18	.05	.03	7.98

Note.--Runoff figures for 1951-55 not previously published.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,041	*22.98
1951	1207	5,990	Dec. 7, 1950	19	747	\$1.21	*16.47	562	*12.39
1952	1237	5,740	Mar. 13, 1952	18	607	*9.87	*13.43	574	*12.70
1953	1277	3,560	Mar. 4, 1953	15	287	*4.67	*6.33	263	*5.61
1954	1337	1,690	Aug. 5, 1954	12	164	*4.267	*3.62	288	*6.37
1955	1387	7,740	Mar. 4, 1955	*9.2	*466	*7.758	*10.29	*427	*9.42
1956	1437	3,700	Nov. 17, 1955	25	410	.667	9.07	333	7.37
1957	1507	7,700	Apr. 8, 1957	12	843	1.05	14.20	820	18.11
1958	1557	6,170	June 14, 1958	40	671	1.05	14.61	562	12.40
1959	1677	11,300	Feb. 10-11, 1959	13	690	1.12	15.22	687	15.15
1960	1707	4,200	Feb. 11, 1960	12	361	.587	7.98	-	-

\* Revised

\* Not previously published.

## STREAMS TRIBUTARY TO LAKE ERIE

1820. St. Marys River near Fort Wayne, Ind.

Location.--Lat 41°00', long 85°07', in NE $\frac{1}{4}$  sec.12, T.29 N., R.12 E., on left bank 130 ft downstream from highway bridge, 4 miles south of Fort Wayne, and 12 miles upstream from confluence with St. Joseph River.

Drainage area.--753 sq mi.

Records available.--October 1930 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 748.61 ft above mean sea level, unadjusted. Prior to Apr. 13, 1939, chain gage on highway bridge at same datum.

Average discharge.--30 years (1930-60), 569 cfs.

Extremes.--1930-60: Maximum discharge, 13,600 cfs Feb. 11, 1959; maximum gage height, 19.42 ft Feb. 11, 1959 (ice jam); minimum discharge observed, 3.4 cfs Oct. 19, 1934 (gage height, 0.28 ft).

Remarks.--Flow regulated by Grand Lake (formerly known as Lake St. Marys). Slight diversion from or into Wabash River basin and into Miami and Erie Canal.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	910	1,135	1,889	1,643	2,093	1,297	1,310	1,032	424	132	38.4	44.6	990
1952	32.1	150	894	2,756	1,491	1,915	1,636	748	137	69.7	32.6	60.2	827
1953	28.4	66.4	294	840	603	1,618	446	441	84.9	53.8	45.4	22.9	379
1954	16.1	19.8	28.1	73.9	149	341	649	232	269	*35.5	*652	*49.3	*210
1955	1,299	335	510	1,179	728	2,532	615	77.9	60.9	164	63.3	*15.8	*635
1956	126	1,108	141	116	1,886	1,481	441	390	482	291	85.3	48.8	543
1957	27.4	31.1	103	487	653	439	4,119	1,262	723	1,234	53.5	154	770
1958	353	384	2,102	564	355	519	494	360	2,321	1,296	1,074	184	838
1959	51.6	877	281	1,818	3,404	1,150	1,510	1,302	265	169	28.4	25.6	889
1960	127	325	759	1,220	1,202	*599	525	261	472	95.2	25.2	17.3	*466

\* Revised.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.40	1.68	2.89	2.51	2.90	1.98	1.94	1.58	0.83	0.20	0.06	0.07	17.84
1952	.05	.22	1.37	4.22	2.14	2.93	2.42	1.14	.20	.11	.05	.09	14.94
1953	.04	.10	.45	1.29	.83	2.48	.66	.68	.13	.08	.07	.03	6.84
1954	.02	.03	.04	.11	.21	.52	.96	.36	.40	.05	1.00	.07	3.77
1955	1.99	.50	.78	1.81	1.01	3.87	.91	.12	.09	.25	.10	.02	11.45
1956	.19	1.64	.22	.18	2.70	2.27	.65	.60	.71	.45	.13	.07	9.81
1957	.04	.05	.16	.75	.90	.67	6.10	1.94	1.07	1.89	.08	.23	13.88
1958	.54	.57	3.22	.86	.49	.79	.73	.55	3.44	1.98	1.65	.27	15.09
1959	.08	1.29	1.43	2.78	4.71	1.76	2.24	1.99	.39	.26	.04	.04	16.01
1960	.19	.48	1.16	1.87	1.73	*.92	.78	.40	.70	.15	.04	.03	*8.45

\* Revised.

Note.--Runoff figures for 1951-55 not previously published.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	1207	8,770	Dec. 7, 1950	22	990	1.31	17.84	1,363	24.58	
1952	1237	8,570	Mar. 14, 1952	15	827	1.10	14.94	750	13.51	
1953	1277	4,470	Mar. 4, 1953	15	379	*.503	6.84	769	13.89	
1954	1337	1,950	Apr. 12, 1954	*13	*210	*.279	3.77	352	*6.34	
1955	1387	8,350	Mar. 5, 1955	*10	*635	*.843	11.45	385	*6.95	
1956	1437	5,150	Feb. 25, 1956	24	543	.721	9.81	*568	10.23	
1957	1507	8,990	Apr. 8, 1957	11	770	1.02	13.88	443	8.01	
1958	1557	6,980	June 14, 1958	45	838	1.11	15.09	896	17.96	
1959	1627	13,600	Feb. 11, 1959	12	889	1.18	16.01	698	12.56	
1960	1707	4,940	Feb. 11, 1960	10	*466	*.619	*8.45	891	16.04	

\* Revised.

\* Not previously published.

## 1830. Maumee River at New Haven, Ind.

Location.--Lat 41°05', long 85°01', in SW<sup>1</sup>/<sub>4</sub> sec.1, T.30 N., R.13 E., in center of span on downstream side of county road bridge, a quarter of a mile upstream from Wabash Railroad bridge, half a mile north of New Haven, and 6 miles downstream from confluence of St. Marys and St. Joseph Rivers.

Drainage area.--1,940 sq mi.

Records available.--December 1946 to September 1956 (high-water records only), October 1956 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 724.51 ft above mean sea level, datum of 1929. Prior to Sept. 7, 1956, wire-weight gage at same site and datum.

Extremes.--1946-60: Maximum discharge, 19,100 cfs Feb. 16, 1950 (gage height, 21.4 ft). 1956-60: Minimum daily, 92 cfs Sept. 20, 1959; minimum gage height, 2.17 ft Oct. 12, 1956.

Remarks.--Flow regulated at low stage by powerplant above station. Flow slightly regulated by upstream reservoirs.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	3,584	3,664	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	3,519	-	-	-	-	-	-
1955	-	-	-	-	-	5,169	-	-	-	-	-	-	-
1956	-	-	-	-	-	4,766	-	5,134	-	-	-	-	-
1957	124	194	332	811	1,544	1,266	7,955	2,356	1,433	1,805	187	293	1,515
1958	799	1,259	4,465	1,132	910	1,887	1,445	647	3,189	2,434	2,119	1,243	1,802
1959	322	1,807	687	2,516	7,413	4,025	4,240	2,994	689	414	187	149	2,081
1960	699	1,628	2,187	3,634	3,469	1,553	2,942	1,170	2,655	562	267	170	1,734

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	2.13	2.11	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	2.02	-	-	-	-	-	-
1955	-	-	-	-	-	3.07	-	-	-	-	-	-	-
1956	-	-	-	-	-	2.84	-	3.06	-	-	-	-	-
1957	0.07	0.11	0.20	0.48	0.83	.75	4.57	1.40	0.83	1.07	0.11	0.17	10.59
1958	.48	.72	2.65	.67	.49	1.12	.83	.39	1.83	1.44	1.26	.72	12.60
1959	.19	1.04	.41	1.50	3.98	2.39	2.44	1.78	.40	.25	.11	.09	14.58
1960	.42	.94	1.30	2.16	1.93	.92	1.70	.70	1.53	.33	.16	.10	12.19

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	14,900	Feb. 24, 1951	-	-	-	-	-	-
1952	1237	14,100	Jan. 27, 1952	-	-	-	-	-	-
1953	1277	9,930	Mar. 4, 1953	-	-	-	-	-	-
1954	1337	7,230	Mar. 26, 1954	-	-	-	-	-	-
1955	1387	12,200	Mar. 5, 1955	-	-	-	-	-	-
1956	1437	all, 800	May 3, 1956	-	-	-	-	-	-
1957	1507	15,000	Apr. 11, 1957	95	1,515	0.781	10.59	2,011	14.06
1958	1557	10,800	Dec. 21, 1957	110	1,802	.929	12.60	1,485	10.39
1959	1627	18,900	Feb. 12, 1959	92	2,081	1.07	14.58	2,226	15.60
1960	1707	11,700	Feb. 11, 1960	118	1,734	.894	12.19	-	-

a Maximum observed.

## STREAMS TRIBUTARY TO LAKE ERIE

1835. Maumee River at Antwerp, Ohio

Location.--Lat 41°11'56", long 84°44'40", in sec.22, T.3 N., R.1 E., on left bank 425 ft downstream from bridge on State Highway 49, 1 mile north of Antwerp, Paulding County, 7 miles downstream from Indiana State line, and 10 miles upstream from Marie DeLarme Creek.

Drainage area.--2,049 sq mi.

Records available.--September 1921 to December 1935, April 1939 to September 1960. Monthly discharge only for April 1939, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 695.49 ft above mean sea level, adjustment of 1912. Prior to Sept. 13, 1925, chain gage at site of former bridge 400 ft upstream at same datum.

Average discharge.--35 years (1921-35, 1939-60), 1,705 cfs.

Extremes.--1921-35, 1939-60: Maximum discharge, 26,200 cfs May 20, 1943 (gage height, 20.29 ft); minimum, 24 cfs Oct. 17, 1930, June 21, 22, 1933 (gage height, 0.32 ft). Flood of Mar. 27, 1913, estimated as 40,000 cfs.

Remarks.--Low flow slightly regulated by powerplant at Fort Wayne, Ind.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,341	2,540	4,781	4,114	6,214	3,989	4,167	3,516	1,674	2,382	558	250	2,943
1952	410	1,375	1,984	7,864	4,059	5,077	4,166	2,801	795	467	225	195	2,452
1953	142	120	573	1,452	1,196	3,632	1,579	1,364	312	181	324	95.7	927
1954	81.0	132	169	304	776	2,534	3,638	909	981	573	1,533	197	985
1955	4,012	1,275	1,691	3,438	1,999	5,486	1,956	534	404	651	368	96.8	1,834
1956	533	2,774	587	293	3,496	5,070	1,911	5,394	1,084	538	474	170	1,856
1957	103	1,185	336	825	1,581	1,427	8,958	2,250	1,445	1,860	189	280	1,607
1958	752	1,232	4,668	1,174	818	1,888	1,433	622	3,157	2,591	2,153	1,225	1,818
1959	343	1,761	708	2,657	7,541	4,025	4,213	3,241	707	436	205	143	2,126
1960	650	1,593	2,205	3,785	3,567	1,509	2,967	1,189	2,771	598	263	170	1,761

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.75	1.38	2.69	2.32	3.16	2.25	2.26	1.98	0.91	1.34	0.31	0.14	19.49
1952	.23	.75	1.12	4.43	2.14	2.86	2.26	1.58	.43	.26	.13	.11	16.30
1953	.08	.14	.32	.82	.61	2.04	.86	.77	.17	.10	.18	.05	6.14
1954	.05	.07	.09	.17	.39	1.43	1.99	.51	.53	.32	.86	.11	6.52
1955	2.26	.69	.95	1.94	1.02	3.09	1.07	.30	.22	.37	.21	.05	12.17
1956	.30	1.51	.33	.16	1.84	2.85	1.04	3.03	.59	.30	.27	.09	12.31
1957	.06	.10	.19	.46	.80	.80	4.86	1.27	.79	1.05	.11	.15	10.64
1958	.42	.67	2.63	.66	.42	1.06	.78	.35	1.72	1.45	1.21	.67	12.04
1959	.19	.96	.40	1.50	3.83	2.26	2.30	1.82	.38	.25	.12	.08	14.09
1960	.37	.87	1.24	2.13	1.88	.85	1.62	.67	1.51	.54	.15	.09	11.72

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	3,938	26.09
1951	1207	15,100	Feb. 22, 1951	177	2,943	1.44	19.49	2,530	16.77
1952	1237	14,000	Jan. 28, 1952	141	2,452	1.20	16.30	2,217	14.74
1953	1277	10,800	Mar. 5, 1953	77	927	.452	6.14	878	5.81
1954	1337	7,500	Mar. 28, 1954	62	985	.481	6.52	1,542	10.21
1955	1387	13,000	Mar. 6, 1955	62	1,834	.895	12.17	1,568	10.41
1956	1437	12,900	May 3, 1956	108	1,856	.906	12.31	1,586	10.52
1957	1507	16,800	Apr. 11, 1957	77	1,607	.784	10.64	2,116	14.01
1958	1557	12,000	Dec. 21, 1957	125	1,818	.887	12.04	1,490	9.87
1959	1627	20,000	Feb. 13, 1959	95	2,126	1.04	14.09	2,265	15.02
1960	1707	12,300	Feb. 12, 1960	121	1,761	.859	11.72	-	-

1845. Bean Creek at Powers, Ohio

Location.--Lat 41°40'40", long 84°13'50", in NE $\frac{1}{4}$  sec.24, T.9 S., R.1 E., on right bank at downstream side of bridge on U.S. Highway 20, 1 mile east of Powers, Fulton County, and 2 $\frac{1}{2}$  miles upstream from Iron Creek.

Drainage area.--238 sq mi.

Records available.--October 1940 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 722.6 ft above mean sea level, adjustment of 1912. Prior to Jan. 18, 1941, wire-weight gage at same site and datum.

Average discharge.--20 years (1940-60), 169 cfs.

Extremes.--1940-60: Maximum discharge, 4,250 cfs Apr. 29, 1956 (gage height, 13.82 ft); minimum, 5.9 cfs Sept. 1-3, 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	78.5	192	425	310	705	440	322	317	113	507	96.0	31.8	295
1952	68.9	227	256	761	327	507	479	250	72.6	30.5	20.1	17.1	248
1953	17.4	26.4	28.6	38.5	41.0	214	127	98.4	26.2	16.8	15.1	11.3	55.2
1954	10.6	14.7	20.6	62.2	136	327	399	89.9	75.1	26.7	15.7	13.3	98.6
1955	154	82.2	109	289	246	364	197	74.5	75.3	36.7	18.8	10.7	138
1956	27.8	99.6	72.6	40.2	325	430	368	503	60.7	35.0	47.9	12.6	168
1957	13.4	19.6	33.3	64.6	167	127	394	127	61.9	40.2	19.7	24.9	90.0
1958	69.2	138	336	101	138	203	125	101	35.1	22.1	62.5	112	137
1959	54.8	185	69.7	199	644	520	382	168	46.5	26.3	30.2	23.2	192
1960	133	240	212	464	327	202	313	118	355	216	33.8	21.7	219

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.38	0.90	2.06	1.50	3.08	2.13	1.51	1.53	0.53	2.46	0.46	0.15	16.69
1952	.33	1.06	1.14	3.69	1.48	2.46	2.24	1.11	.34	.15	.10	.08	14.18
1953	.08	.12	.14	.19	.18	1.04	.60	.48	.12	.08	.07	.05	3.15
1954	.05	.07	.10	.30	.59	1.58	1.87	.44	.35	.13	.08	.06	5.62
1955	.75	.38	.53	1.40	1.07	1.76	.92	.36	.35	.18	.09	.05	7.84
1956	.13	.47	.35	.19	1.48	2.09	1.73	2.43	.28	.17	.23	.06	9.61
1957	.06	.09	.16	.31	.73	.62	1.85	.62	.29	.19	.10	.12	5.14
1958	.34	.65	1.63	.49	.60	.98	.59	.49	.16	1.07	.30	.53	7.83
1959	.27	.87	.34	.96	2.82	2.51	1.80	.81	.22	.13	.15	.11	10.99
1960	.64	1.13	1.03	2.25	1.48	.98	1.47	.57	1.66	1.05	.16	.10	12.52

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	362	20.63
1951	1207	3,240	July 23, 1951	25	293	1.23	16.69	279	15.88
1952	1237	1,900	Jan. 17, 1952	14	248	1.04	14.18	210	11.99
1953	1277	1,040	Mar. 4, 1953	5.9	55.2	.232	3.15	55.0	3.03
1954	1337	1,860	Mar. 25, 1954	8.4	98.6	.414	5.62	124	7.06
1955	1387	1,450	Jan. 6, 1955	8.0	138	.580	7.84	125	7.13
1956	1437	4,250	Apr. 29, 1956	10	168	.706	9.61	157	8.97
1957	1507	1,320	Apr. 27, 1957	8.6	90.0	.378	5.14	130	7.45
1958	1557	1,900	July 15, 1958	14	137	.576	7.83	117	6.69
1959	1627	1,700	Feb. 15, 1959	11	192	.807	10.99	216	12.51
1960	1707	2,600	Jan. 13, 1960	17	219	.920	12.52	-	-

## 1850. Tiffin River at Stryker, Ohio

Location.--Lat 41°30'16", long 84°25'50", in SW $\frac{1}{4}$  sec.5, T.6 N., R.4 E., on right bank at downstream side of bridge on State Highway 191 at west edge of Stryker, Williams County, 0.6 mile upstream from New York Central Railroad bridge and  $1\frac{1}{2}$  miles downstream from Leatherwood Creek.

Drainage area.--441 sq mi. At site used prior to 1953, 444 sq mi.

Records available.--September 1921 to September 1928 (published as "near Stryker"), October 1940 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 685.5 ft above mean sea level, adjustment of 1912. Prior to Sept. 30, 1928, chain gage at site  $3\frac{1}{2}$  miles downstream at different datum. Oct. 13, 1940, to Jan. 17, 1941, staff gage and Jan. 18, 1941, to Sept. 30, 1953, water-stage recorder, at site half a mile downstream at same datum.

Average discharge.--27 years (1921-28, 1940-60), 324 cfs.

Extremes.--1921-28, 1940-60: Maximum discharge, 6,640 cfs Apr. 25, 1950; maximum gage height, 16.16 ft May 1, 1956; minimum discharge, 3.6 cfs Aug. 30, 31, 1953. Flood in March 1913 reached a stage of 16.0 ft, from floodmarks (discharge, 7,600 cfs). Flood in 1937 reached a stage of 15.0 ft, from information by local resident (discharge, 6,000 cfs).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	150	485	836	720	1,367	819	789	661	187	613	113	41.2	561
1952	103	436	464	1,573	588	953	785	323	101	46.2	27.0	18.3	452
1953	19.6	31.8	43.5	74.3	87.4	501	273	202	38.2	19.7	40.7	7.40	112
1954	10.4	14.6	21.1	87.7	201	655	802	144	145	46.5	23.8	16.8	180
1955	284	156	221	606	412	704	366	115	109	58.7	42.4	12.2	257
1956	49.9	225	138	60.7	522	925	538	1,418	82.4	54.0	115	18.5	346
1957	19.2	28.5	52.4	97.8	267	242	844	247	123	106	22.5	39.1	172
1958	208	309	804	235	296	482	276	150	67.7	573	169	240	319
1959	70.3	340	110	338	1,215	983	684	537	89.9	38.5	37.9	27.1	367
1960	188	435	444	873	744	308	688	221	644	294	47.5	27.7	407

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.39	1.22	2.17	1.87	3.21	2.12	1.99	1.72	0.47	1.59	0.29	0.10	17.14
1952	.27	1.10	1.21	4.08	1.42	2.48	1.98	.84	.25	.12	.07	.05	13.87
1953	.05	.08	.11	.19	.21	1.30	.69	.52	.10	.05	.11	.02	3.43
1954	.03	.04	.06	.23	.47	1.72	2.03	.38	.37	.12	.06	.04	5.55
1955	.74	.40	.58	1.58	.97	1.84	.93	.30	.28	.15	.11	.03	7.91
1956	.13	.57	.36	.16	1.27	2.42	1.36	3.71	.21	.14	.30	.05	10.68
1957	.05	.07	.14	.26	.63	.63	2.13	.65	.31	.28	.06	.10	5.31
1958	.54	.78	2.10	.61	.70	1.26	.70	.39	.17	1.50	.44	.61	9.80
1959	.18	.86	.29	.88	2.87	2.57	1.73	1.41	.23	.10	.10	.07	11.29
1960	.49	1.10	1.16	2.28	1.82	.80	1.74	.58	1.63	.77	.12	.07	12.56

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	737	22.53
1951	1207	4,950	Feb. 22, 1951	36	561	1.26	17.14	521	15.94
1952	1237	3,460	Jan. 17, 1952	14	452	1.02	13.87	376	11.53
1953	1277	1,650	Mar. 6, 1953	3.9	112	.252	3.43	108	3.32
1954	1337	2,680	Mar. 27, 1954	7.2	180	.408	5.55	232	7.14
1955	1387	2,360	Jan. 8, 1955	8.0	257	.583	7.91	236	7.25
1956	1437	6,040	May 1, 1956	14	346	.785	10.68	320	9.88
1957	1507	1,670	Apr. 13, 1957	12	172	.390	5.31	275	8.47
1958	1557	2,630	July 18, 1958	18	319	.723	9.80	251	7.71
1959	1627	2,600	Feb. 15, 1959	16	367	.852	11.29	413	12.71
1960	1707	3,180	Jan. 15, 1960	21	407	.923	12.56	-	-

1865. Auglaize River near Fort Jennings, Ohio

Location--Lat 40°56'55", long 84°15'58", in SE $\frac{1}{4}$  sec.15, T.1 S., R.5 E., on left bank 200 ft upstream from bridge on U.S. Highway 224,  $\frac{3}{2}$  miles northeast of Fort Jennings, Putnam County, and 6 miles upstream from Ottawa River.

Drainage area--333 sq mi.

Records available--August 1921 to December 1935, October 1940 to September 1960.

Gage--Water-stage recorder. Datum of gage is 713.9 ft above mean sea level, adjustment of 1912. Prior to Oct. 6, 1930, chain gage at same site and datum.

Average discharge--34 years (1921-35, 1940-60), 293 cfs.

Extremes--1921-35, 1940-60: Maximum discharge, about 12,000 cfs Jan. 23, 1959; maximum gage height, 20.30 ft Jan. 23, 1959, from floodmark (ice jam); minimum discharge, 4.5 cfs Oct. 7, 1956; minimum gage height, 0.75 ft Aug. 28, 1932.

Remarks--Some diversion from Grand Lake by Miami & Erie Canal into Jennings Creek, tributary to Auglaize River, above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	575	538	932	779	1,057	587	507	508	183	38.1	21.1	16.3	476
1952	17.7	53.9	440	1,379	571	821	716	152	47.2	32.2	18.1	37.7	358
1953	15.9	23.5	99.3	358	250	571	160	319	35.6	29.4	64.0	10.3	162
1954	9.49	15.3	19.2	55.7	53.6	199	374	112	107	31.3	199	23.4	99.9
1955	399	136	243	508	509	1,035	152	43.0	39.8	86.5	34.9	174	267
1956	74.9	423	65.3	45.6	943	782	244	260	195	93.1	57.6	28.0	265
1957	7.93	13.4	58.8	271	385	157	1,874	612	501	490	38.7	138	376
1958	103	205	942	175	241	260	276	199	1,012	771	312	148	388
1959	42.3	447	131	1,032	1,054	484	713	232	148	36.3	20.6	33.1	359
1960	58.1	137	420	606	534	258	159	114	122	37.3	28.5	12.8	207

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	633	-
1951	1207	7,000	Dec. 4, 1950	12	476	-	-	347	-
1952	1237	6,140	Mar. 12, 1952	6.0	358	-	-	326	-
1953	1277	5,030	Mar. 5, 1953	5.2	162	-	-	154	-
1954	1337	1,820	Apr. 18, 1954	6.0	99.9	-	-	162	-
1955	1387	4,960	Mar. 5, 1955	12	267	-	-	248	-
1956	1437	3,450	Feb. 27, 1956	7.8	265	-	-	225	-
1957	1507	7,000	Apr. 6, 1957	4.9	376	-	-	475	-
1958	1557	3,590	June 12, 1958	28	388	-	-	334	-
1959	1627	12,000	Jan. 23, 1959	14	359	-	-	360	-
1960	1707	2,920	Feb. 11, 1960	9.5	207	-	-	-	-

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## 1875. Ottawa River at Allentown, Ohio

Location.--Lat 40°45'18", long 84°11'41", in NW¼ sec.29, T.3 S., R.6 E., on left bank at upstream side of bridge on State Highway 81 at Allentown, Allen County, 0.3 mile downstream from Kessler Run.

Drainage area.--168 sq mi.

Records available.--October 1923 to December 1935, August 1943 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 789.67 ft above mean sea level, adjustment of 1912. Prior to Oct. 1, 1925, chain gage and Oct. 1, 1925, to Dec. 30, 1935, water-stage recorder, at site 35 ft downstream at same datum.

Average discharge.--29 years (1923-35, 1943-60), 126 cfs.

Extremes.--1923-35, 1943-60: Maximum discharge, 7,740 cfs Jan. 22, 1959 (gage height, 10.88 ft), from rating curve extended above 4,800 cfs by logarithmic plotting; minimum, 1.4 cfs June 28, 29, 1933.  
Flood of Mar. 15, 1939, reached a stage of 10.1 ft and flood in May 1943 a stage of about 10 ft (discharge not determined).

Remarks.--Diurnal fluctuation and some regulation caused by operation of water-supply and sewage-treatment plants of city of Lima upstream from station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	197	226	378	346	446	303	272	176	50.2	24.2	19.6	19.1	203
1952	21.4	26.6	191	589	263	418	381	101	29.2	28.9	22.1	25.7	175
1953	18.6	23.8	28.4	99.0	90.0	187	68.7	129	26.2	25.0	24.6	17.6	61.4
1954	14.9	15.3	20.1	27.0	25.9	47.9	134	49.0	42.4	22.4	30.5	20.3	37.4
1955	59.1	29.3	72.9	181	235	456	60.5	25.0	24.3	44.5	39.0	21.4	104
1956	29.3	113	29.1	41.2	357	385	118	114	137	64.3	34.0	18.7	119
1957	17.5	20.1	30.8	105	190	61.4	825	264	317	133	19.5	29.9	166
1958	29.1	36.1	331	72.9	117	124	111	116	221	281	131	82.9	138
1959	24.1	210	65.4	542	580	270	310	116	50.2	26.3	25.7	37.0	185
1960	46.5	45.5	192	241	241	115	82.2	59.7	41.5	25.0	25.0	20.2	94.2

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.35	1.51	2.59	2.38	2.76	2.08	1.81	1.21	0.33	0.17	0.13	0.13	16.45
1952	.15	.18	1.31	4.05	1.69	2.87	2.53	.69	.19	.20	.15	.17	14.18
1953	.13	.16	.19	.68	.56	1.28	.46	.89	.17	.16	.17	.12	4.97
1954	.10	.10	.14	.19	.16	.33	.89	.34	.28	.15	.21	.14	3.03
1955	.41	.19	.50	1.24	1.46	3.12	.40	.17	.16	.31	.27	.14	8.37
1956	.20	.75	.20	.28	2.29	2.64	.78	.78	.91	.44	.23	.12	9.62
1957	.12	.13	.21	.72	1.18	.42	5.48	1.61	2.11	.91	.13	.20	13.42
1958	.20	.24	2.27	.50	.72	.85	.74	.80	1.47	1.92	.90	.55	11.16
1959	.16	1.40	.43	3.72	3.59	1.86	2.06	.80	.33	.18	.18	.25	14.96
1960	.32	.30	1.31	1.65	1.54	.79	.55	.41	.28	.17	.17	.13	7.62

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	241	19.44
1951	1207	4,250	Dec. 3, 1950	14	203	1.21	16.45	156	12.64		
1952	1237	3,930	Mar. 11, 1952	13	175	1.04	14.18	161	13.02		
1953	1277	1,770	Mar. 4, 1953	12	61.4	.365	4.97	59.7	4.83		
1954	1337	1,340	Apr. 17, 1954	11	37.4	.223	3.03	46.8	3.79		
1955	1397	2,780	Mar. 4, 1955	11	104	.619	8.37	104	8.42		
1956	1437	2,230	Feb. 25, 1956	14	119	.708	9.62	111	8.93		
1957	1507	5,300	June 29, 1957	9.6	166	.988	13.42	194	15.67		
1958	1557	1,840	July 16, 1958	13	138	.821	11.16	129	10.44		
1959	1627	7,740	Jan. 22, 1959	16	185	1.10	14.96	184	14.90		
1960	1707	1,860	Dec. 13, 1959	17	94.2	.561	7.62	-	-		



Location.--Lat 40°59'35", long 83°39'05", on line between sec.1, T.1 S., R.10 E., and sec.36, T.1 N., R.10 E., on right bank at downstream side of highway bridge, 3 $\frac{1}{4}$  miles south of Findlay, Hancock County, and 4 $\frac{1}{4}$  miles upstream from mouth.

Records available.--October 1946 to July 1957. Prior to February 1947, monthly discharge only published in WSP 1307.

Average discharge.--10 years (1946-56), 46.1 cfs.

Extremes.--1946-57: Maximum discharge, 2,920 cfs June 7, 1947; maximum gage height, 13.45 ft June 29, 1957; no flow for many days.

Maximum discharge known, 6,300 cfs, in January or February 1959, on basis of contracted-opening measurement of peak flow (gage height not recoverable).

[illegible][illegible][illegible]

1890. Blanchard River near Findlay, Ohio

Location.--Lat 41°03'21", long 83°41'17", on east line of sec.10, T.1 N., R.10 E., on left bank at upstream side of county highway bridge, 2 miles west of Findlay, Hancock County, and 3 miles downstream from Eagle Creek.

Drainage area.--343 sq mi.

Records available.--October 1923 to December 1935, October 1940 to September 1960.

Monthly discharge only for October 1923, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 754.55 ft above mean sea level. Prior to July 24, 1930, chain gage at same site and datum.

Average discharge.--32 years (1923-35, 1940-60), 241 cfs.

Extremes.--1923-35, 1940-60: Maximum discharge, 15,000 cfs Feb. 11, 1959 (gage height, 16.76 ft); minimum, 0.4 cfs Aug. 26, 27, Sept. 3, 1934.

Flood in March 1913 reached a stage of 18.5 ft (discharge, 22,000 cfs, from rating curve extended above 10,000 cfs).

Note.--Maximum discharges for the water years 1936-40, not previously published, have been estimated and furnished by the Corps of Engineers as shown in the following table:

Water year	Date	Discharge (cfs)
1935	Feb. 27, 1936	5,800
1937	June 22, 1937	9,200
1938	Apr. 9, 1938	6,200
1939	Mar. 13, 1939	7,900
1940	Apr. 18, 1940	5,600

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	270	510	672	771	875	720	522	318	77.8	40.6	9.35	4.89	397
1952	6.01	29.3	379	1,370	507	845	681	120	28.6	9.90	5.93	7.04	333
1953	4.71	7.66	27.1	164	86.6	298	89.6	553	42.1	144	26.1	4.51	122
1954	5.79	5.60	8.82	27.9	32.2	160	4.67	83.0	36.1	11.5	28.3	5.61	72.2
1955	144	53.8	128	360	495	1,035	141	36.6	22.1	17.3	13.2	6.84	204
1956	12.2	126	23	30.7	663	866	192	429	387	46.2	34.2	10.6	233
1957	8.12	10.5	25.9	147	340	119	586	250	626	259	12.6	64.5	286
1958	48.3	108	610	145	254	223	208	167	293	330	224	111	227
1959	16.4	311	86.4	1,168	1,402	661	616	249	49.1	53.7	45.6	51.9	386
1960	34.6	101	409	627	631	262	172	95.5	149	47.5	23.4	6.74	212

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.91	1.66	2.26	2.59	2.66	2.42	1.70	1.07	0.25	0.14	0.03	0.02	15.71
1952	.02	.09	1.27	4.80	1.60	2.84	2.22	.40	.09	.03	.02	.02	13.20
1953	.02	.02	.09	.55	.26	1.00	.29	1.88	.14	.48	.09	.01	4.81
1954	.01	.02	.03	.09	.10	.54	1.52	.28	.12	.04	.10	.02	2.87
1955	.48	.18	.43	1.21	1.50	3.48	.46	.12	.07	.06	.04	.02	8.05
1956	.04	.41	.08	.10	2.08	2.90	.62	1.44	1.26	.16	.12	.03	9.24
1957	.03	.03	.09	.49	1.03	.40	5.17	.84	2.04	.87	.04	.27	11.30
1958	.16	.35	2.05	.49	.77	.75	.68	.56	.95	1.11	.75	.36	8.98
1959	.06	1.01	.29	3.93	4.26	2.22	2.01	.84	.16	.18	.15	.17	15.28
1960	.12	.33	1.37	2.11	1.98	.68	.56	.32	.48	.16	.08	.02	8.41

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	438	17.34	
1951	1207	4,900	Nov. 21, 1950	2.6	397	1.16	15.71	310	12.26	
1952	1237, 1387	7,020	Jan. 27, 1952	3.0	353	.971	13.20	301	11.95	
1953	1277	2,370	May 18, 1953	2.44	122	.356	4.81	120	4.74	
1954	1337	2,470	Apr. 17, 1954	2.2	72.2	.210	2.87	98.2	3.90	
1955	1387	5,100	Mar. 4, 1955	3.7	204	.595	8.05	189	7.49	
1956	1437	4,700	Feb. 26, 1956	5.2	233	.679	9.24	224	8.86	
1957	1507	6,580	Apr. 6, 1957	4.6	286	.834	11.30	347	13.71	
1958	1557	2,470	Dec. 7, 1957	9.2	227	.662	8.98	196	7.78	
1959	1627	15,000	Feb. 11, 1959	7.6	366	1.13	15.28	397	15.74	
1960	1707	3,370	Feb. 11, 1960	4.8	212	.618	8.41	-	-	

## 1895. Blanchard River at Glandorf, Ohio

Location.--Lat 41°02'40", long 84°04'55", in NE¼ sec.17, T.1 N., R.7 E., near center of span on upstream side of highway bridge half a mile upstream from Pike Run and three-quarters of a mile north of Glandorf, Putnam County.

Drainage area.--643 sq mi.

Records available.--November 1902 to August 1903, gage heights and discharge measurements only (published as "at Ottawa"), August 1921 to September 1928, October 1946 to December 1951. Monthly figures only for some periods, published in WSP 1307.

Gage.--Wire-weight gage. Datum of gage is 697.02 ft above mean sea level (levels by Ohio Division of Water). Aug. 30, 1921, to July 31, 1928, chain gage at same site and datum.

Average discharge.--12 years (1921-28, 1946-51), 598 cfs.

Extremes.--1921-28, 1946-51: Maximum discharge, 15,800 cfs Feb. 15, 1950 (gage height, 27.0 ft, from gage readings on crest); minimum, 0.3 cfs Oct. 7, 1951 (gage height, 1.73 ft).

Flood of Feb. 12, 1959, reached a stage of 27.9 ft, from floodmark (discharge, 17,700 cfs).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	628	1,044	1,376	1,398	1,609	1,253	942	852	179	86.6	12.5	9.89	778
1952	12.8	63.8	526	-	-	-	-	-	-	-	-	-	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.13	1.61	2.47	2.50	2.60	2.25	1.63	1.53	0.31	0.16	0.02	0.02	16.43
1952	.02	.11	.94	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	981	20.70
1951	1207	6,790	Dec. 4, 1950	3.3	778	1.21	16.43	573	12.09
1952	1237	-	-	-	-	-	-	-	-

## 1910. Town Creek near Van Wert, Ohio

Location.--Lat 40°49'30", long 84°34'50", in sec.36, T.2 S., R.2 E., on left bank at downstream side of bridge on U.S. Highway 127, 3 miles south of Van Wert, Van Wert County, and 5½ miles downstream from Roller Creek.

Drainage area.--20.4 sq mi.

Records available.--July 1945 to September 1953.

Gage.--Water-stage recorder. Datum of gage is 777.93 ft above mean sea level (levels by Ohio Department of Highways).

Average discharge.--8 years (1945-53), 20.7 cfs.

Extremes.--1945-53: Maximum discharge, 935 cfs Mar. 21, 1948 (gage height, 9.34 ft), from rating curve extended above 440 cfs; maximum gage height, 9.73 ft Mar. 11, 1952; no flow for many days each year.

Flood of Feb. 10, 1959, reached a stage of 11.77 ft from floodmark (discharge, 2,350 cfs, on basis of contracted-opening measurement of peak flow at site 2.6 miles upstream with drainage area of 17.8 sq mi, adjusted to gage site by 0.8 power of drainage area ratio).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	20.8	23.6	47.2	45.1	65.6	31.9	37.6	30.6	31.2	1.08	0	0	27.6
1952	.35	3.07	29.1	87.5	38.9	60.6	46.4	26.5	.86	1.61	1.15	.13	24.7
1953	0	.46	6.16	20.3	20.0	47.5	9.87	8.19	.61	1.40	.07	0	9.53

## STREAMS TRIBUTARY TO LAKE ERIE

Monthly and yearly runoff, in inches, of Town Creek near Van Wert, Ohio

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.18	1.29	2.66	2.55	3.35	1.80	2.05	1.73	1.71	0.06	0	0	18.38
1952	.02	.17	1.65	4.95	2.06	3.42	2.53	1.50	.05	.09	.06	.007	16.51
1953	0	.03	.35	1.15	1.02	2.69	.54	.46	.03	.08	.004	0	6.35

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	37.3	24.78
1951	1207	696	Feb. 21, 1951	0	27.6	1.35	18.38	22.7	15.09
1952	1237	810	Mar. 11, 1952	0	24.7	1.21	16.51	22.5	15.05
1953	1277	640	Mar. 4, 1953	0	9.53	.467	6.35	-	-

## 1915. Auglaize River near Defiance, Ohio

Location.--Lat 41°14'15", long 84°24'02", in NE $\frac{1}{4}$  sec.9, T.3 N., R.4 E., on right bank 125 ft downstream from dam and powerplant of Toledo Edison Co., a quarter of a mile upstream from Jackson ditch, and 3 miles south of Defiance, Defiance County.

Drainage area.--2,329 sq mi.

Records available.--May to August 1903 (gage heights only), April 1915 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 660.00 ft above mean sea level, adjustment of 1912. May 20 to Aug. 8, 1903, staff gage at site  $1\frac{1}{2}$  miles downstream at different datum. Apr. 13, 1915, to Dec. 6, 1933, staff gage near right bank on upstream side of dam at datum 6.00 ft higher. Auxiliary tailwater staff gage near right bank on downstream side of dam at present datum.

Average discharge.--45 years (1915-60), 1,695 cfs.

Extremes.--1915-60: Maximum discharge, 52,500 cfs Feb. 16, 1950, Feb. 12, 1959 (gage height, 26.4 ft, from graph based on hourly powerplant tailwater-gage readings and gage readings, respectively); maximum gage height, 27.65 ft Feb. 13, 1959, from flood-mark (ice jam); minimum daily discharge, 0.5 cfs Oct. 13, 14, 1952 (during repairs to powerplant dam).

Flood in March 1913 reached a stage of 38.8 ft from reading on powerplant tailwater gage at present datum (discharge, 120,000 cfs, from rating curve extended above 51,000 cfs).

Remarks.--Flow regulated by powerplant above station (reservoir capacity, 9,800 acre-ft). Some diversion by Miami & Erie Canal from Grand Lake into Jennings Creek, tributary to Auglaize River above station.

Correction.--In WSP 1307 the date of the maximum discharge for the water year 1937 is listed in error; it should be Jan. 16, 1937.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	3,212	3,560	5,255	4,522	6,584	4,105	3,778	3,076	1,130	430	66.2	55.1	2,961
1952	44.4	378	2,350	9,445	3,788	5,870	4,392	2,196	243	95.7	55.4	204	2,426
1953	23.6	7.28	252	1,489	1,259	3,308	1,074	1,595	134	279	175	63.6	806
1954	39.9	16.3	36.5	164	368	1,213	2,336	637	696	152	961	111	560
1955	3,445	837	1,468	3,335	2,665	7,862	1,907	275	153	408	198	48.0	1,889
1956	225	2,383	261	175	5,541	6,067	1,529	2,695	1,717	407	286	88.9	1,765
1957	50.6	54.2	191	1,141	1,898	1,238	11,210	2,207	1,953	2,504	93.2	290	1,887
1958	496	910	5,214	893	1,162	1,913	1,610	951	4,412	3,133	1,515	419	1,892
1959	105	2,287	613	4,793	9,960	4,287	4,082	2,631	500	205	99.5	228	2,429
1960	345	908	2,801	4,150	3,977	1,467	1,531	640	1,157	159	71.6	62.9	1,431

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	4,002	-
1951	1207	29,900	Dec. 5, 1950	40	2,961	-	-	2,184	-
1952	1237	32,400	Mar. 13, 1952	14	2,426	-	-	2,217	-
1953	1277	14,800	Mar. 5, 1953	5	806	-	-	790	-
1954	1337	7,470	Apr. 18, 1954	1.6	560	-	-	1,038	-
1955	1387	27,000	Mar. 6, 1955	37	1,889	-	-	1,641	-
1956	1437	22,600	Feb. 27, 1956	35	1,765	-	-	1,553	-
1957	1507	33,900	Apr. 6, 1957	21	1,887	-	-	2,421	-
1958	1557	18,100	Dec. 20, 1957	28	1,892	-	-	1,581	-
1959	1627	52,500	Feb. 12, 1959	21	2,429	-	-	2,522	-
1960	1707	17,800	Feb. 12, 1960	16	1,431	-	-	-	-

1920. Miami &amp; Erie Canal near Defiance, Ohio

Location.--Lat 41°17'30", long 84°16'50", in NW¼ sec.22, T.4 N., R.5 E., on right bank adjacent to Independence Dam, 275 ft downstream from point of diversion from Maumee River and 4½ miles east of Defiance, Defiance County.

Records available.--October 1924 to July 1929, May to December 1935, October 1952 to September 1960. Monthly discharge only for October 1924, published in WSP 1307. Published as "near Florida" May to December 1935.

Gage.--Water-stage recorder. Datum of gage is 656.12 ft above mean sea level. Prior to July 23, 1929, water-stage recorder at same site at datum 2.69 ft higher. May to December 1935, staff gage at site 5½ miles downstream at different datum. Oct. 1, 1952, to Mar. 25, 1953, staff gage at present site and datum.

Extremes.--1924-29, 1935, 1952-60: Maximum daily discharge, about 900 cfs Feb. 12, 1959; no flow at times.

Remarks.--Flow is diverted from Maumee River into canal at headgates 275 ft upstream and returned to river above station at Waterville.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	57.3	55.1	56.5	8.3	0	20.6	92.1	101	78.6	88.9	85.5	74.8	60.2
1954	75.0	72.2	60.8	49.4	52.6	53.5	32.7	37.8	71.2	68.0	78.5	69.2	60.1
1955	29.5	8.26	7.62	10.6	11.6	8.67	6.55	61.7	69.2	73.0	69.9	66.2	35.4
1956	76.8	25.2	7.74	4.76	11.7	19.4	54.3	121	79.5	63.4	70.0	56.4	49.3
1957	48.5	43.5	39.0	24.9	31.2	20.7	23.6	32.4	40.5	45.9	25.0	80.4	37.9
1958	79.9	5.84	10.8	2.48	3.65	2.01	20.2	30.0	124	115	104	82.5	48.7
1959	67.1	83.2	69.2	95.2	237	90.4	73.7	60.5	45.0	51.8	50.7	43.2	79.5
1960	38.5	32.0	30.6	36.7	30.0	22.5	21.9	23.0	29.6	28.6	27.0	26.7	28.9

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	1277	120	May 25, 1953	0	60.2	-	-	63.5	-
1954	1337	97	Aug. 21, 27, 28	21	60.1	-	-	46.5	-
1955	1387	96	July 17, 1955	2.2	35.4	-	-	40.8	-
1956	1437	214	Apr. 29, 1956	-	49.3	-	-	51.1	-
1957	1507	113	Sept. 23, 24	1.8	37.9	-	-	35.1	-
1958	1557	173	June 15, 1958	.5	48.7	-	-	59.0	-
1959	1627	900	Feb. 12, 1959	39	79.5	-	-	69.6	-
1960	1707	80	Jan. 12, 1960	17	28.9	-	-	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

## 1925. Maumee River near Defiance, Ohio

Location.--Lat 41°17'30", long 84°16'50", in NW $\frac{1}{4}$  sec.22, T.4 N., R.5 E., on left bank 40 ft upstream from Independence Dam, 275 ft downstream from point of diversion to Miami & Erie Canal, 4 miles downstream from Auglaize River, and  $4\frac{1}{2}$  miles east of Defiance, Defiance County.

Drainage area.--5,530 sq mi.

Records available.--October 1924 to December 1935, March 1939 to September 1960.

Gage.--Water-stage recorder above concrete dam. Datum of gage is 659.12 ft above mean sea level. Prior to Nov. 13, 1924, staff gage at same site and datum.

Average discharge.--32 years (1924-35, 1939-60), 4,081 cfs (not including flow in Miami & Erie Canal).

Extremes.--1924-35, 1939-60: Maximum discharge, 87,100 cfs Feb. 16, 1950 (gage height, 13.70 ft); maximum gage height, 13.77 ft Feb. 11, 1959 (ice jam); minimum discharge, 2 cfs Sept. 3, 1925 (gage height, 1.14 ft).

Remarks.--Flow affected by regulation of Auglaize River at hydroelectric plant of Toledo Edison Co., 3 miles south of Defiance. Water diverted into Miami & Erie Canal, 275 ft upstream, bypasses station. These records do not include flow in canal; record of diversion published as Miami & Erie Canal near Defiance (see p. 245).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	5,166	7,598	12,660	10,550	16,720	10,220	10,100	8,706	3,304	3,768	803	416	7,448
1952	604	2,531	5,020	22,410	9,684	13,690	10,610	6,038	1,253	634	312	369	6,118
1953	124	217	906	3,290	2,716	8,376	3,171	3,419	444	373	504	101	1,975
1954	68.5	110	168	473	1,566	5,305	7,719	1,912	1,869	772	2,329	288	1,879
1955	8,314	2,377	3,829	8,234	5,538	15,740	4,972	989	651	1,070	520	86.1	4,376
1956	773	6,103	951	464	10,130	13,680	4,644	11,550	2,913	896	937	234	4,418
1957	111	203	544	2,117	4,048	3,047	23,210	5,354	3,942	4,832	309	562	3,991
1958	1,637	2,897	12,210	2,605	2,583	5,117	3,820	1,895	7,668	6,844	4,739	1,859	4,510
1959	490	4,492	1,403	7,396	22,460	10,490	9,588	7,369	1,454	708	297	332	5,419
1960	1,152	3,225	6,016	10,150	8,700	3,489	5,924	2,197	5,006	1,138	354	232	4,023

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	9,937	-
1951	1207	52,400	Feb. 23, 1951	301	7,448	-	-	5,995	-
1952	1237	50,900	Mar. 13, 1952	185	6,118	-	-	5,540	-
1953	1277	33,200	Mar. 5, 1953	51	1,975	-	-	1,899	-
1954	1337	18,600	Mar. 26, 1954	51	1,678	-	-	3,075	-
1955	1387	44,000	Mar. 6, 1955	54	4,376	-	-	3,797	-
1956	1437	36,100	Mar. 8, 1956	93	4,418	-	-	3,844	-
1957	1507	55,500	Apr. 7, 1957	85	3,991	-	-	5,333	-
1958	1557	36,100	Dec. 21, 1957	126	4,510	-	-	3,626	-
1959	1627	76,500	Feb. 12, 1958	99	5,419	-	-	5,763	-
1960	1707	37,600	Feb. 12, 1960	137	4,023	-	-	-	-

## 1935. Maumee River at Waterville, Ohio

Location.--Lat 41°30'00", long 83°42'46", on downstream side of second pier from left end of bridge on State Highway 64 at Waterville, Lucas County, 3 miles downstream from Tontogany Creek.

Drainage area.--6,314 sq mi.

Records available.--November 1898 to December 1901, August 1921 to December 1935, March 1939 to September 1960. Monthly discharge only for March 1939, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 596.33 ft above mean sea level, adjustment of 1912. Nov. 19, 1898, to Dec. 31, 1901, wire-weight gage, Aug. 26, 1921, to July 31, 1930, chain gage, Aug. 1, 1930, to Dec. 31, 1935, water-stage recorder, and Mar. 14, 1939, to Mar. 12, 1940, chain gage, all at same site and datum.

Average discharge.--35 years (1921-35, 1939-60), 4,821 cfs (includes flow in Miami & Erie Canal at Waterville 1922-29; canal was abandoned in 1929 and was filled in prior to March 1939).

Extremes.--1921-35, 1939-60: Maximum discharge, 94,000 cfs Feb. 16, 1950 (gage height, 14.52 ft); maximum gage height, 16.17 ft Feb. 12, 1959 (ice jam); practically no flow at times prior to June 30, 1929, when entire river flow was being diverted by canal; minimum since canal was abandoned, 32 cfs Sept. 29, 1941.

Flood of March 1913 reached a stage of 19.9 ft from information by local resident (estimated discharge, 180,000 cfs, from rating curve extended above 94,000 cfs on basis of logarithmic plotting).

Remarks.--Low flow slightly regulated by powerplants above station. Records include flow of Miami & Erie Canal near Defiance (see p.245 ), which returns to river above this station. Small diversion above gage into Portage River basin. Records of chemical analyses March 1950 to February 1952, suspended-sediment loads April 1950 to September 1960, and water temperatures March 1950 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	6,282	9,066	14,350	12,030	18,080	12,150	11,510	9,837	4,934	4,286	806	356	8,587
1952	639	3,203	6,322	25,440	11,370	15,280	12,110	6,980	1,414	688	306	386	7,016
1953	186	294	917	3,877	5,066	9,651	3,646	4,216	601	483	688	146	2,302
1954	138	213	296	579	1,820	6,687	9,109	2,248	2,307	903	2,596	394	2,270
1955	9,041	2,418	4,133	9,395	6,051	17,630	5,744	1,115	869	1,377	666	144	4,899
1956	930	7,571	1,303	509	11,700	15,850	5,525	14,230	3,395	985	1,155	325	5,266
1957	193	295	678	2,970	4,686	3,531	25,890	5,710	4,412	5,616	360	663	4,547
1958	2,140	3,494	13,740	3,017	2,791	5,801	4,483	2,094	8,797	8,585	6,185	2,073	5,293
1959	523	5,057	1,742	8,843	26,270	12,990	10,840	9,543	1,699	893	348	349	6,452
1960	1,424	4,610	7,919	13,300	12,500	4,013	7,345	2,660	6,618	1,306	374	266	5,160

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.15	1.61	2.62	2.20	2.98	2.21	2.03	1.80	0.87	0.78	0.15	0.06	18.46
1952	1.12	.57	1.15	4.65	1.94	2.79	2.14	1.28	.25	.13	.06	.07	15.15
1953	.03	.05	.17	.67	.51	1.76	.64	.77	.11	.09	.12	.03	4.95
1954	.03	.04	.05	.11	.30	1.22	1.61	.41	.41	.16	.47	.07	4.88
1955	1.65	.43	.76	1.72	.99	3.22	1.02	.20	.15	.25	.12	.03	10.54
1956	.17	1.34	.24	.09	2.00	2.89	.98	2.59	.60	.18	.21	.06	11.35
1957	.04	.05	1.12	.54	.77	1.64	4.57	1.04	1.78	1.02	.07	.12	9.76
1958	.38	.62	2.51	.55	.46	1.06	.79	.38	1.55	1.57	1.13	.37	11.38
1959	.10	.89	.32	1.61	4.33	2.38	1.92	1.74	.30	.16	.06	.06	13.87
1960	.26	.81	1.44	2.43	2.14	.73	1.29	.49	1.17	.24	.07	.05	11.12

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	11,300	24.31
1951	1207	54,000	Feb. 23, 1951	168	8,587	1.36	18.46	6,944	14.92
1952	1237	54,000	Jan. 28, 1952	186	7,016	1.11	15.15	6,281	13.56
1953	1277	35,500	Mar. 6, 1953	83	2,302	.365	4.95	2,238	4.82
1954	1337	24,100	Mar. 26, 1954	80	2,270	.360	4.88	3,533	7.60
1955	1387	46,800	Mar. 6, 1955	63	4,899	.776	10.54	4,393	9.45
1956	1437	48,800	May 12, 1956	110	5,266	.834	11.35	4,554	9.81
1957	1507	62,400	Apr. 7, 1957	68	4,547	.720	9.76	6,085	13.07
1958	1557	41,100	Dec. 21, 1957	229	5,293	.858	11.38	4,265	9.17
1959	1627	85,000	Feb. 12, 1959	114	6,452	1.02	13.87	7,017	15.07
1960	1707	46,800	Feb. 11, 1960	116	5,160	.817	11.12	-	-

## 1955. Portage River at Woodville, Ohio

Location.--Lat 41°26'55", long 83°21'41", in sec.28, T.6 N., R.13 E., on left bank at upstream side of bridge on U.S. Highway 20 in Woodville, Sandusky County.

Drainage area.--433 sq mi.

Records available.--July 1928 to December 1935, October 1939 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 615.14 ft above mean sea level, adjustment of 1912. Prior to Mar. 24, 1933, chain gage, Apr. 7 to Oct. 8, 1933, staff gage, Oct. 9, 1933, to Dec. 31, 1935, water-stage recorder, and Oct. 17 to Nov. 29, 1939, wire-weight gage, all at same site and datum.

Average discharge.--28 years (1928-35, 1939-60), 312 cfs (adjusted for diversion).

Extremes.--1928-35, 1939-60: Maximum discharge, 11,500 cfs Feb. 15, 1950 (gage height, 14.51 ft); minimum, 0.3 cfs Aug. 28, 1931; minimum gage height, 1.60 ft July 25, 26, 1934.

Flood in March 1913 reached a stage of 17 ft, from information by local residents (discharge, 17,000 cfs, from rating curve extended above 11,500 cfs).

Remarks.--Records of suspended sediment loads for the period October 1950 to September 1956 and water temperatures for the period October 1952 to September 1956 are published in reports of the Geological Survey. Flow supplemented by water diverted from Maumee River basin for municipal supply of Bowling Green 16 miles upstream. Diversion began Sept. 1, 1951.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	722	824	864	965	1,220	1,027	542	471	844	44.2	8.08	7.64	624
1952	8.17	111	514	2,129	793	1,162	805	361	25.5	33.2	6.45	9.65	498
1953	7.97	13.6	32.5	276	143	386	287	460	44.5	40.2	20.4	8.00	144
1954	3.73	3.61	6.75	30.7	113	573	566	119	68.3	20.4	41.5	8.96	131
1955	349	110	284	605	673	1,437	365	45.1	13.3	68.3	14.0	6.80	330
1956	20.3	396	90.0	33.3	927	1,370	362	1,197	365	139	72.5	27.1	415
1957	11.0	9.68	91.9	275	492	141	1,955	173	381	171	8.77	36.8	311
1958	125	232	968	147	314	374	345	116	336	821	459	27.7	357
1959	14.6	194	94.2	769	1,660	936	718	409	55.4	16.4	9.95	73.0	404
1960	144	295	643	1,033	867	338	259	98.0	193	92.1	15.1	8.06	331

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.92	2.12	2.31	2.57	2.94	2.73	1.40	1.26	2.18	0.12	0.02	0.01	19.58
1952	.02	.28	1.36	5.66	1.97	3.09	2.06	.96	.06	.08	.01	.02	15.57
1953	.02	.03	.08	.73	.34	1.02	.74	1.22	.11	.10	.05	.009	4.45
1954	.006	.006	.01	.08	.27	1.52	1.45	.51	.22	.05	.11	.01	4.04
1955	.92	.28	.75	1.60	1.61	3.63	.94	.12	.03	.18	.03	.007	10.30
1956	.05	1.02	.24	.09	2.31	3.64	.93	3.18	.94	.37	.19	.06	13.02
1957	.02	.02	.24	.72	1.18	.37	5.06	.46	.98	.45	.02	.09	9.61
1958	.33	.59	2.57	.39	.75	.99	.89	.30	.86	2.18	1.22	.06	11.13
1959	.03	.50	.25	2.04	3.99	2.49	1.84	1.08	.14	.04	.02	.18	12.60
1960	.38	.76	1.71	2.74	2.16	.89	.66	.26	.49	.24	.03	.01	10.33

Note.--Records for September 1951 to September 1955 corrected for diversion.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	-	-
1951	1207	7,510	Jan. 4, 1951	3.9	624	624	1.44	19.58	761	474	14.89
1952	1237	9,490	Mar. 12, 1952	2.3	498	496	1.15	15.57	475	447	14.04
1953	1277	4,140	May 24, 1953	2.3	144	142	.328	4.45	141	139	4.34
1954	1337	3,610	Mar. 26, 1954	1.9	131	129	.298	4.04	193	191	5.97
1955	1387	6,150	Mar. 5, 1955	1.8	330	328	.758	10.30	309	307	9.69
1956	1437	8,740	May 13, 1956	4.8	415	413	.954	13.02	383	381	11.99
1957	1507	8,180	Apr. 6, 1957	5.2	309	307	.709	9.61	411	409	12.82
1958	1557	4,930	(a)	5.5	357	355	.820	11.13	270	268	8.42
1959	1627	7,490	Feb. 12, 1959	4.6	404	402	.928	12.60	470	468	14.07
1960	1707	5,270	Jan. 14, 1960	5.2	331	329	.760	10.33	-	-	-

a Dec. 9, 1957, Feb. 25, July 13, 1958.

Note.--Records for September 1951 to September 1955 corrected for diversion.



## 1960. Sandusky River near Bucyrus, Ohio

Location.--Lat 40°48'13", long 83°00'21", in NE $\frac{1}{4}$  sec.10, T.3 S., R.16 E., on right bank at upstream side of highway bridge,  $1\frac{1}{2}$  miles west of Bucyrus, Crawford County, and 12 miles downstream from Loss Creek.

Drainage area.--89.8 sq mi.

Records available.--August 1925 to November 1935, July 1938 to December 1951.

Gage.--Water-stage recorder. Datum of gage is 955.9 ft above mean sea level, adjustment of 1912. Prior to May 11, 1940, chain gage at same site and datum.

Average discharge.--23 years (1925-35, 1938-51), 81.5 cfs.

Extremes.--1925-35, 1938-51: Maximum discharge observed, 5,800 cfs Dec. 14, 1927 (gage height, 9.15 ft); minimum discharge, 0.4 cfs Sept. 23, 1941, July 16, 1942. Flood of Mar. 23, 1913, reached a stage of 14.5 ft, from floodmarks. Flood of Jan. 22, 1959, reached a stage of 11.9 ft, from floodmarks (13,500 cfs, on basis of contracted-opening measurement of peak flow at site  $2\frac{1}{2}$  miles upstream with drainage area of 85.4 sq mi, adjusted to gage site by 0.8 power of the drainage-area ratio).

Remarks.--Low flow slightly affected by operation of reservoirs for municipal supply of Bucyrus.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	21.6	84.4	215	264	269	178	127	58.9	11.2	7.96	3.11	3.41	103
1952	2.70	18.7	226	-	-	-	-	-	-	-	-	-	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.28	1.05	2.76	3.39	3.12	2.28	1.57	0.76	0.14	0.10	0.04	0.04	15.53
1952	.03	.23	2.90	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Runoff, drainage, in cubic feet per second									
Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	145	21.98
1951	1207	2,270	Jan. 4, 1951	1.6	103	1.15	15.53	96.7	14.60
1952	1237	-	-	-	-	-	-	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

1965. Sandusky River near Upper Sandusky, Ohio

Location--Lat 40°51'02", long 83°15'23", in sec.21, T.2 S., R.14 E., on left bank at downstream side of highway bridge, three-quarters of a mile upstream from Rock Run and 2 miles northeast of Upper Sandusky, Wyandot County.

Drainage area--299 sq mi.

Records available--October 1921 to December 1935, January 1938 to September 1960. Gage-height records (fragmentary) collected at site 3 miles upstream since 1912 are contained in reports of U.S. Weather Bureau.

Gage--Water-stage recorder. Datum of gage is 792.8 ft above mean sea level, adjustment of 1912. Prior to Sept. 14, 1924, chain gage at same site and datum.

Average discharge--36 years (1921-35, 1938-60), 239 cfs.

Extremes--1921-35, 1938-60: Maximum discharge, about 10,000 cfs Jan. 22, 1959; maximum gage height, 15.00 ft in gage well, 15.55 ft from outside floodmark, Jan. 22, 1959 (ice jam); minimum discharge, 0.6 cfs Sept. 13, 14, 1955; minimum gage height, 0.67 ft Sept. 6, 7, 1934.

Flood in June 1937 reached a stage of 14.3 ft, from high-water marks in gage well.

Correction--In WSP 1307, the monthly means for September 1922-30 are listed in error; they should be 589, 594, 12.7, 120, 527, 30.5, 10.3, 13.5, 10.1 cfs, respectively.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	77.7	246	595	723	872	591	439	193	33.1	17.0	4.57	4.47	513
1952	5.04	37.1	537	1,248	488	714	608	70.7	22.3	12.3	4.02	12.2	314
1953	3.96	8.06	28.9	177	116	165	102	363	21.7	117	16.8	3.16	94.0
1954	2.82	5.94	9.50	35.2	51.2	213	678	101	92.2	10.1	12.7	3.51	101
1955	50.8	22.2	93.2	255	618	909	151	28.0	8.58	13.6	11.1	1.22	178
1956	8.01	96.8	22.0	70.9	814	749	164	426	314	84.0	47.2	8.44	231
1957	6.86	9.37	37.5	162	359	155	1,399	441	327	107	9.44	215	266
1958	40.8	199	659	204	211	241	310	220	192	260	504	50.6	257
1959	25.9	150	112	955	955	507	569	324	61.7	29.8	9.71	7.42	305
1960	13.7	35.1	224	433	412	220	305	75.3	160	31.4	15.9	5.92	160

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.30	0.92	2.29	2.79	3.04	2.28	1.64	0.74	0.12	0.07	0.02	0.02	14.23
1952	.02	.14	2.08	4.81	1.76	2.76	.27	.08	.05	.02	.05	.02	14.30
1953	.02	.03	.11	.68	.40	.64	.38	1.40	.08	.45	.06	.01	4.26
1954	.01	.02	.04	.14	.18	.82	2.53	.39	.34	.04	.05	.01	4.57
1955	.20	.08	.36	.98	2.16	3.50	.56	.11	.03	.05	.04	.005	8.08
1956	.03	.36	.09	.27	2.93	2.89	.61	1.64	1.17	.32	.18	.03	10.52
1957	.03	.03	.14	.62	1.25	.60	5.22	1.70	1.22	.41	.04	.79	12.05
1958	.16	.74	2.47	.79	.74	.93	1.16	.85	.72	1.00	1.95	.19	11.70
1959	.10	.56	.43	3.68	3.52	1.96	2.12	1.24	.23	.12	.04	.03	13.83
1960	.05	.13	.86	1.67	1.49	.85	1.14	.29	.60	.12	.06	.02	7.28

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	417	18.93
1951	1207	4,510	Dec. 4, 1950	1.5	313	1.05	14.23	285			12.96
1952	1237	7,070	Jan. 27, 1952	1.5	314	1.05	14.30	268			12.22
1953	1277	2,090	May 23, 1953	1.2	94.0	.314	4.28	92.1			4.17
1954	1337	3,070	Apr. 18, 1954	1.7	101	.358	4.57	113			5.14
1955	1387	3,630	Mar. 5, 1955	.6	178	.595	8.08	175			7.92
1956	1437	4,310	Feb. 27, 1956	2.2	231	.773	10.52	225			10.24
1957	1507	7,670	Apr. 6, 1957	3.5	266	.890	12.05	335			15.22
1958	1557	2,680	Aug. 8, 1958	12	257	.860	11.70	207			9.42
1959	1627	10,000	Jan. 22, 1959	2.8	305	1.02	13.83	304			13.78
1960	1707	2,250	Feb. 11, 1960	3.3	160	.535	7.28	-			-

a About.

## 1970. Sandusky River near Mexico, Ohio

Location.--Lat 41°02'39", long 83°11'42", in sec.13, T.1 N., R.14 E., on right bank at downstream side of highway bridge, 3 miles upstream from Honey Creek and 4½ miles north of Mexico, Seneca County.

Drainage area.--776 sq mi.

Records available.--November 1898 to November 1900 (gage heights and discharge measurements only), March 1923 to December 1935, July 1938 to September 1960. Discharge records for November 1898 to November 1900 published in 22nd Annual Report, Part 4, have been found unreliable and should not be used.

Gage.--Water-stage recorder. Datum of gage is 733.1 ft above mean sea level, adjustment of 1912. Prior to Aug. 15, 1929, chain gage at same site and datum.

Average discharge.--34 years (1923-35, 1938-60), 562 cfs.

Extremes.--1923-35, 1938-60: Maximum discharge, 18,900 cfs Jan. 23, 1959 (gage height, 22.43 ft, from floodmark); minimum, 1.8 cfs Oct. 31, 1942 (during repairs to small dam above station).

Flood in June 1937 reached a stage of 22.5 ft, from information by local residents (discharge, 19,000 cfs).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	249	665	1,453	1,865	2,211	1,511	1,120	520	97.3	56.5	19.8	18.9	808
1952	22.7	92.9	1,171	5,322	1,201	1,822	1,476	194	57.3	31.7	15.9	31.5	788
1953	14.6	27.6	69.7	373	240	451	216	904	55.3	250	35.6	9.65	222
1954	8.48	17.8	25.2	75.2	116	408	1,394	222	131	29.2	53.6	15.9	207
1955	185	77.1	223	664	1,376	2,337	382	74.8	30.2	46.9	135	11.8	458
1956	31.0	290	63.1	97.5	2,055	1,946	396	911	621	133	73.4	21.1	547
1957	15.2	30.5	67.8	374	719	394	3,394	796	657	490	27.8	417	608
1958	88.5	372	1,464	498	551	608	732	437	551	825	1,078	179	617
1959	56.7	461	271	2,461	2,671	1,295	1,295	864	120	62.3	32.4	37.1	790
1960	40.3	105	582	1,144	1,113	516	678	140	359	59.4	44.2	18.9	397

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.37	0.96	2.16	2.77	2.97	2.25	1.61	0.77	0.14	0.08	0.03	0.03	14.14
1952	.03	.13	1.74	4.93	1.67	2.71	2.12	.29	.08	.05	.02	.05	13.82
1953	.02	.04	.10	.55	.32	.67	.31	1.54	.08	.37	.05	.01	3.86
1954	.01	.03	.04	.11	.16	.61	2.01	.33	.19	.04	.08	.02	3.63
1955	.27	.11	.33	.99	1.84	3.47	.55	.11	.04	.07	.20	.02	8.00
1956	.05	.42	.09	.15	2.86	2.89	.57	1.35	.89	.20	.11	.03	9.61
1957	.02	.04	.10	.56	.97	.57	4.88	1.19	.94	.73	.04	.60	10.64
1958	.13	.53	2.18	.74	.74	.90	1.05	.65	.79	1.22	1.60	.26	10.79
1959	.08	.66	.40	3.66	3.58	1.92	1.86	1.28	.17	.09	.05	.05	13.80
1960	.06	.15	.86	1.70	1.54	.77	.98	.21	.52	.09	.07	.03	6.98

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,022	17.87
1951	1207	7,350	Jan. 6, 1951	12	808	1.04	14.14	718	12.55
1952	1237	11,500	Jan. 29, 1952	12	788	1.02	13.82	689	12.08
1953	1277	3,680	May 24, 1953	5.8	222	.286	3.86	217	3.78
1954	1337	4,970	Apr. 17, 1954	5.5	207	.267	3.63	243	4.28
1955	1387	6,270	Mar. 5, 1955	5.8	458	.590	8.00	449	7.85
1956	1437	7,050	Feb. 26, Mar. 8	11	547	.705	9.61	525	9.21
1957	1507	11,800	Apr. 7, 1957	11	608	.784	10.64	761	13.32
1958	1557	5,130	July 12, 1958	29	617	.795	10.79	521	9.09
1959	1627	18,900	Jan. 23, 1959	12	790	1.02	13.80	786	13.73
1960	1707	4,670	Feb. 11, 1960	13	397	.512	6.98	-	-

## 1980. Sandusky River near Fremont, Ohio

Location.--Lat 41°18'28", long 83°09'32", in sec.17, T.4 N., R.15 E., on left bank at downstream side of highway bridge, 2.3 miles upstream from Ballville power dam, 2½ miles downstream from Wolf Creek, and 3½ miles southwest of Fremont, Sandusky County.

Drainage area.--1,248 sq mi.

Records available.--November 1898 to March 1901 (gage heights and discharge measurements only, published as "at Fremont"), October 1923 to December 1935, July 1938 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage 626.3 ft above mean sea level, adjustment of 1912. Nov. 18, 1898, to Mar. 10, 1901, staff gage at site 4 miles downstream at different datum. Nov. 8, 1923, to Sept. 5, 1930, chain gage at present site and datum.

Average discharge.--34 years (1923-35, 1938-60), 922 cfs.

Extremes.--1923-35, 1938-60: Maximum discharge, about 28,000 cfs Feb. 10, 1959; maximum gage height, 15.20 ft Feb. 10, 1959, from floodmark (ice jam); minimum discharge, 5.0 cfs Sept. 27, 28, 1941 (gage height, 0.80 ft).

Remarks.--Records of water temperatures and suspended-sediment loads for the period October 1950 to September 1956; and chemical analyses for the period October 1950 to September 1952 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	639	1,474	2,576	3,011	3,414	2,517	1,766	1,018	252	98.6	28.5	24.4	1,391
1952	33.7	155	1,926	5,444	2,058	3,105	2,289	489	104	54.8	22.4	43.0	1,314
1953	23.0	41.9	91.9	549	341	750	393	1,856	104	328	62.0	13.5	382
1954	13.2	25.4	36.7	109	181	906	2,435	382	170	36.2	73.5	19.9	364
1955	302	117	352	1,231	2,303	3,878	808	141	50.1	86.7	178	16.7	792
1956	46.3	463	109	164	3,243	3,506	724	1,938	1,046	216	121	29.0	959
1957	17.7	34.8	101	613	1,327	652	5,524	977	1,027	760	38.0	500	952
1958	162	516	2,370	796	901	903	1,153	696	720	1,088	1,660	273	940
1959	70.3	822	415	3,862	4,776	2,279	2,116	1,554	183	128	101	72.5	1,343
1960	72.5	232	1,086	2,066	1,998	836	1,143	294	888	166	107	32.9	738

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.59	1.32	2.38	2.78	2.85	2.33	1.58	0.94	0.23	0.09	0.03	0.02	15.14
1952	.03	.14	1.78	5.03	1.78	2.87	2.04	.45	.09	.05	.02	.04	14.32
1953	.02	.04	.09	.51	.28	.69	.35	1.72	.09	.30	.06	.01	4.16
1954	.01	.02	.03	.10	.15	.84	2.18	.35	.15	.03	.07	.02	3.95
1955	.28	.10	.33	1.14	1.93	3.58	.72	.13	.04	.08	.16	.01	8.50
1956	.04	.41	.10	.15	2.80	3.24	.65	1.79	.94	.20	.11	.03	10.46
1957	.02	.03	.08	.57	1.10	.60	4.94	.90	.92	.70	.03	.45	10.35
1958	.15	.46	2.19	.74	.75	.83	1.03	.64	.64	1.01	1.53	.24	10.21
1959	.06	.74	.38	3.56	3.99	2.11	1.90	1.44	.16	.12	.09	.06	14.61
1960	.07	.21	1.00	1.91	1.73	.77	1.02	.27	.79	.15	.10	.03	8.05

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,772	19.28
1951	1207	13,200	Dec. 3, 1950	14	1,391	1.11	15.14	1,176	12.80
1952	1237	19,100	Jan. 27, 1952	14	1,314	1.05	14.32	1,148	12.52
1953	1277	9,940	May 23, 1953	9.4	382	.306	4.16	376	4.07
1954	1337	10,200	Apr. 17, 1954	10	364	.292	3.95	423	4.60
1955	1387	13,600	Mar. 5, 1955	10	782	.627	8.50	768	8.34
1956	1437	14,500	May 12, 1956	17	959	.788	10.46	921	10.05
1957	1507	15,800	Apr. 6, 1957	11	952	.763	10.35	1,197	13.01
1958	1557	7,980	Dec. 8, 1957	61	940	.753	10.21	791	8.59
1959	1627	a28,000	Feb. 10, 1959	22	1,343	1.08	14.61	1,352	14.71
1960	1707	9,410	Feb. 11, 1960	21	738	.591	8.05	-	-

a About.

## 1990. Huron River at Milan, Ohio

Location.--Lat 41°18'00", long 82°36'30", in SE $\frac{1}{4}$  sec.4, T.5 N., R.22 W., on right bank 500 ft downstream from bridge on U.S. Highway 250, a quarter of a mile northwest of Milan, Erie County, and 2 miles downstream from confluence of East and West Branches.

Drainage area.--363 sq mi.

Records available.--March 1950 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 573.43 ft above mean sea level, adjustment of 1912. Prior to July 29, 1953, wire-weight gage at site of former highway bridge 45 ft upstream at same datum.

Average discharge.--10 years (1950-60), 290 cfs.

Extremes.--1950-60: Maximum discharge, 25,800 cfs Jan. 22, 1959 (gage height, 24.08 ft), from rating curve extended above 18,100 cfs on basis of contracted-opening measurement of peak flow; minimum, 2.2 cfs Sept. 10, 15, 19, 20, 21, 1955; minimum gage height, 5.16 ft Sept. 24, 1959.

Remarks.--Records of chemical analyses for the period March 1950 to September 1952 and records of water temperatures for the period March to August 1950, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	157	555	832	876	1,071	726	454	346	103	32.2	11.8	15.5	428
1952	16.6	77.9	729	1,302	608	1,065	634	191	48.5	23.0	11.3	15.1	394
1953	11.5	19.5	39.2	242	88.0	169	209	717	94.4	97.5	31.6	6.82	145
1954	9.70	17.0	24.7	65.6	140	632	1,007	127	310	17.6	18.5	10.4	197
1955	69.3	28.3	93.6	298	405	1,049	234	55.8	19.3	63.4	22.6	5.76	195
1956	20.2	148	39.4	56.9	940	1,134	245	879	434	86.1	80.5	16.1	338
1957	11.6	19.6	53.3	261	569	201	1,536	169	422	315	15.9	46.3	297
1958	36.3	108	522	148	210	231	400	150	75.3	206	514	74.8	224
1959	33.3	464	141	1,259	1,422	744	614	345	69.7	109	29.5	7.09	430
1960	22.7	76.6	398	568	449	312	507	171	273	112	92.3	25.4	250

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.50	1.71	2.64	2.78	3.07	2.31	1.40	1.10	0.32	0.10	0.04	0.05	16.02
1952	.05	.24	2.32	4.14	1.80	3.38	1.95	.61	.15	.07	.04	.05	14.80
1953	.04	.06	.12	.77	.25	.54	.64	2.28	.29	.31	.10	.02	5.42
1954	.03	.05	.08	.21	.40	2.01	3.09	.40	.95	.06	.06	.03	7.37
1955	.22	.09	.30	.95	1.17	3.33	.72	.18	.06	.20	.07	.02	7.31
1956	.06	.46	.13	.18	2.79	3.60	.75	2.79	1.34	.27	.26	.05	12.68
1957	.04	.06	.17	.83	1.64	.64	4.72	.54	1.29	1.00	.05	.14	11.12
1958	.12	.33	1.66	.47	.60	.73	1.23	.48	.23	.65	1.64	.23	8.37
1959	.11	1.43	.45	4.00	4.08	2.36	1.89	1.10	.21	.55	.09	.02	16.09
1960	.07	.24	1.27	1.80	1.34	.99	1.56	.54	.84	.36	.29	.08	8.38

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	10,300	Dec. 3, 1950	4.6	428	1.18	16.02	368	13.78
1952	1237	13,200	Mar. 11, 1952	6.1	394	1.09	14.80	351	12.41
1953	1277	6,390	May 23, 1953	3.6	145	.399	5.42	143	5.36
1954	1337	7,110	Apr. 17, 1954	5.7	197	.545	7.37	209	7.82
1955	1387	6,260	Mar. 4, 1955	3.0	195	.537	7.31	196	7.35
1956	1437	18,200	May 12, 1956	7.0	338	.931	12.68	328	12.30
1957	1507	10,500	Apr. 4, 1957	7.4	297	.818	11.12	346	12.96
1958	1557	4,390	Aug. 1, 1958	14	224	.617	8.37	220	8.25
1959	1627	25,800	Jan. 22, 1959	4.0	430	1.18	16.09	419	15.68
1960	1707	4,650	Apr. 4, 1960	12	250	.689	9.38	-	-

## 1995. Vermilion River near Vermilion, Ohio

Location.--Lat 41°22'55", long 82°19'00", in T.6 N., R.19 W., on right bank 40 ft downstream from bridge on North Ridge Road in Lorain County, 3½ miles southeast of Vermilion, Erie County, and 4½ miles upstream from mouth.

Drainage area.--260 sq mi.

Records available.--March 1950 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 592.58 ft above mean sea level (Lorain County bench mark). Prior to Aug. 3, 1953, wire-weight gage at site 40 ft upstream at same datum.

Average discharge.--10 years (1950-60), 233 cfs.

Extremes.--1950-60: Maximum discharge, 20,500 cfs Jan. 21, 1959 (gage height, 13.80 ft). From rating curve extended above 9,800 cfs on basis of contracted-opening measurement of peak flow; no flow at times in most years.

Remarks.--Records of water temperatures for the period March to September 1950 and records of chemical analyses for the period March 1950 to February 1952 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	24.3	266	738	722	869	626	454	287	52.3	21.4	2.74	4.98	336
1952	9.52	142	670	1,396	459	861	566	72.6	13.0	7.67	1.54	6.63	352
1953	.92	5.37	16.3	142	96.6	96.3	243	546	34.0	33.6	6.43	0	102
1954	.85	2.73	9.58	25.8	69.4	614	893	100	109	3.23	4.27	1.98	153
1955	106	22.6	128	263	860	898	187	36.5	12.4	16.8	20.2	.47	209
1956	7.16	111	35.0	44.7	764	857	264	668	281	139	183	32.6	291
1957	4.44	11.1	52.5	294	443	224	1,170	182	282	324	5.28	16.4	246
1958	11.5	47.6	420	137	159	217	304	148	40.7	96.3	329	43.6	163
1959	14.4	274	109	827	989	494	510	266	93.5	40.6	13.5	2.79	298
1960	9.81	68.1	408	420	324	321	357	145	153	56.1	47.6	14.4	193

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.11	1.14	3.27	3.20	3.48	2.78	1.95	1.27	0.22	0.09	0.01	0.02	17.54
1952	.04	.61	2.97	6.19	1.91	3.82	2.43	.32	.06	.03	.007	.03	18.42
1953	.004	.02	.07	.63	.39	.43	1.04	2.42	.15	.15	.03	0	5.33
1954	.004	.01	.04	.11	.28	2.72	3.83	.44	.47	.01	.02	.008	7.94
1955	.47	.10	.57	1.16	3.45	3.98	.80	.16	.05	.07	.09	.002	10.90
1956	.03	.48	.16	.20	3.17	3.80	1.14	2.96	1.20	.62	.81	.14	14.71
1957	.02	.05	.23	1.30	1.77	.99	5.02	.81	1.13	1.44	.02	.07	12.85
1958	.05	.20	1.87	.61	.64	.96	1.30	.66	.18	.43	1.46	.19	8.55
1959	.06	1.17	.48	3.67	3.96	2.19	2.19	1.18	.40	.18	.06	.01	15.55
1960	.04	.29	1.81	1.87	1.35	1.42	1.53	.64	.66	.25	.21	.06	10.13

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	8,320	Dec. 3, 1950	0.1	336	1.29	17.54	319	16.64
1952	1237	9,820	Jan. 26, 1952	.1	352	1.35	18.42	284	14.89
1953	1277	3,530	May 24, 1953	0	102	.592	5.33	101	5.29
1954	1337	4,370	Mar. 25, 1954	0	153	.588	7.94	173	9.03
1955	1387	3,950	Mar. 12, 1955	.1	209	.804	10.90	200	10.43
1956	1437	9,820	May 12, 1956	.5	281	1.08	14.71	274	14.34
1957	1507	5,540	Apr. 5, 1957	1.5	246	.946	12.85	281	14.67
1958	1557	2,170	Aug. 1, 1958	2.1	163	.627	8.55	156	8.14
1959	1627	20,500	Jan. 21, 1959	1.2	298	1.15	15.55	306	15.98
1960	1707	3,130	Dec. 13, 1959	2.3	193	.742	10.13	-	-

## 2005. Black River at Elyria, Ohio

Location.--Lat 41°22'50", long 82°06'15", in T.6 N., R.17 W., on left bank in Cascade Park at Elyria, Lorain County, three-quarters of a mile downstream from confluence of East and West Branches.

Drainage area.--392 sq mi.

Records available.--October 1944 to September 1960. Records for May 1903 to July 1906 (published as "near Elyria") published in WSP 97, 129, and 205 have been found to be unreliable and should not be used.

Gage.--Water-stage recorder. Datum of gage is 621.6 ft above mean sea level (city of Elyria bench mark).

Average discharge.--16 years (1944-60), 325 cfs.

Extremes.--1944-60: Maximum discharge, 24,000 cfs Jan. 22, 1959 (gage height, 22.9 ft, from floodmark), from rating curve extended above 13,000 cfs by logarithmic plotting; no flow for part of Oct. 10, 1956 (result of temporary storage at dam upstream).

Remarks.--Some regulation at low flow for industrial use.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1950	-	-	-	-	-	-	-	-	-	-	-	-	-
1951	16.5	196	801	867	1,119	925	541	386	92.4	34.3	8.51	21.2	414
1952	11.5	214	740	1,825	567	897	582	123	19.3	8.67	4.72	4.19	418
1953	9.15	20.4	22.3	185	135	135	348	539	97.5	36.1	19.6	6.13	130
1954	6.84	6.88	8.99	50.0	974	940	1,191	86.1	43.0	7.56	8.53	7.30	204
1955	268	33.1	145	329	760	1,308	358	91.7	51.5	27.2	97.3	6.50	288
1956	36.9	255	60.9	79.0	1,245	1,108	356	988	459	66.2	99.6	45.4	397
1957	9.21	16.8	58.3	372	524	327	1,728	414	468	529	16.0	25.9	371
1958	17.6	64.4	621	184	260	298	406	233	58.1	178	529	106	247
1959	19.6	397	145	1,374	1,505	761	817	370	258	32.3	23.3	25.1	470
1960	27.1	164	632	569	456	609	594	237	158	108	26.2	20.6	300

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.05	0.56	2.35	2.55	2.97	2.72	1.54	1.14	0.26	0.10	0.03	0.06	14.33
1952	.03	.61	2.18	5.37	1.56	2.64	1.65	.36	.05	.03	.01	.01	14.50
1953	.03	.06	.07	.54	.36	.40	.99	1.58	.28	.11	.06	.02	4.50
1954	.02	.02	.03	.15	.26	2.77	3.39	.25	.12	.02	.03	.02	7.08
1955	.79	.09	.43	.97	2.02	3.85	1.02	.27	.15	.08	.29	.02	9.98
1956	.11	.73	.18	.23	3.43	3.26	1.01	2.90	1.30	.19	.29	.13	13.76
1957	.03	.05	.17	1.09	1.40	.96	4.32	1.22	1.33	1.56	.05	.07	12.85
1958	.05	.18	1.82	.54	.69	.88	1.16	.68	.17	.52	1.56	.30	8.55
1959	.06	1.13	.42	4.05	4.00	2.29	2.32	1.09	.68	.09	.07	.07	16.27
1960	.08	.47	1.86	1.67	1.25	1.79	1.70	.70	.45	.32	.08	.06	10.43

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	541	18.71
1951	1207	7,470	Dec. 3, 1950	3.8	414	1.06	14.33	410	14.19
1952	1237	12,300	Jan. 27, 1952	1.3	418	1.07	14.50	341	11.84
1953	1277	3,290	May 18, 1953	2.2	130	.332	4.50	127	4.41
1954	1337	6,240	Mar. 25, 1954	2.4	204	.520	7.08	240	8.32
1955	1387	6,240	Mar. 23, 1955	3.9	288	.735	9.98	279	9.69
1956	1437	14,900	May 13, 1956	4.5	397	1.01	13.76	375	12.99
1957	1507	9,820	Apr. 5, 1957	3.5	371	.946	12.85	423	14.85
1958	1557	3,450	Aug. 1, 1958	5.6	247	.630	8.55	234	8.11
1959	1627	24,000	Jan. 22, 1959	7.0	470	1.20	16.27	493	17.07
1960	1707	5,690	Mar. 29, 1960	6.7	300	.765	10.43	-	-

## 2015. Rocky River near Berea, Ohio

Location.--Lat 41°24'22", long 81°53'13", in T.6 N., R.15 W., on right bank at downstream side of highway bridge just downstream from confluence of East and West Branches, 3 miles northwest of Berea, Cuyahoga County.

Drainage area.--269 sq mi.

Records available.--October 1923 to September 1935, September 1943 to September 1960. Monthly discharge only for October 1923, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 649.9 ft above mean sea level, datum of 1929 (Cuyahoga County bench mark). Prior to Aug. 31, 1929, chain gage and Aug. 31, 1929, to Sept. 30, 1935, staff gage, at same site and datum.

Average discharge.--29 years (1923-35, 1943-60), 260 cfs.

Extremes.--1923-35, 1943-60: Maximum discharge, 21,400 cfs Jan. 22, 1959 (gage height, 14.10 ft), from rating curve extended above 11,000 cfs on basis of contracted-opening measurement of peak flow; maximum gage height, 18.6 ft June 29, 1924 (backwater caused by tornado); minimum discharge, 0.2 cfs Sept. 2, 1932, Aug. 18, 19, 22, 27, 28, 30, 31, 1933.

Maximum stage known, 20.9 ft in March 1913.

Revisions.--The momentary maximum discharge for the water year 1947, published in WSP 1307, has been revised to 11,900 cfs.

Remarks.--Some regulation at low flow by small reservoirs on East Branch.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	12.0	108	667	642	849	811	423	240	164	29.0	4.02	17.1	328
1952	11.1	256	528	1,224	486	615	458	144	17.2	6.01	5.64	5.92	314
1953	2.82	11.9	30.8	221	142	163	359	371	48.7	34.3	21.4	7.19	118
1954	5.02	9.60	36.0	151	202	910	993	103	39.4	4.25	8.15	4.65	205
1955	588	49.7	209	275	520	852	448	131	89.4	32.6	24.4	3.69	268
1956	62.7	241	97.8	140	1,026	831	415	699	306	34.4	32.9	24.4	323
1957	11.1	23.1	70.7	327	395	272	1,204	336	210	285	9.00	25.3	262
1958	27.7	76.3	538	198	288	227	310	193	75.6	226	431	115	226
1959	45.9	392	555	979	1,245	657	652	312	310	267	57.0	36.4	418
1960	103	288	512	421	350	512	456	311	136	49.6	46.1	11.6	266

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.05	0.45	2.86	2.76	3.29	3.47	1.75	1.03	0.68	0.12	0.02	0.07	16.55
1952	.05	1.06	2.26	5.25	1.95	2.64	1.90	.62	.07	.03	.02	.02	15.87
1953	.01	.05	.13	.95	.55	.70	1.48	1.59	.20	.15	.09	.03	5.93
1954	.02	.04	.15	.65	.78	3.90	4.12	.44	.16	.02	.03	.02	10.33
1955	2.52	.21	.90	1.18	2.01	3.66	1.86	.56	.37	.14	.10	.02	13.53
1956	.27	1.00	.42	.60	4.11	3.56	1.72	3.00	1.27	.15	.14	.10	16.34
1957	.05	.10	.30	1.41	1.53	1.16	5.00	1.44	.87	1.22	.04	.10	13.22
1958	.12	.32	2.31	.85	1.11	.97	1.28	.83	.31	.97	1.84	.48	11.39
1959	.20	1.63	.58	4.20	4.82	2.81	2.70	1.34	1.28	1.14	.24	.15	21.09
1960	.44	1.19	2.19	1.81	1.40	2.19	1.90	1.34	.56	.21	.20	.05	13.48

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	405	20.43
1951	1207	6,640	Dec. 3, 1950	1.8	328	1.22	16.55	328	16.56
1952	1237	11,700	Jan. 27, 1952	2.6	314	1.17	15.87	251	12.69
1953	1277	3,560	May 18, 1953	1.5	118	.439	5.93	118	5.95
1954	1337	8,280	Mar. 25, 1954	1.7	205	.762	10.33	272	13.75
1955	1387	9,660	Oct. 16, 1954	1.5	268	.996	13.53	229	11.59
1956	1437	9,860	May 12, 1956	2.6	323	1.20	16.34	298	15.10
1957	1507	6,440	Apr. 4, 1957	5.0	262	.974	13.22	307	15.52
1958	1557	6,610	Aug. 8, 1958	6.1	226	.840	11.39	219	11.05
1959	1627	21,400	Jan. 22, 1959	7.4	418	1.55	21.09	446	22.50
1960	1707	5,330	Dec. 13, 1959	6.3	266	.989	13.48	-	-



## 2020. Cuyahoga River at Hiram Rapids, Ohio

Location.--Lat 41°20'27", long 81°10'01", in T.5 N., R.7 W., on left bank at downstream side of highway bridge at Hiram Rapids, Portage County, 0.6 mile downstream from Black Brook.

Drainage area.--147 sq mi.

Records available.--August 1927 to December 1935, October 1944 to September 1960.  
Published as "near Hiram" 1927-35.

Gage.--Water-stage recorder. Datum of gage is 1,087.46 ft above mean sea level, unadjusted. Prior to Aug. 26, 1927, staff gage and Aug. 26, 1927, to Dec. 31, 1935, water-stage recorder, at site  $\frac{1}{2}$  miles downstream at different datum. Oct. 20, 1944, to Oct. 22, 1946, wire-weight gage at present site and datum.

Average discharge.--24 years (1927-35, 1944-60), 199 cfs (unadjusted).

Extremes.--1927-35, 1944-60: Maximum discharge, 3,670 cfs Jan. 23, 1959 (gage height, 8.11 ft), from rating curve extended above 2,600 cfs by logarithmic plotting; minimum, 5.1 cfs Sept. 2, 1933.

Remarks.--Flow regulated by East Branch Reservoir (usable capacity, 4,140 acre-ft) since 1939.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	65.4	187	490	464	546	601	431	141	63.3	53.1	33.4	60.2	260
1952	46.5	225	327	962	407	416	334	156	56.9	29.5	46.2	42.1	254
1953	49.9	56.6	92.2	201	170	181	198	203	76.0	33.7	40.8	42.4	112
1954	20.1	28.9	43.8	111	190	612	529	221	84.0	25.1	39.4	40.4	162
1955	378	118	255	296	359	609	350	108	82.1	39.5	32.5	54.5	223
1956	93.5	127	143	71.6	569	609	470	434	153	162	347	67.0	270
1957	41.3	58.3	157	368	258	253	914	258	116	162	48.5	53.7	223
1958	38.6	62.0	385	166	159	343	126	189	56.9	239	280	364	201
1959	95.0	245	179	647	703	484	286	295	111	42.8	50.2	89.1	266
1960	287	268	395	368	394	249	560	287	204	69.4	77.0	34.5	265

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.41	1.73	3.90	3.64	3.87	4.75	3.24	1.11	0.48	0.42	0.10	0.21	23.86
1952	.32	1.99	2.76	7.52	2.99	3.26	2.53	1.22	.43	.22	.25	.17	23.66
1953	.18	.54	.93	1.75	1.20	1.43	1.51	1.60	.56	.15	.10	.09	10.04
1954	.18	.18	.43	1.16	1.54	4.81	4.02	1.73	.64	.11	.14	.11	15.05
1955	3.12	1.00	2.21	2.29	2.56	4.77	2.66	.85	.64	.29	.19	.08	20.66
1956	.69	1.16	1.37	.56	4.18	4.77	3.57	3.40	1.17	1.31	2.68	.50	25.36
1957	.32	.42	1.26	2.88	1.85	1.96	6.94	2.01	.91	1.23	.17	.23	20.18
1958	.28	.60	3.51	1.30	1.17	2.65	1.02	1.45	.40	1.87	2.19	2.77	19.01
1959	.73	1.84	1.41	5.08	4.98	3.79	2.20	2.28	.84	.35	.39	.66	24.55
1960	2.25	2.03	3.10	2.88	2.88	1.97	4.23	2.26	1.53	.54	.60	.26	24.53

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30										Calendar year		
		Observed					Adjusted					Observed		Adjusted
		Momentary maximum		Minimum		Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches	Mean	Mean
		Discharge	Date	day	day									
1950	-	-	-	-	-	-	-	-	-	-	-	298	299	27.61
1951	1207	1,980	Jan. 5, 1951	26	260	258	1.76	23.86	248	248	248	22.89	22.89	22.89
1952	1237	2,380	Jan. 27, 1952	21	254	256	1.74	23.66	221	219	219	20.24	20.24	20.24
1953	1277	474	Jan. 21, 1953	20	112	109	.741	10.04	103	101	101	9.18	9.18	9.18
1954	1337	1,260	Mar. 27, 1954	18	162	163	1.11	15.05	217	223	20.59	20.59	20.59	20.59
1955	1387	1,980	Oct. 17, 1954	18	223	224	1.52	20.66	190	190	17.55	17.55	17.55	17.55
1956	1437	1,860	Mar. 9, 1956	44	270	274	1.86	25.36	261	261	24.14	24.14	24.14	24.14
1957	1507	2,170	Apr. 26, 1957	21	223	219	1.49	20.18	242	242	22.37	22.37	22.37	22.37
1958	1557	1,320	Mar. 1, 1958	16	201	205	1.39	19.01	203	203	18.80	18.80	18.80	18.80
1959	1627	3,670	Jan. 23, 1959	26	266	266	1.81	24.55	303	303	27.95	27.95	27.95	27.95
1960	1707	2,490	Mar. 31, 1960	27	265	265	1.80	24.53	-	-	-	-	-	-

## 2040. Little Cuyahoga River at Mogadore, Ohio

Location.--Lat 41°03'45", long 81°23'40", in T.1 N., R.10 W., on left bank at upstream side of bridge on State Highway 532, 500 ft downstream from Mogadore Reservoir, three-quarters of a mile upstream from Fritch Lake Outlet, and 0.8 mile north of Mogadore, Summit County.

Drainage area.--12.3 sq mi.

Records available.--February 1946 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 1,058.74 ft above mean sea level, unadjusted.

Average discharge.--14 years (1946-60), 13.6 cfs.

Extremes.--1946-60: Maximum discharge, 155 cfs Nov. 16, 1955 (gage height, 3.46 ft); maximum gage height, 4.30 ft Jan. 21, 1959 (backwater from aquatic growth); minimum discharge, 0.2 cfs Nov. 20, 1954; minimum gage height, 0.24 ft Nov. 18, 19, 1954.

Remarks.--Flow regulated by Mogadore Reservoir (usable capacity, 6,540 acre-ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	5.35	7.64	34.3	22.9	35.0	34.3	28.0	16.4	9.43	6.12	4.42	4.41	17.3
1952	1.64	12.3	22.0	48.1	40.4	22.0	24.9	11.0	9.11	7.75	4.68	9.42	17.7
1953	12.3	13.1	33.9	8.87	8.76	9.02	2.32	5.82	3.13	3.19	9.09	6.00	9.67
1954	8.34	9.37	9.62	8.39	9.76	10.4	9.30	4.71	3.91	4.48	3.05	6.49	7.30
1955	3.42	.59	.42	1.77	9.96	41.6	22.5	7.74	5.11	2.81	1.12	.88	8.16
1956	1.99	18.7	13.6	2.50	25.6	37.4	25.0	36.0	24.9	14.6	8.74	17.7	18.8
1957	5.81	3.25	10.5	22.1	21.7	11.2	36.3	12.3	18.15	16.7	5.58	9.22	13.5
1958	4.59	5.16	16.8	14.2	11.2	12.7	12.9	14.1	8.03	11.9	30.3	9.20	12.6
1959	5.06	5.69	8.91	26.1	43.5	33.6	14.1	12.6	16.7	12.1	9.61	5.02	15.9
1960	11.5	15.2	26.7	21.7	18.4	22.9	20.9	10.6	10.2	6.98	5.46	2.60	14.4

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	18.6	-
1951	1207	91	Nov. 30, 1950	0.9	17.3	-	-	16.3	-
1952	1237	136	Jan. 26, 1952	.9	17.7	-	-	19.7	-
1953	1277	84	May 22, 1953	.8	9.67	-	-	6.97	-
1954	1337	21	Mar. 25, 1954	1.3	7.30	-	-	5.38	-
1955	1387	132	Mar. 11, 1955	.3	8.16	-	-	10.7	-
1956	1437	155	Nov. 16, 1955	.9	18.8	-	-	17.6	-
1957	1507	107	July 9, 1957	1.6	13.5	-	-	14.1	-
1958	1557	62	July 31, 1958	3.4	12.6	-	-	12.1	-
1959	1627	97	Jan. 21, 1959	3.0	15.9	-	-	18.8	-
1960	1707	115	Dec. 12, 1959	1.9	14.4	-	-	-	-

## 2045. Little Cuyahoga River at Massillon Road, Akron, Ohio

Location.--Lat 41°03'35", long 81°27'45", in T.1 N., R.10 W., on left bank 50 ft downstream from bridge on Massillon Road in Akron, Summit County, and 250 ft upstream from Springfield Lake Outlet.

Drainage area.--31.0 sq mi.

Records available.--February 1946 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 1,005.20 ft above mean sea level (city of Akron bench mark).

Average discharge.--14 years (1946-60), 30.7 cfs.

Extremes.--1946-60: Maximum discharge, 891 cfs Jan. 21, 1959 (gage height, 3.99 ft); minimum, 2.9 cfs May 10, 1955 (gage height, 0.22 ft).

Remarks.--Flow regulated by Mogadore Reservoir (usable capacity, 6,540 acre-ft) and Fritch Lake.

Monthly and yearly mean discharge, in cubic feet per second, of Little Cuyahoga River at Massillon Road, Akron, Ohio

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	12.5	18.5	58.5	49.4	68.9	78.2	67.1	41.5	21.1	14.7	11.7	12.9	37.8
1952	7.05	23.8	45.1	91.0	74.3	61.8	62.0	32.3	17.5	17.9	11.9	14.2	38.1
1953	16.2	19.1	44.4	23.7	17.7	21.1	19.6	32.4	14.2	10.4	13.6	12.2	20.5
1954	12.4	13.8	13.8	15.9	16.3	27.4	36.8	19.7	10.7	8.01	7.93	12.2	16.2
1955	26.5	8.10	10.2	14.7	29.7	82.6	50.3	21.2	15.9	11.1	7.45	6.80	23.7
1956	11.6	41.0	22.7	12.5	58.7	67.3	50.3	81.6	47.7	26.4	19.5	29.3	38.9
1957	12.5	11.2	20.8	33.0	33.5	24.6	73.2	29.8	28.5	52.0	14.6	18.9	29.3
1958	13.0	14.0	36.5	29.9	27.9	29.1	32.8	37.9	24.1	45.9	73.6	28.3	32.9
1959	18.9	20.2	20.5	70.7	101	63.0	41.8	32.3	30.1	23.6	16.8	13.9	37.3
1960	27.2	31.6	47.4	48.5	42.7	45.8	39.8	26.8	26.4	17.1	12.6	6.31	31.0

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	40.7	-
1951	1207	236	Jan. 4, 1951	7.5	37.8	-	-	36.6	-
1952	1237	632	Jan. 26, 1952	4.7	38.1	-	-	39.5	-
1953	1277	303	May 22, 1953	6.6	20.5	-	-	17.1	-
1954	1337	163	Apr. 27, 1954	5.4	16.2	-	-	16.6	-
1955	1387	641	Mar. 11, 1955	4.9	23.7	-	-	26.2	-
1956	1437	706	May 12, 1956	7.8	38.9	-	-	36.4	-
1957	1507	680	July 9, 1957	9.0	29.3	-	-	30.9	-
1958	1557	808	July 31, 1958	9.8	32.9	-	-	32.5	-
1959	1627	891	Jan. 21, 1959	8.2	37.3	-	-	41.3	-
1960	1707	252	Dec. 12, 1959	5.6	31.0	-	-	-	-

2050. Springfield Lake Outlet at Akron, Ohio

Location.--Lat 41°03'20", long 81°27'50", in T.1 N., R.10 W., on right bank in Akron, Summit County, 0.3 mile upstream from mouth and 3 miles downstream from Springfield Lake.

Drainage area.--8.40 sq mi.

Records available.--May 1946 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 1,015.34 ft above mean sea level (city of Akron bench mark).

Average discharge.--14 years (1946-60), 6.99 cfs.

Extremes.--1946-60: Maximum discharge, 519 cfs Jan. 21, 1959 (gage height, 3.42 ft), from rating curve extended above 95 cfs by logarithmic plotting; no flow at times 1953-54.

Remarks.--Flow regulated by Springfield Lake.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2.25	3.00	8.65	13.4	20.2	23.4	18.9	10.7	5.61	3.62	1.55	1.21	9.31
1952	.65	2.80	6.56	23.2	20.8	19.3	16.0	6.58	3.04	2.47	1.14	.47	8.55
1953	.18	.49	.99	4.80	3.91	4.78	6.97	8.71	3.19	1.95	.34	.09	3.03
1954	0	.01	.13	.88	.71	4.74	13.0	7.54	1.76	.11	.26	.07	2.44
1955	6.38	1.11	2.72	5.71	9.79	23.0	13.1	4.42	3.62	1.67	2.71	1.81	6.32
1956	1.45	7.67	3.93	3.35	14.4	18.0	14.7	24.5	12.1	6.28	3.90	4.19	9.51
1957	1.89	.67	2.38	4.29	5.97	5.03	18.6	6.55	8.36	12.8	2.69	3.21	6.02
1958	2.69	3.26	7.51	6.75	6.17	5.67	4.71	7.44	3.82	16.9	22.3	6.34	7.85
1959	2.70	2.24	1.54	23.5	26.9	16.0	12.2	8.09	5.45	4.75	2.95	3.61	9.05
1960	2.66	3.66	13.0	10.3	6.18	6.14	8.08	5.99	4.87	1.92	1.40	1.08	5.45

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	10.3	-
1951	1207	81	Jan. 4, 1951	0.7	9.31	-	-	8.98	-
1952	1237	172	Jan. 27, 1952	.2	8.55	-	-	7.84	-
1953	1277	62	May 22, 1953	0	3.03	-	-	2.90	-
1954	1337	82	Apr. 27, 1954	0	2.44	-	-	3.29	-
1955	1387	172	Mar. 11, 1955	0	6.32	-	-	6.55	-
1956	1437	226	May 12, 1956	.1	9.51	-	-	8.85	-
1957	1507	144	July 9, 1957	.1	6.02	-	-	6.74	-
1958	1557	268	July 31, 1958	.4	7.85	-	-	7.26	-
1959	1627	519	Jan. 21, 1959	.7	9.05	-	-	10.1	-
1960	1707	102	Dec. 12, 1959	.2	5.45	-	-	-	-

## 2060. Cuyahoga River at Old Portage, Ohio

Location.--Lat 41°08'04", long 81°32'49", on right bank 230 ft upstream from highway bridge at Old Portage, Summit County, 1½ miles downstream from Little Cuyahoga River, and 4 miles northwest of Akron.

Drainage area.--405 sq mi.

Records available.--September 1921 to December 1935, March 1939 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 740.11 ft above mean sea level, unadjusted. Prior to Dec. 21, 1923, chain gage at same site and datum.

Average discharge.--35 years (1921-35, 1939-60), 422 cfs.

Extremes.--1921-35, 1939-60: Maximum discharge, 6,500 cfs Jan. 21, 1959 (gage height, 11.54 ft), from rating curve extended above 3,900 cfs on basis of contracted-opening estimate of peak flow at site with drainage area of 488 sq mi adjusted to gaging-station site by drainage-area relation; minimum, 14 cfs Aug. 27, 1944; minimum gage height, 0.33 ft Nov. 19-24, Dec. 11-13, 1954.

Remarks.--Diurnal fluctuation caused by powerplants above station. Flow regulated by reservoirs and lakes above station. Municipal water supply for city of Akron is diverted at Lake Rockwell, about 16 miles above gage. Sewage from city enters river below station. A small amount of water from Tuscarawas River is diverted into this basin at Portage Lakes.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	121	271	851	826	1,011	1,145	860	404	185	155	108	107	501
1952	102	442	674	1,807	969	903	743	329	162	166	96.4	110	542
1953	81.5	119	185	375	295	319	402	443	163	74.7	60.5	52.1	214
1954	57.1	58.9	63.9	138	307	838	937	412	171	50.4	74.5	65.1	263
1955	673	184	352	527	650	1,347	781	276	233	163	84.2	71.2	445
1956	153	409	239	143	1,060	1,194	875	1,027	527	353	573	254	565
1957	141	126	283	505	467	514	1,476	479	310	531	134	133	424
1958	100	156	608	351	297	532	310	432	213	572	637	464	391
1959	192	393	286	1,171	1,522	904	573	590	318	227	205	210	543
1960	507	553	833	737	738	549	968	522	384	151	197	88.8	518

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	602	-
1951	1207	3,060	Dec. 7, 1950	62	501	-	-	499	-
1952	1237	4,540	Jan. 26, 1952	69	542	-	-	472	-
1953	1277	2,050	May 22, 1953	33	214	-	-	197	-
1954	1337	2,000	Apr. 27, 1954	26	263	-	-	351	-
1955	1387	2,940	Mar. 11, 1955	41	445	-	-	410	-
1956	1437	4,540	Nov. 16, 1955	42	565	-	-	545	-
1957	1507	4,000	July 8, 1957	89	424	-	-	450	-
1958	1557	3,000	July 31, 1958	69	391	-	-	391	-
1959	1627	6,500	Jan. 21, 1959	119	543	-	-	629	-
1960	1707	3,390	Apr. 1, 1960	52	518	-	-	-	-

## 2075. Ohio Canal at Independence, Ohio

Location.--Lat 41°23'25", long 81°37'35", in T.6 N., R.12 W., on right bank at upstream side of dam, 0.4 mile upstream from Rockside Road and 1 mile northeast of Independence, Cuyahoga County.

Records available.--September 1921 to May 1923, August 1927 to December 1935, October 1940 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 605.31 ft above mean sea level. Prior to Dec. 9, 1946, staff or chain gage, or water-stage recorder at site 0.4 mile downstream at various datums. Dec. 10, 1946, to Nov. 3, 1950, staff gage at present site and datum.

Extremes.--1921-23, 1927-35, 1940-60: Maximum daily discharge, 277 cfs Jan. 22, 1959; no flow June 4, 1947, July 2-7, 1950, July 16 to Aug. 19, 1959.

Remarks.--Water is diverted from Cuyahoga River into canal at headgates at Brecksville, 6 miles upstream. Some diurnal fluctuation caused by small mill upstream from station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	63.7	64.9	57.4	59.6	57.5	54.1	55.6	54.3	50.0	55.6	64.4	65.3	58.5
1952	77.0	64.8	53.9	48.1	58.4	68.0	72.1	64.5	61.5	66.5	68.2	68.6	64.3
1953	75.8	83.9	69.6	72.7	67.1	61.5	65.5	67.4	75.5	71.1	75.8	72.1	71.5
1954	67.8	75.4	79.1	69.9	66.6	58.7	55.3	62.5	67.4	73.5	67.2	68.5	67.7
1955	64.1	69.7	73.1	66.7	61.9	56.1	62.0	59.1	65.3	64.6	59.4	70.3	64.4
1956	62.9	59.9	60.6	55.1	57.9	57.8	59.9	60.0	58.4	50.9	56.4	65.8	58.8
1957	68.5	66.0	67.6	62.5	53.0	58.4	65.4	61.0	63.9	67.4	80.5	71.3	65.6
1958	76.3	74.2	67.8	65.8	61.5	56.6	55.6	54.5	53.8	55.5	56.4	58.5	61.4
1959	55.7	58.9	53.0	72.7	88.4	80.4	72.8	66.2	64.4	29.5	30.2	76.8	62.1
1960	65.0	72.0	73.7	66.4	75.4	80.9	69.4	65.6	66.9	63.4	72.2	73.4	70.3

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	56.8	-
1951	1207	77	Nov. 25, 1950	8.4	58.5	-	-	59.4	-
1952	1237	88	Jan. 27, 1952	3.4	64.3	-	-	67.1	-
1953	1277	146	Nov. 26, 1952	54	71.5	-	-	70.9	-
1954	1337	82	Nov. 25, Dec. 14	42	67.7	-	-	66.4	-
1955	1387	145	Oct. 16, 1954	35	64.4	-	-	62.4	-
1956	1437	-	-	34	58.8	-	-	60.3	-
1957	1507	95	Aug. 9, 1957	45	65.6	-	-	66.9	-
1958	1557	98	Oct. 24, 1957	43	61.4	-	-	57.1	-
1959	1627	277	Jan. 21, 1959	0	62.1	-	-	65.7	-
1960	1707	92	Dec. 7, 1959	43	70.3	-	-	-	-

## 2080. Cuyahoga River at Independence, Ohio

Location.--Lat 41°23'44", long 81°37'54", in T.6 N., R.12 W., on right bank 140 ft downstream from highway bridge on Rockside Road, 1 mile northeast of Independence, Cuyahoga County, and 3 miles downstream from Tinkers Creek.

Drainage area.--709 sq mi.

Records available.--September 1903 to December 1905 (fragmentary), January to July 1906 (gage heights and discharge measurements only), September 1921 to May 1923, September 1927 to December 1935, March 1940 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 584.14 ft above mean sea level (levels by city of Cleveland). Sept. 21, 1903, to July 21, 1906, chain gage at bridge 140 ft upstream at same datum. Sept. 28, 1921, to May 30, 1923, chain gage at bridge 140 ft upstream at datum 2.42 ft higher. Sept. 5 to Oct. 8, 1927, staff gage at present site and datum.

Average discharge.--29 years (1921-22, 1927-35, 1940-60), 765 cfs (not including flow in Ohio Canal).

Extremes.--1921-23, 1927-35, 1940-60: Maximum discharge, 24,800 cfs Jan. 22, 1959 (gage height, 22.41 ft), from rating curve extended above 17,000 cfs on basis of contracted-opening measurement of peak flow; minimum, 14 cfs Nov. 30, 1930; minimum combined daily discharge of river and canal, 55 cfs Aug. 28, 1933.

Remarks.--Diurnal fluctuation caused by powerplants above station. Flow slightly regulated by reservoirs and lakes above station. Some diversion from Tuscarawas River into this basin at Portage Lakes. Water diverted into Ohio Canal at Brecksville, 6 miles above station, bypasses station. These records do not include flow in canal except above about 15,000 cfs, when channels merge; record of diversion published as Ohio Canal at Independence (see preceding page). Records of suspended sediment loads for the period October 1950 to September 1960, and water temperatures for the period October 1952 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	176	541	1,771	1,704	2,218	2,485	1,739	842	519	270	146	191	1,044
1952	128	1,047	1,620	3,585	1,844	1,867	1,450	590	236	253	143	132	1,074
1953	123	179	303	829	553	653	917	909	246	152	104	86.0	421
1954	81.2	94.1	146	383	626	1,996	2,109	739	267	82.9	109	107	560
1955	1,747	299	765	976	1,405	2,521	1,605	489	357	256	161	113	890
1956	268	742	415	277	2,332	2,311	1,611	2,062	1,244	612	1,163	406	1,115
1957	202	195	505	1,184	1,054	908	3,175	1,125	655	908	145	201	851
1958	181	263	1,283	677	713	944	701	861	358	1,071	1,269	832	766
1959	287	859	568	2,560	3,217	1,940	1,417	1,334	687	536	437	393	1,173
1960	1,159	1,128	1,702	1,389	1,339	1,178	1,760	1,143	675	301	462	150	1,032

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,184	-
1951	1207	7,930	Dec. 8, 1950	97	1,044	-	-	1,069	-
1952	1237	11,200	Jan. 27, 1952	90	1,074	-	-	891	-
1953	1277	4,410	Jan. 18, 1953	63	421	-	-	397	-
1954	1337	9,300	Mar. 25, 1954	60	560	-	-	771	-
1955	1387	14,200	Oct. 16, 1954	76	890	-	-	771	-
1956	1437	8,830	Feb. 25, May 12	76	1,115	-	-	1,072	-
1957	1507	8,940	May 20, 1957	96	851	-	-	921	-
1958	1557	6,680	Aug. 8, 1958	116	766	-	-	763	-
1959	1627	24,800	Jan. 22, 1959	154	1,173	-	-	1,366	-
1960	1707	7,780	Dec. 13, 1959	98	1,032	-	-	-	-

## 2090. Chagrin River at Willoughby, Ohio

Location.--Lat 41°37'51", long 81°24'13", on left bank at city waterworks, 150 ft downstream from waterworks dam, 800 ft downstream from East Branch, 1 mile southeast of Willoughby, Lake County, and 5 miles upstream from mouth.

Drainage area.--251 sq mi.

Records available.--July 1925 to November 1935, October 1939 to September 1960 (July 1925 to September 1932 monthly runoff in inches, adjusted for diversion, published in WSP 1307; previously published runoff was unadjusted and should not be used).

Gage.--Water-stage recorder. Datum of gage is 594.24 ft above mean sea level, datum of 1929. Prior to Dec. 20, 1939, staff gage on left concrete abutment on upstream side of waterworks dam, 150 ft upstream at datum 7 ft higher.

Average discharge.--31 years (1925-35, 1939-60), 320 cfs (adjusted for diversion).

Extremes.--1925-35, 1939-60: Maximum discharge, 28,000 cfs Mar. 22, 1948 (gage height, 17.95 ft, from high-water mark in well), from rating curve extended above 14,000 cfs on basis of contracted-opening measurement of peak flow; minimum daily, 3.0 cfs July 25, 26, 1934.

Remarks.--Second table given below adjusted for water diverted at dam just above station for municipal supply of city of Willoughby. Records of chemical analyses for the period October 1950 to February 1952 at site 4½ miles downstream are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	99.5	417	633	668	801	922	533	234	93.3	129	32.1	52.7	399
1952	43.0	508	803	1,312	624	699	639	297	89.6	50.3	48.1	38.6	429
1953	36.4	95.9	202	456	256	359	396	475	113	39.7	38.8	23.2	208
1954	21.9	53.2	131	326	342	1,138	1,015	273	79.4	23.0	28.1	28.7	288
1955	878	386	584	384	750	858	613	138	152	55.8	59.0	23.8	404
1956	143	299	270	142	959	894	662	789	250	213	467	142	434
1957	55.4	81.2	283	571	489	295	1,409	510	416	110	28.2	42.0	355
1958	69.6	141	631	260	352	296	290	262	103	290	505	338	295
1959	118	472	218	1,178	1,131	701	640	469	256	83.3	80.9	76.2	448
1960	354	435	630	582	497	596	511	492	284	119	176	54.6	395

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.47	1.86	3.84	3.08	3.33	4.24	2.38	1.08	0.43	0.61	0.16	0.25	21.73
1952	.21	2.26	3.70	6.04	2.68	3.22	2.84	1.37	.41	.24	.23	.18	23.38
1953	.18	.44	.94	2.10	1.07	1.66	1.77	2.19	.52	.20	.19	.12	11.38
1954	.11	.25	.62	1.51	1.43	5.25	4.53	1.27	.37	.12	.15	.14	15.75
1955	4.05	1.73	2.61	1.78	3.12	3.95	2.73	.65	.69	.27	.29	.12	21.99
1956	.67	1.34	1.26	.66	4.13	4.12	2.96	3.64	1.13	.99	2.16	.64	23.70
1957	.27	.37	1.31	2.64	2.04	1.37	6.28	2.35	1.86	.52	.15	.20	19.36
1958	.34	.64	2.92	1.21	1.47	1.37	1.30	1.22	.47	1.35	2.33	1.52	16.14
1959	.56	2.11	1.01	5.43	4.71	3.23	2.86	2.17	1.20	.40	.39	.35	24.42
1960	1.64	1.95	2.90	2.69	2.15	2.76	2.29	2.27	1.27	.56	.82	.26	21.56

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year			
		Observed				Adjusted			Observed		Adjusted	
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches	
		Discharge	Date									
1950	-	-	-	-	-	-	-	-	508	510	27.59	
1951	1207	9,200	Dec. 3, 1950	21	399	401	1.60	21.73	399	401	21.73	
1952	1237	10,400	Jan. 26, 1952	19	429	431	1.72	23.38	344	346	18.77	
1953	1277	3,330	Jan. 18, 1953	13	208	211	.841	11.38	197	200	10.80	
1954	1337	11,300	Mar. 25, 1954	13	288	291	1.16	15.75	425	428	23.16	
1955	1387	18,600	Oct. 15, 1954	14	404	407	1.62	21.99	309	312	16.87	
1956	1437	8,410	May 13, 1956	26	434	437	1.74	23.70	410	413	22.38	
1957	1507	14,800	May 20, 1957	22	355	358	1.43	19.36	391	394	21.31	
1958	1557	6,900	Aug. 6, 1958	28	295	298	1.19	16.14	291	294	15.92	
1959	1627	22,000	Jan. 21, 1959	26	448	451	1.80	24.42	500	503	27.23	
1960	1707	7,080	Mar. 29, 1960	31	395	398	1.59	21.56	-	-	-	





## 2110. Rock Creek near Rock Creek, Ohio

Location.--Lat 41°30'05", long 80°50'10", in T.10 N., R.4 W., on left bank at downstream side of highway bridge, 0.4 mile downstream from Plum Creek, 1.4 miles southeast of village of Rock Creek, Ashtabula County, 1½ miles downstream from Sugar Creek, and 3 miles upstream from mouth.

Drainage area.--56.6 sq mi.

Records available.--March 1942 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 810 ft (from topographic map). Prior to June 10, 1942, chain gage at same site and datum.

Average discharge.--18 years (1942-60), 83.0 cfs.

Extremes.--1942-60: Maximum discharge, 8,000 cfs Jan. 21, 1959 (gage height, 10.89 ft), from rating curve extended above 2,000 cfs on basis of flood studies; no flow at times.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.91	88.7	226	214	251	305	117	37.4	30.9	23.3	0.73	0.51	107
1952	.28	96.6	225	411	127	125	98.6	65.4	1.81	.17	1.02	.41	96.4
1953	.20	13.8	39.1	147	60.4	71.1	69.8	160	30.9	.26	1.05	0	49.6
1954	0	.22	12.1	82.3	81.7	280	270	44.8	63.4	.09	0	0	69.3
1955	133	85.9	187	86.7	204	208	94.1	6.00	7.81	.50	1.50	0	84.0
1956	12.8	67.3	106	9.37	130	266	184	161	119	43.1	177	17.0	121
1957	4.36	8.14	68.4	136	137	75.2	311	29.7	47.8	6.32	0	0	87.8
1958	.45	3.25	127	73.3	122	100	56.8	49.1	5.56	95.3	70.2	27.0	60.8
1959	14.0	98.7	54.2	254	251	170	138	30.2	17.1	5.39	2.05	.85	85.2
1960	99.6	139	187	161	108	193	94.4	155	14.7	2.45	1.35	.40	96.6

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.04	1.75	4.60	4.37	4.61	6.22	2.31	0.76	0.61	0.48	0.01	0.01	25.77
1952	.006	1.91	4.59	8.37	2.42	2.55	1.94	1.34	.04	.003	.02	.008	23.20
1953	.004	.27	.80	3.00	1.11	1.45	1.37	3.26	.61	.005	.02	0	11.90
1954	0	.004	.25	1.67	1.50	5.71	5.32	.91	1.25	.002	0	0	16.62
1955	2.71	1.70	3.80	1.76	3.75	4.23	1.85	.12	.15	.01	.03	0	20.11
1956	.26	1.33	2.16	.19	5.74	5.42	3.63	3.27	2.34	.88	3.61	.33	29.16
1957	.09	.16	1.40	2.77	2.52	1.53	6.12	.61	.94	.13	0	0	16.27
1958	.009	.06	2.58	1.50	2.25	2.04	1.12	1.00	.11	1.94	1.43	.53	14.57
1959	.28	1.94	1.10	5.18	4.61	3.46	2.72	.62	.34	.11	.04	.02	20.42
1960	2.03	2.74	3.80	3.27	2.06	3.93	1.86	3.16	.29	.05	.03	.01	23.23

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	135	32.24
1951	1207	3,200	Jan. 4, 1951	0	107	1.89	25.77	108	25.89
1952	1237	3,370	Jan. 18, 1952	0	96.4	1.70	23.20	73.9	17.76
1953	1277	1,040	Jan. 18, 1953	0	49.6	.876	11.90	46.2	11.08
1954	1337	3,260	Mar. 1, 1954	0	69.3	1.22	16.62	103	24.57
1955	1387	3,300	Oct. 15, 1954	0	84.0	1.48	20.11	65.3	16.65
1956	1437	2,100	Aug. 19, 1956	0	121	2.14	29.16	112	27.06
1957	1507	2,260	Jan. 22, 1957	0	67.8	1.20	16.27	72.1	17.27
1958	1557	1,400	Aug. 24, 1958	0	60.8	1.07	14.57	63.6	15.24
1959	1627	8,000	Jan. 21, 1959	0	85.2	1.51	20.42	107	25.67
1960	1707	3,380	Mar. 30, 1960	.1	96.6	1.71	23.23	-	-

## 2115. Mill Creek near Jefferson, Ohio

Location.--Lat 41°45'10", long 80°48'00", in T.11 N., R.3 W., on right bank at downstream side of bridge on State Highway 307, 1½ miles northwest of Jefferson, Ashtabula County, and 3¼ miles downstream from Griggs Creek.

Drainage area.--78.3 sq mi.

Records available.--March 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 822.59 ft above mean sea level (Ashtabula County bench mark). Prior to June 10, 1942, wire-weight gage at same site and datum.

Average discharge.--18 years (1942-60), 113 cfs (unadjusted).

Extremes.--1942-60: Maximum discharge, 9,810 cfs Jan. 22, 1959 (gage height, 12.50 ft), from rating curve extended above 3,700 cfs on basis of contracted-opening measurement of peak flow; no flow at times.

Remarks.--Water diverted above station for municipal supply for city of Jefferson. Records adjusted for diversion beginning October 1955; prior to that date only fragmentary record of diversion available.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	31.3	214	374	286	325	317	175	54.7	6.64	0.66	0.003	0.02	148
1952	0	116	214	462	133	147	117	91.7	5.62	.02	.10	0	108
1953	0	11.4	68.9	148	81.8	119	72.8	248	27.2	.22	.05	.14	65.0
1954	.09	.11	58.3	212	156	340	410	89.0	20.0	.66	.34	.34	107
1955	145	79.8	299	113	280	256	117	4.22	6.39	.28	1.56	.05	108
1956	19.2	147	185	27.4	388	345	227	274	75.7	5.81	167	59.4	159
1957	.65	10.1	190	207	200	96.4	417	65.9	124	24.5	0	.02	110
1958	.06	1.13	187	84.3	166	177	74.2	53.6	43.5	27.9	213	159	98.7
1959	39.0	152	78.9	336	318	261	151	72.8	42.9	2.10	1.09	.75	120
1960	194	263	308	214	178	248	105	197	12.8	.329	.210	.623	144

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	0.29	2.10	2.72	0.41	5.35	5.08	3.24	4.04	1.06	0.09	2.46	0.85	27.71
1957	.01	.15	2.80	3.04	2.66	1.43	5.95	.98	1.76	.37	.006	.006	19.16
1958	.007	.02	2.76	1.24	2.21	2.61	1.06	.60	.63	.42	3.14	2.26	17.16
1959	.58	2.16	1.16	4.95	4.23	3.84	2.15	1.08	.62	.04	.02	.01	20.84
1960	2.86	3.75	4.53	3.15	2.45	3.66	1.50	2.90	.19	.01	.01	.14	25.15

Note.--Figures of monthly discharge in cubic feet per second per square mile and runoff in inches for period 1942-55 previously published in water-supply papers may be subject to considerable error because of diversion. Those figures should not be used.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Observed			Adjusted			Observed		Adjusted	
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	-	-
1951	1207	5,900	Dec. 3 or 4	0	148	-	1.89	25.61	197	-	54.14
1952	1237	3,290	Jan. 27, 1952	0	108	-	1.38	18.69	124	-	21.38
1953	1277	2,670	May 23, 1953	0	65.0	-	.850	11.28	86.7	-	15.06
1954	1337	3,480	Mar. 1, 1954	0	107	-	1.37	18.51	63.2	-	10.97
1955	1387	3,930	Oct. 16, 1954	0	108	-	1.38	18.66	146	-	25.32
									92.8	-	16.09
1956	1437	2,690	May 13, 1956	0	159	159	2.03	27.71	147	147	25.56
1957	1507	3,620	Jan. 22, 1957	0	110	110	1.40	19.16	109	109	18.99
1958	1557	2,180	Feb. 28, 1958	0	98.7	99.1	1.27	17.16	105	105	18.27
1959	1627	9,810	Jan. 22, 1959	0	120	120	1.53	20.84	162	162	28.06
1960	1707	4,110	Mar. 30, 1960	.1	144	144	1.84	25.15	-	-	-

2120. Grand River near Madison, Ohio

Location.--Lat 41°44'26", long 81°02'48", on downstream end of center pier of bridge on State Highway 528, half a mile upstream from Griswold Creek and 2 miles south of Madison, Lake County.

Drainage area.--587 sq mi.

Records available.--July 1922 to December 1935, February 1938 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 674.47 ft above mean sea level, adjustment of 1912. Prior to Jan. 20, 1939, chain gage at same site and datum.

Average discharge.--35 years (1922-35, 1938-60), 668 cfs.

Extremes.--1922-35, 1938-60: Maximum discharge, 21,100 cfs Jan. 22, 1959 (gage height, 14.73 ft), from rating curve extended above 12,200 cfs on basis of estimated peak flow over dam at site about 8 miles upstream with drainage area of 559 sq mi, adjusted to gage site by 0.8 power of the drainage area ratio; no flow July 31, Aug. 1, 2, 1934.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	58.8	840	1,875	1,847	2,167	2,462	1,310	356	92.9	75.4	9.07	12.2	919
1952	10.8	664	1,565	3,596	1,302	1,299	1,074	568	40.1	15.2	25.8	10.1	849
1953	7.50	97.2	319	923	532	717	558	1,269	235	16.6	32.7	6.13	392
1954	2.67	14.0	188	802	765	2,374	2,324	604	213	11.5	4.11	4.53	607
1955	1,137	531	1,492	815	1,539	2,030	985	114	117	28.5	24.5	5.57	732
1956	127	723	909	278	2,302	2,310	1,547	1,633	670	411	1,321	241	1,035
1957	33.2	81.4	745	1,285	1,116	737	3,193	465	491	262	7.07	9.70	696
1958	16.8	86.6	1,223	614	706	1,204	505	618	187	686	1,102	820	650
1959	203	903	489	2,355	2,192	1,710	1,139	625	241	45.4	21.5	21.0	820
1960	966	1,169	1,719	1,311	1,164	1,220	1,362	1,149	335	49.0	37.8	22.4	875

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.12	1.60	3.68	3.63	3.84	4.83	2.49	0.70	0.18	0.15	0.02	0.02	21.26
1952	.02	1.26	3.08	7.07	2.39	2.55	2.04	1.12	.08	.03	.05	.02	19.71
1953	.02	.19	.63	†1.81	.94	1.41	1.02	2.49	.45	.03	.06	.01	9.06
1954	.005	.03	.37	1.58	1.35	4.66	4.42	1.19	.40	.02	.008	.009	14.04
1955	2.24	1.01	2.93	1.60	2.73	3.99	1.87	.22	.22	.06	.05	.01	16.93
1956	.25	1.37	1.79	.55	4.23	4.54	2.94	3.20	1.27	.81	2.59	.46	24.00
1957	.07	.16	1.46	2.52	1.98	1.45	6.07	.91	.93	.51	.01	.02	16.09
1958	.03	.17	2.40	1.21	1.25	2.36	.96	1.21	.36	1.35	2.17	1.56	15.03
1959	.40	1.72	.96	4.62	3.88	3.36	2.16	1.22	.46	.09	.04	.04	18.95
1960	1.90	2.22	3.38	2.57	2.14	2.40	2.59	2.26	.64	.10	.07	.04	20.31

† Corrected.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,104	25.56
1951	1207	12,900	Dec. 4, 1950	2.8	919	1.57	21.26	874	20.22
1952	1237	10,100	Jan. 27, 1952	3.6	849	1.45	19.71	697	16.19
1953	1277	6,780	May 23, 1953	2.4	392	1.58	9.06	375	8.62
1954	1337	9,860	Mar. 2, 1954	2	607	1.03	14.04	857	19.82
1955	1387	10,100	Oct. 16, 1954	3.5	732	1.25	16.93	612	14.16
1956	1437	9,860	May 13, 1956	6.2	1,035	1.76	24.00	961	22.28
1957	1507	12,000	Jan. 23, 1957	4.5	696	1.19	16.09	736	17.00
1958	1557	7,710	Feb. 28, 1958	4.8	650	1.11	15.03	670	15.51
1959	1627	21,100	Jan. 22, 1959	5.0	820	1.40	18.95	1,011	23.37
1960	1707	14,300	Mar. 31, 1960	9.3	875	1.49	20.31	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

2125. Ashtabula River near Ashtabula, Ohio

Location.--Lat 41°51'19", long 80°45'43", on left bank at downstream side of highway bridge, 1 mile upstream from Hubbard Run, 1½ miles southeast of Ashtabula, Ashtabula County, and 5½ miles upstream from mouth.

Drainage area.--118 sq mi.

Records available.--July 1924 to December 1935, March 1939 to November 1947, March 1950 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 605 ft (from topographic map). Prior to Aug. 27, 1924, staff gage at same site and datum.

Average discharge.--29 years (1924-35, 1939-47, 1950-60), 152 cfs.

Extremes.--1924-35, 1939-47, 1950-60: Maximum discharge, 11,600 cfs Jan. 22, 1959 (gage height, 11.03 ft), from rating curve extended above 4,600 cfs by logarithmic plotting; no flow at times during most years.

Remarks.--Records of chemical analyses for the period March 1950 to March 1952 at Main Street Bridge in Ashtabula are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	20.9	248	477	356	389	397	264	77.6	9.54	4.02	0.11	0.31	186
1952	.97	122	315	504	219	219	178	161	9.19	1.73	4.74	3.30	145
1953	1.53	33.8	142	225	140	254	105	411	70.2	1.68	2.08	.94	114
1954	3.18	5.95	149	319	210	488	563	193	34.8	10.3	.38	.05	164
1955	323	182	541	198	375	342	166	13.0	6.39	.23	1.54	.16	178
1956	32.0	187	225	50.8	476	463	331	378	63.0	10.6	181	110	208
1957	6.82	35.0	348	337	257	131	544	72.1	189	51.2	.04	.29	163
1958	1.26	8.19	240	122	216	223	116	92.7	55.2	33.7	227	253	132
1959	64.5	160	96.0	494	407	333	220	125	32.4	2.96	2.00	.15	160
1960	204	368	539	319	254	373	170	257	17.1	1.94	2.21	6.25	210

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.20	2.35	4.66	3.48	3.44	3.88	2.50	0.76	0.09	0.04	0.001	0.003	21.40
1952	.009	1.15	3.08	4.92	2.01	2.14	1.68	1.57	.09	.007	.05	.03	16.74
1953	.02	.32	1.38	2.18	1.24	2.28	.99	4.01	.66	.02	.02	.009	13.13
1954	.002	.04	1.45	3.10	1.85	4.77	5.32	1.89	.33	.10	.004	.0005	18.86
1955	3.16	1.72	5.28	1.94	3.31	3.34	1.57	.13	.06	.002	.02	.002	20.53
1956	.31	1.76	2.20	.50	4.35	4.52	3.14	3.69	.60	.10	1.76	1.04	23.97
1957	.07	.53	3.40	3.30	2.27	1.28	5.14	.70	1.78	.50	.0004	.003	18.77
1958	.01	.08	2.34	1.19	1.91	2.18	1.10	.91	.52	.33	2.21	2.39	15.17
1959	.63	1.52	.94	4.83	3.59	3.25	2.08	1.22	.31	.03	.02	.001	18.42
1960	1.99	3.48	5.27	3.11	2.32	3.64	1.61	2.51	.16	.02	.02	.06	24.19

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	7,180	Dec. 4, 1950	0	186	1.58	21.40	160	18.43
1952	1237	4,450	Jan. 27, 1952	0	145	1.23	16.74	123	14.22
1953	1277	6,810	May 23, 1953	0	114	.966	13.13	112	12.90
1954	1337	6,250	Mar. 1, 1954	0	164	1.39	18.86	239	27.52
1955	1387	8,880	Oct. 16, 1954	0	178	1.51	20.53	127	14.64
1956	1437	5,070	Mar. 12, 1956	.1	208	1.76	23.97	204	23.50
1957	1507	6,110	Jan. 23, 1957	0	163	1.38	18.77	151	17.40
1958	1557	2,800	Sept. 5, 1958	0	132	1.12	15.17	138	15.83
1959	1627	11,600	Jan. 22, 1959	0	160	1.36	18.42	227	26.07
1960	1707	7,110	Mar. 30, 1960	.1	210	1.78	24.19	-	-

## 2130. Conneaut Creek at Amboy, Ohio

Location.--Lat 41°55'34", long 80°36'18", on right bank at downstream side of highway bridge, half a mile east of Amboy, Ashtabula County, 3 miles southwest of Conneaut, and 6½ miles upstream from mouth.

Drainage area.--178 sq mi.

Records available.--July 1922 to December 1935, March 1950 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 605 ft (from topographic map). Prior to Aug. 17, 1924, chain gage at same site and datum.

Average discharge.--23 years (1922-35, 1950-60), 247 cfs.

Extremes.--1922-35, 1950-60: Maximum discharge, 17,000 cfs Jan. 22, 1959 (gage height, 11.70 ft); maximum gage height, 12.94 ft Mar. 4, 1934 (ice jam); minimum discharge, 0.2 cfs July 31, Aug. 1, 1933, Aug. 1, 2, 1934.

Remarks.--Records of chemical analyses for the period March 1950 to March 1952 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	55.9	451	725	584	665	613	487	154	46.1	31.0	7.11	10.2	317
1952	9.55	238	564	876	373	430	300	422	32.9	14.4	23.1	23.3	276
1953	10.6	96.2	260	313	238	408	206	670	147	14.1	8.93	13.7	199
1954	6.34	17.1	167	443	353	693	809	331	48.7	19.5	5.63	5.61	241
1955	580	273	601	285	601	555	300	46.5	19.2	8.49	6.77	5.15	269
1956	109	320	343	91.4	775	745	542	653	154	79.4	256	213	355
1957	31.1	77.8	533	497	421	252	839	117	409	90.6	6.55	8.77	272
1958	9.94	20.9	593	171	328	523	214	169	123	110	273	564	243
1959	128	339	194	774	658	607	350	197	79.8	19.7	17.3	35.3	281
1960	502	533	692	445	435	559	363	409	42.6	16.1	14.8	18.2	336

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.36	2.82	4.69	3.78	3.90	3.97	3.06	1.00	0.29	0.20	0.05	0.06	24.18
1952	.06	1.50	3.66	5.67	2.26	2.79	1.89	2.73	.21	.09	.15	.15	21.16
1953	.07	.60	1.68	2.03	1.40	2.64	1.29	4.34	.92	.09	.06	.09	15.21
1954	.04	.11	1.08	2.87	2.06	4.48	5.06	2.14	.31	.13	.04	.04	18.36
1955	3.76	1.71	5.19	1.84	3.52	3.60	1.89	.30	.12	.06	.06	.03	22.08
1956	.71	2.01	2.22	.59	4.69	4.83	3.39	4.23	.97	.51	1.66	1.34	27.15
1957	.20	.49	3.45	3.22	2.47	1.64	5.26	.76	2.57	.59	.08	.05	20.76
1958	.06	.33	2.55	1.11	1.92	3.39	1.34	1.22	.77	.71	1.76	3.54	18.50
1959	.83	2.12	1.26	5.02	3.85	3.93	2.20	1.28	.50	.13	.11	.22	21.45
1960	3.25	3.34	4.48	2.88	2.63	3.62	2.28	2.65	.27	.10	.10	.11	25.71

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1237	-	-	-	317	1.78	24.18	282	21.53
1952	1237	8,830	Dec. 4, 1950	3.3	276	1.55	21.16	239	18.29
1953	1277	5,140	Jan. 27, 1952	3.6	199	1.12	15.21	185	14.09
1954	1537	6,430	May 23, 1953	3.7	241	1.35	18.36	365	27.79
1955	1387	6,810	Mar. 1, 1954	2.2	289	1.62	22.08	214	16.36
1956	1437	12,900	Oct. 16, 1954	2.0	-	-	-	-	-
1957	1507	6,810	May 13, 1956	5.3	355	1.99	27.15	345	26.35
1958	1507	7,400	June 30, 1957	5.8	272	1.53	20.76	254	19.36
1959	1557	8,410	Sept. 5, 1958	4.1	243	1.37	16.50	262	19.97
1959	1627	17,000	Jan. 22, 1959	6.2	281	1.58	21.45	371	28.31
1960	1707	7,960	Mar. 30, 1960	5.6	336	1.89	25.71	-	-

## STREAMS TRIBUTARY TO LAKE ERIE

## 2135. Cattaraugus Creek at Gowanda, N. Y.

Location.--Lat 42°27'50", long 78°56'10", on right bank at Gowanda, Erie County, 380 ft downstream from highway bridge, 600 ft downstream from powerhouse of Niagara Mohawk Power Corp., and 4.2 miles downstream from South Branch.

Drainage area.--428 sq mi.

Records available.--November 1939 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 738.74 ft above mean sea level (village of Gowanda bench mark).

Average discharge.--20 years (1940-60), 730 cfs.

Extremes.--1939-60: Maximum discharge, 35,900 cfs Mar. 17, 1942, from rating curve extended above 6,500 cfs by logarithmic plotting; maximum gage height, 14.14 ft Mar. 7, 1956; minimum discharge, about 6 cfs Aug. 21, 1941; minimum gage height, 0.90 ft Oct. 26, 1951; minimum daily discharge, 52 cfs Sept. 13, 1945, Aug. 1, 1955.

Remarks.--Flow regulated by several industrial plants above station. Diurnal fluctuation at low and medium flow caused by powerplant above station. Records of chemical analyses and water temperatures for the period October 1958 to September 1959, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	302	1,161	1,250	1,462	1,539	1,736	1,425	459	397	197	99.7	130	842
1952	108	622	1,059	1,727	1,074	1,567	978	845	282	125	125	181	724
1953	135	300	633	760	835	1,451	637	1,141	454	158	211	147	587
1954	97.8	180	474	785	1,183	1,322	1,784	569	354	127	121	121	588
1955	353	395	966	707	855	2,080	853	330	143	78.3	132	92.9	582
1956	674	827	932	275	1,019	2,545	2,167	1,339	392	332	579	791	989
1957	294	424	1,930	1,411	975	985	1,665	799	488	512	128	176	816
1958	112	215	732	321	348	1,224	2,175	712	867	545	185	597	669
1959	315	689	648	1,608	1,242	1,710	1,839	440	239	142	131	99.5	755
1960	634	917	1,405	1,170	1,156	1,411	1,655	557	449	148	168	65.8	812

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.81	3.03	3.37	3.94	3.74	4.68	3.71	1.24	1.04	0.53	0.27	0.34	26.70
1952	.29	1.62	2.85	4.65	2.71	4.22	2.55	2.28	.73	.33	.34	.47	23.04
1953	.36	.78	1.70	2.05	2.03	3.91	2.18	3.07	1.13	.42	.57	.38	18.58
1954	.26	.47	1.28	2.11	2.88	3.56	4.65	1.53	.92	.34	.33	.31	18.64
1955	.95	1.03	2.60	1.91	2.08	5.60	2.22	.89	.37	.21	.36	.24	18.46
1956	1.82	2.16	2.51	.74	2.57	6.86	5.65	3.61	1.02	.89	1.56	2.06	31.45
1957	.79	1.10	5.20	3.60	2.37	2.65	4.34	2.15	1.27	1.38	.34	.46	25.85
1958	.30	.56	1.97	.87	.85	3.30	5.67	1.92	2.26	1.47	.50	1.56	21.23
1959	.85	1.79	1.74	4.33	3.02	4.60	4.79	1.18	.62	.38	.35	.26	23.91
1960	1.71	2.39	3.78	3.15	2.91	3.80	4.31	1.50	1.17	.40	.45	.22	25.79

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	787	24.97
1951	1207	17,600	Nov. 25, 1950	75	842	1.97	26.70	765	24.25
1952	1237	12,300	Mar. 11, 1952	62	724	1.69	23.04	664	21.12
1953	1277	6,730	Mar. 24, 1953	71	587	1.37	18.58	560	17.75
1954	1337	11,100	Apr. 28, 1954	56	588	1.37	18.64	669	21.21
1955	1387	19,400	Mar. 1, 1955	52	582	1.36	18.46	642	20.37
1956	1437	34,600	Mar. 7, 1956	74	989	2.31	31.45	1,008	32.05
1957	1507	22,900	Jan. 23, 1957	98	816	1.91	25.85	681	21.59
1958	1557	11,200	June 13, 1958	94	669	1.56	21.23	718	22.78
1959	1627	27,000	Jan. 22, 1959	61	755	1.76	23.91	865	27.41
1960	1707	19,700	Mar. 30, 1960	67	812	1.90	25.79	-	-

## 2145. Buffalo Creek at Gardenville, N. Y.

Location.--Lat 42°51'15", long 78°45'30", on left bank in Gardenville, Erie County, 700 ft downstream from bridge on Union Road and 2 miles upstream from Cayuga Creek.

Drainage area.--145 sq mi.

Records available.--October 1938 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 604.04 ft above mean sea level, unadjusted.

Average discharge.--22 years (1938-60), 193 cfs.

Extremes.--1938-60: Maximum discharge, 13,000 cfs Mar. 1, 1955, Mar. 7, 1956, from rating curve extended above 3,200 cfs on basis of slope-area measurement at gage height 7.07 ft; maximum gage height, 11.90 ft Mar. 9, 1942 (ice jam); minimum discharge, 0.7 cfs Aug. 22, 24, 25, 1941.

Remarks.--Diurnal fluctuation at low flow caused by mill 3.2 miles above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	36.2	297	397	470	433	558	400	95.6	#78.8	53.0	12.0	21.9	237
1952	16.8	177	200	424	262	485	237	219	33.0	11.8	11.8	26.6	175
1953	17.1	43.4	170	251	209	393	173	385	68.1	26.8	58.3	19.7	151
1954	9.62	36.6	149	268	471	380	567	130	60.9	16.1	13.7	27.0	175
1955	213	179	415	159	311	688	238	52.9	15.6	6.89	13.8	7.68	192
1956	181	218	323	70.9	350	782	584	349	89.4	39.1	107	172	272
1957	55.0	99.9	467	503	336	245	462	267	68.6	72.5	13.5	26.1	217
1958	18.2	126	248	64.2	111	476	396	154	246	128	35.6	143	179
1959	71.6	161	153	444	379	512	520	102	57.3	19.6	16.6	10.5	203
1960	128	199	406	295	336	402	384	96.0	90.2	18.1	16.0	7.52	198

\* Correction.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.29	2.29	3.16	3.74	3.11	4.44	3.08	0.76	0.61	0.42	0.10	0.17	22.17
1952	.13	1.36	1.59	3.37	1.95	3.85	1.82	1.74	.25	.09	.09	.20	16.44
1953	.14	.33	1.35	1.99	1.50	3.12	1.33	3.06	.52	.21	.46	.15	14.16
1954	.08	.28	1.19	2.13	3.38	3.02	4.36	1.05	.47	.13	.11	.21	16.39
1955	1.70	1.36	3.30	1.26	2.23	5.47	1.83	.42	.12	.05	.11	.06	17.93
1956	1.44	1.67	2.57	.56	2.60	6.22	4.49	2.77	.69	.31	.85	1.33	25.50
1957	.44	.77	3.71	4.00	2.41	1.95	3.55	2.12	.53	.58	.11	.20	20.37
1958	.14	.97	1.97	.51	.80	3.79	3.04	1.23	1.89	1.02	.28	1.10	16.74
1959	.57	1.24	1.21	3.53	2.72	4.07	4.00	.81	.44	.16	.13	.08	18.96
1960	1.01	1.53	3.23	2.34	2.50	3.20	2.95	.76	.69	.14	.13	.06	18.54

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean
		Discharge	Date					
1950	-	-	-	-	-	-	-	202
1951	1207, 1337	8,400	Dec. 3, 1950	8.0	237	1.63	22.17	18.93
1952	1237, 1337	7,100	Mar. 11, 1952	4.4	174	1.21	16.44	19.51
1953	1277	8,940	May 26, 1953	3.1	151	1.04	14.16	162
1954	1337	8,420	Feb. 16, 1954	5.6	175	1.21	16.39	15.18
1955	1367	13,000	Mar. 1, 1955	1.8	192	1.32	17.93	149
1956	1437	13,000	Mar. 7, 1956	8.0	272	1.88	25.50	227
1957	1507	11,400	Jan. 23, 1957	7.6	217	1.50	20.37	184
1958	1557	4,110	June 13, 1958	12	179	1.23	16.74	264
1959	1627	10,000	Jan. 22, 1959	5.3	203	1.40	18.96	198
1960	1707	7,530	Mar. 30, 1960	4.4	198	1.37	18.54	178
								21.71
								-

## 2150. Cayuga Creek near Lancaster, N. Y.

Location.--Lat 42°53'20", long 78°38'40", on right bank just upstream from low flat-crested dam in Como Lake Park, 700 ft downstream from bridge on Bowen Road, 800 ft downstream from Little Buffalo Creek, and 2 miles southeast of Lancaster, Erie County.

Drainage area.--93.3 sq mi.

Records available.--September 1938 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 672.80 ft above mean sea level, unadjusted.

Average discharge.--22 years (1938-60), 128 cfs.

Extremes.--1938-60: Maximum discharge, 8,750 cfs Jan. 22, 1959; maximum gage height, 12.58 ft Mar. 30, 1960 (ice jam); practically no flow part of Aug. 8, 9, 1939, when permanent stoplogs were installed in dam.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	20.3	185	282	310	319	393	283	64.7	36.6	16.5	1.89	4.90	159
1952	4.65	77.8	104	269	142	316	153	138	11.7	2.25	4.35	12.0	103
1953	5.23	16.1	132	174	122	272	99.4	202	26.6	22.0	73.5	5.58	96.3
1954	3.11	14.5	58.2	153	354	247	378	64.4	23.2	4.35	4.47	10.5	108
1955	175	139	315	99.6	208	418	185	28.2	5.88	1.06	4.17	1.23	132
1956	152	160	273	49.7	287	507	393	267	52.0	20.6	130	180	206
1957	39.8	51.7	235	354	257	172	300	194	28.2	17.2	3.33	4.94	138
1958	4.06	102	194	50.7	95.9	401	262	68.2	132	56.3	11.0	61.8	120
1959	37.4	91.6	89.7	324	280	374	332	57.7	36.9	10.9	3.77	1.89	136
1960	76.2	131	316	240	222	271	233	58.7	30.1	4.42	5.26	.80	132

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.25	2.21	3.49	3.83	3.56	4.86	3.39	0.80	0.44	0.20	0.02	0.06	23.11
1952	.06	.93	1.29	3.32	1.64	3.91	1.82	1.71	.14	.03	.05	.14	15.04
1953	.06	.19	1.63	2.15	1.37	3.36	1.19	2.50	.32	.27	.91	.07	14.02
1954	.04	.17	.72	1.89	3.95	3.05	4.51	.80	.28	.05	.06	.13	15.65
1955	2.17	1.67	3.90	1.23	2.32	5.17	2.22	.35	.07	.01	.05	.01	19.17
1956	1.88	1.91	3.37	.61	3.31	6.27	4.71	3.30	.62	.25	1.61	2.16	30.00
1957	.49	.62	2.91	4.38	2.87	2.13	3.58	2.40	.34	.21	.04	.06	20.03
1958	.05	1.22	2.39	.63	1.07	4.96	3.13	.84	1.58	.70	.14	.74	17.45
1959	.46	1.09	1.11	4.00	3.13	4.62	3.96	.71	.44	.14	.05	.02	19.73
1960	.94	1.56	3.90	2.96	2.57	3.34	2.79	.73	.36	.05	.07	.01	19.28

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	134	19.54
1951	1207	6,190	Dec. 3, 1950	0.7	159	1.70	23.11	134	19.44
1952	1237	5,600	Mar. 11, 1952	.3	103	1.10	15.04	100	14.64
1953	1277	3,710	Aug. 10, 1953	1.2	96.3	1.03	14.02	89.7	13.07
1954	1337	5,370	Feb. 16, 1954	1.5	108	1.16	15.65	154	22.46
1955	1387, 1437	7,900	Mar. 1, 1955	.1	132	1.41	19.17	128	18.59
1956	1437	8,700	Mar. 7, 1956	.8	206	2.21	30.00	184	26.86
1957	1507	7,460	Jan. 22, 1957	1.1	138	1.48	20.05	135	19.67
1958	1557	2,400	Nov. 29, 1957	2.4	120	1.29	17.45	113	16.45
1959	1627	8,750	Jan. 22, 1959	.4	136	1.46	19.73	161	23.47
1960	1707	7,070	Mar. 30, 1960	.3	132	1.41	19.28	-	-



## 2155. Cazenovia Creek at Ebenezer, N. Y.

Location.--Lat 42°49'45", long 78°46'40", on right bank 30 ft upstream from highway bridge on Ridge Road in Ebenezer, Erie County, 4.4 miles upstream from mouth, and 5 miles southeast of Buffalo.

Drainage area.--136 sq mi.

Records available.--June 1940 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 604.86 ft above mean sea level, unadjusted. Prior to Apr. 4, 1955, at datum 2 ft higher than present datum. Apr. 4 to Oct. 12, 1955, wire-weight gage at temporary site 1.3 miles downstream at different datum, during period of construction of highway bridge.

Average discharge.--20 years (1940-60), 222 cfs.

Extremes.--1940-60: Maximum discharge, 13,500 cfs Mar. 1, 1955 (gage height, 15.82 ft, present datum), from rating curve extended above 7,700 cfs by logarithmic plotting; minimum, 2.6 cfs Nov. 7, 1953; minimum gage height, 1.94 ft Sept. 8, 1959, Sept. 6, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	50.6	390	407	544	526	636	434	98.6	72.0	58.5	9.70	15.9	269
1952	17.1	200	237	571	315	530	266	311	32.1	10.5	15.2	30.7	212
1953	17.9	63.4	259	310	232	444	225	407	70.4	15.2	52.6	18.6	177
1954	79.76	31.4	186	303	524	457	628	135	98.7	19.4	14.9	26.9	200
1955	274	224	465	203	377	924	284	54.1	17.5	6.11	22.2	8.61	230
1956	256	304	380	83.3	455	856	678	416	95.6	36.6	110	154	316
1957	42.6	110	566	576	414	299	561	286	105	94.3	13.2	27.7	257
1958	16.0	204	338	69.1	151	466	476	142	273	92.5	52.7	219	206
1959	92.1	203	165	524	408	548	624	118	64.4	23.7	19.7	11.6	232
1960	192	257	458	377	373	447	435	131	117	19.5	14.9	7.93	235

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.43	3.20	3.45	4.61	4.03	5.39	3.58	0.84	0.59	0.50	0.08	0.13	26.81
1952	.15	1.64	2.01	4.84	2.50	4.50	2.18	2.64	.26	.09	.13	.25	21.19
1953	.15	.52	2.20	2.63	1.78	3.77	1.84	3.45	.58	.13	.45	.15	17.65
1954	.08	.26	1.58	2.57	4.01	3.87	5.15	1.14	.81	.16	.13	.22	19.98
1955	2.32	1.84	3.94	1.72	2.89	6.99	2.33	.46	.14	.05	.19	.07	22.94
1956	2.17	2.50	3.22	.71	3.45	7.25	5.55	3.52	.78	.31	.93	1.26	31.65
1957	.56	.90	4.80	4.88	3.17	2.54	4.60	2.42	.86	.80	.11	.23	25.87
1958	.14	1.67	2.87	.59	1.01	3.95	3.91	1.20	2.24	.78	.45	1.80	20.61
1959	.78	1.66	1.40	4.44	3.12	4.64	5.12	1.00	.53	.20	.17	.10	23.16
1960	1.63	2.10	3.88	3.20	2.96	3.79	3.57	1.11	.96	.17	.13	.07	23.57

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	229	22.89
1951	1207	7,330	Jan. 4, 1951	7.0	269	1.98	26.81	236	23.53		
1952	1237	6,510	Mar. 11, 1952	3.4	212	1.56	21.19	202	20.26		
1953	1277	7,110	May 26, 1953	5.8	177	1.30	17.65	167	16.70		
1954	1337	5,570	Mar. 25, 1954	7.3	200	1.47	19.98	262	26.16		
1955	1367	13,500	Mar. 1, 1955	3.1	230	1.69	22.94	228	22.73		
1956	1437	13,000	Mar. 7, 1956	7.6	316	2.32	31.65	298	29.82		
1957	1507	12,100	Jan. 22, 1957	7.2	257	1.89	25.67	243	24.29		
1958	1557	4,610	June 13, 1958	9.2	206	1.51	20.61	198	19.77		
1959	1627	12,600	Jan. 22, 1959	7.0	232	1.71	23.16	270	26.93		
1960	1707	7,160	Mar. 30, 1960	5.8	235	1.73	23.57	-	-		

## ST. LAWRENCE RIVER MAIN STEM

## 2160. Niagara River at Buffalo, N.Y.

Location.--Lat 42°52'40", long 78°53'25", at head of Niagara River at Buffalo.

Drainage area.--260,400 sq mi (revised).

Records available.--January 1905 to September 1935 (monthly discharge only, published in WSP 8047, October 1935 to September 1960 in annual reports of Geological Survey. January 1860 to December 1904 in files of U.S. Lake Survey.

Remarks.--Records for this station through 1950 were not compiled in WSP 1307 and no records are included in this report because all records since 1860 are being reviewed and revised by a coordinating committee composed of representatives of Canada and the United States. Final official records were not available in time for inclusion in this report.

## 2162. Scajaquada Creek at Buffalo, N. Y.

Location.--Lat 42°54'40", long 78°47'45", on right bank 58 ft upstream from point where stream goes underground in concrete-lined tunnel, 86 ft upstream from Pine Ridge Road and 0.16 mile east of boundary line of city of Buffalo, Erie County.

Drainage area.--15.7 sq mi.

Records available.--February 1957 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 626.26 ft above mean sea level (city of Buffalo bench mark).

Extremes.--1957-60: Maximum discharge, 1,150 cfs Jan. 22, 1959 (gage height, 7.98 ft); minimum, 4.1 cfs Sept. 27, 1959; minimum gage height, 1.49 ft Sept. 2, 1957 (may have been lower during period of partly obstructed intake).

Remarks.--Discharge includes sewage diverted into basin above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	24.6	48.9	33.6	12.3	12.0	8.83	10.9	-
1958	9.91	33.4	43.5	13.6	33.4	58.7	30.1	15.0	13.4	9.30	10.7	15.4	23.6
1959	10.0	15.2	15.0	61.0	54.7	66.0	49.2	15.5	13.3	10.0	16.8	10.4	27.9
1960	29.0	33.9	50.9	45.9	47.9	64.8	34.2	26.7	14.7	10.2	15.0	9.17	31.9

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	1.81	3.48	2.47	0.87	0.88	0.65	0.77	-
1958	0.73	2.38	3.20	1.00	2.21	4.31	2.14	1.10	.95	.68	.79	1.09	20.58
1959	.74	1.08	1.10	4.48	3.63	4.84	3.49	1.14	.95	.74	1.23	.74	24.16
1960	2.13	2.41	3.73	3.37	3.29	4.76	2.43	1.96	1.05	.75	1.10	.65	27.63

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1957	1507	-	-	-	-	-	-	-	-
1958	1557	418	Dec. 20, 1957	7.0	23.8	1.52	20.58	19.9	17.19
1959	1627	1,150	Jan. 22, 1959	6.6	27.9	1.78	24.16	34.1	29.51
1960	1707	848	Mar. 29, 1960	6.9	31.9	2.03	27.63	-	-

## 2165. Little Tonawanda Creek at Linden, N. Y.

Location--Lat 42°52'35", long 78°09'45", on right bank at upstream side of highway bridge in Linden, Genesee County, 7 miles upstream from mouth.

Drainage area--22.0 sq mi.

Records available--July 1912 to September 1960.

Gage--Water-stage recorder. Concrete control since Oct. 15, 1930. Datum of gage is 1,081.62 ft above mean sea level, datum of 1929. Prior to Aug. 26, 1943, staff gage at same site and datum.

Average discharge--47 years (1912-19, 1920-60), 27.7 cfs.

Extremes--1912-60: Maximum discharge, 2,700 cfs Mar. 7, 1956 (gage height, 16.04 ft, from high-water mark); minimum, 0.08 cfs Aug. 3, 4, 1955 (gage height, 0.145 ft, back-water from aquatic vegetation and debris).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2.91	30.0	54.6	64.8	72.8	91.6	85.5	15.8	6.17	2.72	0.73	0.63	35.4
1952	.68	7.58	19.0	60.7	43.6	86.9	38.9	28.0	4.48	1.35	.56	.59	24.4
1953	.62	1.31	11.5	25.2	38.4	70.9	31.3	44.8	10.9	4.32	4.29	1.21	20.3
1954	.83	2.95	14.1	27.0	77.4	59.6	80.8	19.1	5.01	1.15	.58	.74	23.7
1955	16.3	19.4	49.6	32.1	40.9	119	53.4	10.1	2.30	.49	.37	.25	28.7
1956	13.7	20.2	44.0	13.0	41.2	121	132	59.4	9.63	3.45	4.55	8.28	39.2
1957	5.18	7.19	39.2	62.6	49.5	42.6	67.4	57.7	8.17	5.72	1.29	.98	28.9
1958	.84	2.72	11.9	7.66	10.8	59.0	125	18.2	28.1	10.6	2.49	6.41	23.6
1959	6.83	16.0	18.5	65.1	52.5	92.9	107	13.3	5.74	1.61	.90	.52	31.6
1960	7.55	17.1	63.9	47.8	54.3	90.1	91.1	17.8	8.61	1.85	.98	.62	33.4

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.15	1.52	2.87	3.39	3.44	4.80	4.34	0.83	0.31	0.14	0.04	0.03	21.86
1952	.04	.38	1.00	3.18	2.14	4.55	1.97	1.47	.25	.07	.05	.03	15.09
1953	.03	.07	.80	1.32	1.82	3.72	1.59	2.35	.55	.23	.22	.08	12.56
1954	.04	.15	.74	1.42	3.68	3.12	4.10	1.00	.25	.06	.03	.04	14.61
1955	.86	.98	2.60	1.68	1.94	6.25	2.71	.53	.12	.03	.02	.01	17.73
1956	.72	1.03	2.31	.68	2.02	6.36	6.72	3.11	.49	.18	.24	.42	24.28
1957	.27	.36	2.06	3.28	2.34	2.23	3.42	3.02	.41	.30	.07	.05	17.81
1958	.04	.14	.63	.40	.51	3.09	6.34	.95	1.42	.55	.13	.32	14.52
1959	.36	.81	.97	3.41	2.48	4.87	5.44	.70	.29	.08	.05	.03	19.49
1960	.40	.87	3.35	2.51	2.66	4.72	4.62	.93	.44	.10	.05	.03	20.68

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	30.6	18.87
1951	1207	1,150	Apr. 12, 1951	0.4	35.4	1.61	21.86	30.4	18.74
1952	1237	1,330	Mar. 11, 1952	.2	24.4	1.11	15.09	23.2	14.37
1953	1277	467	Mar. 24, 1953	.5	20.3	.923	12.56	20.7	12.79
1954	1337	976	Mar. 25, 1954	.4	23.7	1.08	14.61	29.4	18.12
1955	1387	2,460	Mar. 1, 1955	.1	28.7	1.30	17.73	28.1	17.35
1956	1437	2,700	Mar. 7, 1956	.2	39.2	1.78	24.28	37.0	22.91
1957	1507	1,500	Jan. 22, 1957	.6	28.9	1.31	17.81	25.8	15.93
1958	1557	732	Apr. 7, 1958	.7	23.6	1.07	14.52	25.7	15.85
1959	1627	1,630	Jan. 22, 1959	.4	31.6	1.44	19.49	35.6	21.97
1960	1707	1,840	Mar. 30, 1960	.3	33.4	1.52	20.68	-	-

## 2170. Tonawanda Creek at Batavia, N. Y.

Location.--Lat 42°59'55", long 78°11'20", on right bank 150 ft downstream from municipal dam, 500 ft upstream from Walnut Street Bridge in Batavia, Genesee County, and 3½ miles downstream from Little Tonawanda Creek.

Drainage area.--172 sq mi.

Records available.--July 1944 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 876.01 ft above mean sea level (city of Batavia bench mark).

Average discharge.--16 years (1944-60), 206 cfs.

Extremes.--1944-60: Maximum discharge, 7,200 cfs Mar. 31, 1960; maximum gage height, 13.85 ft Apr. 6, 1947; minimum discharge, 0.4 cfs Aug. 5, 6, 7, 1955; minimum gage height, 0.59 ft July 26, 27, 1948.  
Maximum stage known, 14.5 ft in March 1942, from records of city of Batavia.

Remarks.--Slight regulation at low flow by plants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	38.4	238	372	466	489	642	592	131	76.7	40.9	10.5	16.7	258
1952	14.4	103	142	463	296	564	261	199	38.4	12.0	10.1	14.7	177
1953	12.5	32.5	118	168	242	443	199	306	77.7	38.6	52.7	18.0	144
1954	11.5	35.2	103	182	517	401	566	130	47.7	15.1	13.6	17.0	167
1955	158	151	379	212	284	767	350	76.8	20.7	6.17	11.6	5.63	202
1956	147	176	293	79.8	337	851	809	450	95.4	47.5	121	183	299
1957	89.1	79.2	354	467	366	309	487	344	70.1	59.5	14.0	22.6	220
1958	15.9	49.8	145	59.4	78.1	450	775	153	191	113	35.5	83.0	179
1959	61.4	125	130	480	456	657	718	111	53.1	20.9	13.6	19.52	233
1960	96.3	151	450	332	392	488	696	136	79.4	20.0	20.4	8.12	238

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.26	1.54	2.49	3.12	2.96	4.30	3.84	0.88	0.50	0.27	0.07	0.11	20.34
1952	.10	.67	.95	3.10	1.85	3.78	1.69	1.33	.25	.08	.07	.09	13.96
1953	.08	.21	.79	1.26	1.47	2.97	1.29	2.05	.50	.26	.35	.12	11.35
1954	.08	.23	.69	1.22	3.13	2.69	3.67	.87	.31	.10	.09	.11	13.19
1955	1.06	.98	2.54	1.42	1.72	5.14	2.27	.51	.13	.04	.08	.04	15.93
1956	.98	1.14	1.97	.54	2.12	5.70	5.25	3.02	.62	.32	.81	1.19	23.66
1957	.46	.51	2.37	3.13	2.22	2.07	3.16	2.31	.45	.40	.09	.15	17.32
1958	.11	.32	.97	.40	.47	3.02	5.02	1.03	1.24	.76	.24	.54	14.12
1959	.41	.81	.87	3.08	2.76	4.40	4.66	.75	.34	.14	.09	.06	18.37
1960	.65	.98	3.01	2.23	2.46	3.27	4.51	.91	.51	.13	.14	.05	18.85

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean
		Discharge	Date					
1950	-	-	-	-	-	-	-	209
1951	1207	4,230	Jan. 4, 1951	5.9	258	1.50	20.34	125
1952	1237	4,480	Mar. 12, 1952	1.4	177	1.03	13.96	169
1953	1277	1,600	Mar. 28, 1953	4.7	144	.837	11.35	143
1954	1337	4,220	Feb. 17, 1954	6.4	167	.971	13.19	213
1955	1387	5,240	Mar. 2, 1955	.6	202	1.17	15.93	196
1956	1437.1627	6,480	Mar. 7, 1956	7.0	299	1.74	23.66	289
1957	1502.1627	6,090	Jan. 23, 1957	9.2	220	1.28	17.32	195
1958	1557	2,960	Apr. 7, 1958	12	179	1.04	14.12	187
1959	1627	5,230	Jan. 22, 1959	4.3	233	1.35	18.37	265
1960	1707	7,200	Mar. 31, 1960	5.8	238	1.38	18.85	-

## 2175. Tonawanda Creek near Alabama, N. Y.

Location.--Lat 43°05'25", long 78°27'15", near center of span on upstream side of highway bridge on Meadville Road, 0.4 mile downstream from canal feeder connecting Tonawanda and Oak Orchard Creeks, 1.1 miles upstream from small tributary, and 3.2 miles west of Alabama, Genesee County.

Drainage area.--230 sq mi.

Records available.--October 1955 to September 1960.

Gage.--Wire-weight gage. Crest-stage gage since Sept. 5, 1956. Altitude of gage is 620 ft (from topographic map).

Average discharge.--5 years (1955-60), 302 cfs.

Extremes.--1955-60: Maximum discharge, 9,000 cfs Jan. 23, 1959 (gage height, 15.95 ft, from graph based on gage readings, ice jam); minimum daily, 8.5 cfs Sept. 14, 1959.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	157	201	381	108	494	1,136	964	613	132	67.9	137	253	386
1957	89.5	93.1	434	662	537	438	661	425	88.3	76.5	21.8	30.1	296
1958	21.8	60.2	203	77.0	90.4	658	944	200	228	126	41.7	93.7	229
1959	75.0	157	152	533	577	879	949	136	62.1	27.3	17.6	15.1	296
1960	103	158	536	525	544	517	931	178	91.6	25.0	25.7	11.1	303

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	0.79	0.97	1.91	0.54	2.32	5.70	4.68	3.07	0.64	0.34	0.69	1.23	22.88
1957	.45	.48	2.18	3.32	2.43	2.19	3.20	2.13	.43	.38	.11	.15	17.45
1958	.11	.29	1.02	.39	.41	3.30	4.58	1.00	1.10	.63	.21	.45	13.49
1959	.58	.76	.76	2.67	2.61	4.41	4.60	.68	.30	.14	.09	.07	17.47
1960	.51	.77	2.68	2.63	2.55	2.59	4.52	.89	.44	.13	.13	.05	17.89

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1956	1437	6,860	Mar. 8, 1956	10	386	1.68	22.88	377	22.32
1957	1507	6,180	Jan. 24, 1957	14	296	1.29	17.45	267	15.76
1958	1557	3,560	Apr. 7, 1958	18	229	1.00	13.49	237	13.97
1959	1627	9,000	Jan. 23, 1959	8.5	296	1.29	17.47	331	19.53
1960	1707	7,980	Mar. 31, 1960	9.7	303	1.32	17.89	-	-

## STREAMS TRIBUTARY TO NIAGARA RIVER

2180. Tonawanda Creek at Rapids, N. Y.

Location.--Lat 43°05'35", long 78°38'05", on right bank at downstream side of highway bridge at Rapids, Niagara County, 4 $\frac{1}{4}$  miles downstream from Beeman Creek, 4.7 miles east of Pendleton, and 5 $\frac{1}{2}$  miles upstream from Mud Creek.

Drainage area.--358 sq mi.

Records available.--August 1955 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 580 ft (from topographic map).

Average discharge.--5 years (1955-60), 434 cfs.

Extremes.--1955-60: Maximum discharge, 6,280 cfs Apr. 1, 1960 (gage height, 16.96 ft); minimum, 10 cfs Sept. 29, 30, 1959; minimum gage height, 1.17 ft Sept. 29, 30, 1959, Sept. 16, 17, 1960 (backwater from aquatic vegetation).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-	-	-	-	29.0	13.9	-
1956	197	284	511	171	754	1,650	1,268	1,046	195	85.7	158	365	556
1957	124	120	574	972	723	744	965	594	113	106	31.8	36.3	424
1958	26.7	62.0	309	101	104	1,039	1,197	314	233	134	60.4	103.7	307
1959	79.1	184	209	785	888	1,347	1,339	220	88.0	37.7	21.6	17.7	431
1960	118	216	775	785	943	604	1,534	267	111	34.3	33.6	15.9	450

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-	-	-	-	0.09	0.04	-
1956	0.64	0.88	1.64	0.55	2.27	5.31	3.95	3.37	0.61	0.28	.51	1.14	21.15
1957	.40	.38	1.85	3.13	2.10	2.40	3.01	1.91	.35	.34	.10	.11	16.08
1958	.09	.19	.99	.32	.30	3.35	3.73	1.01	.73	.43	.19	.32	11.85
1959	.25	.57	.67	2.53	2.58	4.34	4.17	.71	.27	.12	.07	.06	16.34
1960	.38	.67	2.50	2.53	2.84	1.94	4.78	.86	.35	.11	.11	.05	17.12

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-
1955	1437	-	-	-	-	-	-	-	-
1956	1437	5,090	Mar. 10, 1956	17	556	1.55	21.15	542	20.62
1957	1507	5,210	Jan. 25, 1957	19	424	1.18	16.08	388	14.72
1958	1557	2,960	Apr. 9, 1958	22	307	.858	11.65	314	11.87
1959	1627	4,450	Apr. 4, 1959	11	431	1.20	16.34	485	18.40
1960	1707	6,280	Apr. 1, 1960	11	450	1.26	17.12	-	-

## 2185. Ellicott Creek at Williamsville, N. Y.

Location.--Lat 42°57'10", long 78°44'15", on right bank at downstream side of bridge on Wehrle Drive 0.4 mile upstream from small tributary and 0.8 mile south of Williamsville, Erie County.

Drainage area.--76.3 sq mi.

Records available.--October 1955 to September 1960.

Gage.--Water-stage recorder. Prior to Dec. 17, 1958, wire-weight gage on upstream side of bridge at same datum. Crest-stage gage since Sept. 6, 1956. Datum of gage is 668.93 ft above mean sea level, datum of 1929.

Average discharge.--5 years (1955-60), 101 cfs.

Extremes.--1955-60: Maximum discharge, 5,960 cfs Mar. 31, 1960; maximum gage height, 10.44 ft Mar. 7, 1956 (from graph based on gage readings); no flow for part of each day Aug. 14, 18-23, Aug. 28 to Sept. 9, 1958.

Remarks.--The Buffalo Crushed Stone Co. diverts intermittently up to 27 cfs from stream above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	101	107	194	34.1	197	362	248	184	36.4	14.2	89.1	125	141
1957	29.3	38.8	172	225	186	153	130	20.9	13.4	3.43	3.66		96.2
1958	4.07	49.0	110	19.4	32.7	288	175	55.3	33.8	11.0	1.46	13.0	66.3
1959	16.7	46.0	92.2	175	197	292	240	35.1	15.5	7.93	9.03	6.14	93.7
1960	31.4	78.1	208	165	189	295	199	61.8	25.1	6.45	7.67	2.01	106

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	1.52	1.56	2.93	0.51	2.78	5.48	3.62	2.78	0.53	0.21	1.35	1.83	25.10
1957	.44	.57	2.61	3.40	2.54	2.31	2.68	1.97	.31	.20	.05	.05	17.13
1958	.06	.72	1.66	.29	.45	4.35	2.56	.84	.49	.17	.02	.19	11.80
1959	.25	.67	1.39	2.65	2.69	4.41	3.50	.53	.23	.12	.14	.09	16.67
1960	.47	1.14	3.15	2.50	2.67	4.46	2.91	.93	.37	.10	.12	.03	18.85

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1956	1437	2,510	Mar. 7, 1956	2.5	141	1.85	25.10	127	22.71
1957	1507	2,410	Jan. 23, 1957	.9	96.2	1.26	17.13	89.6	15.95
1958	1557	496	Mar. 25, 1958	0	66.3	.869	11.80	65.6	11.67
1959	1627	1,220	Jan. 23, 1959	.2	93.7	1.23	16.67	107	19.12
1960	1707	5,960	Mar. 31, 1960	.2	106	1.39	18.85	-	-

## 2190. Erie (Barge) Canal at lock 30, Macedon, N. Y.

Location.--Lat 43°04'20", long 77°17'45", on left bank at lock 30, in Macedon, Wayne County, 500 ft downstream from headgate in old Erie Canal.

Records available.--November 1919 to December 1920 (navigation seasons only), October 1950 to September 1960. Prior to October 1956, published as Barge Canal at lock 30, Macedon.

Gage.--Water-stage recorder. Datum of gage is 448.80 ft above mean sea level, New York State Erie (Barge) Canal bench mark. Nov. 1, 1919, to Dec. 28, 1920, staff gage at same site at different datum.

Average discharge.--10 years (1950-60), 216 cfs.

Extremes.--1919-20, 1950-60: Maximum daily discharge, 762 cfs Dec. 9, 1954; minimum daily, 1.1 cfs Mar. 20, 21, 1953.

Remarks.--This record represents net diversion from Niagara River basin into Oswego River basin through Erie (Barge) Canal.

## STREAMS TRIBUTARY TO NIAGARA RIVER

Monthly and yearly mean discharge, in cubic feet per second, of Erie (Barge) Canal at lock 30, Macedon, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	335	312	119	67.6	48.9	57.5	125	157	373	375	367	365	226
1952	358	352	124	90.0	42.2	58.0	107	179	297	342	341	342	220
1953	334	328	128	7.70	9.75	27.1	89.0	121	340	351	334	333	201
1954	334	324	151	11.8	28.1	31.3	101	129	348	306	307	326	200
1955	361	377	126	13.7	12.3	37.3	112	135	384	394	404	406	231
1956	408	321	110	28.1	32.4	49.2	112	120	241	380	370	384	213
1957	402	400	124	10.5	9.54	11.2	112	130	344	387	367	376	224
1958	378	370	150	4.58	5.05	21.4	29.3	103	351	398	361	368	212
1959	349	350	132	28.0	23.0	45.1	55.7	80.5	391	411	397	390	222
1960	372	363	134	37.2	32.0	35.3	71.8	120	145	372	412	389	208

## Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Maximum day		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	425	June 14, 1951	2	226	-	-	231	-
1952	1237	380	Oct. 5, 1951	2	210	-	-	216	-
1953	1277	375	July 7, 1953	1.1	201	-	-	203	-
1954	1337	400	June 2, 30, 1954	3.0	200	-	-	205	-
1955	1387	762	Dec. 9, 1954	4.0	231	-	-	229	-
1956	1437	452	Oct. 6, 1955	4.0	213	-	-	221	-
1957	1507	416	Nov. 1, 1956	1.3	224	-	-	221	-
1958	1557	451	Dec. 10, 1957	1.6	212	-	-	206	-
1959	1627	435	Dec. 10, 1958	4.3	222	-	-	225	-
1960	1707	449	July 8, 1960	6.1	208	-	-	-	-

## STREAMS TRIBUTARY TO LAKE ONTARIO

2202.5 West Creek near Hilton, N. Y.

Location.--Lat 43°18'10", long 77°48'50", on right bank just downstream from bridge on Collamer Road, 0.5 mile north of Collamer and 1.5 miles northwest of Hilton, Monroe County.

Drainage area.--31.0 sq mi.

Records available.--May 1957 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 261.53 ft above mean sea level. Prior to Oct. 1, 1957, wire-weight gage at same site and datum.

Extremes.--1957-60: Maximum discharge, 1,480 cfs Mar. 30, 1960 (gage height, 10.67 ft); minimum daily, 0.6 cfs July 2, 1958.

Remarks.--During summer growing season, water is diverted from Erie (Barge) Canal into Moorman Creek, a tributary of West Creek, for irrigation. During canning season, two factories upstream at Hamlin discharge waste water into a tributary. The increase in discharge at gaging station from these diversions is not known.

## Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	-	3.24	8.36	5.35	4.66	-
1958	5.45	2.22	2.77	2.15	4.88	118	23.5	5.28	1.98	2.80	4.06	6.53	15.1
1959	10.4	16.2	11.9	58.2	36.1	64.5	64.7	4.16	3.56	5.09	6.27	7.67	24.0
1960	5.59	4.78	67.2	56.1	129	121	64.6	38.2	9.30	4.62	8.25	3.25	42.4

## Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	-	0.12	0.24	0.20	0.17	-
1958	0.20	0.08	0.10	0.08	0.16	4.58	0.85	0.20	.07	.10	.15	.24	6.61
1959	.39	.58	.44	2.11	1.21	2.40	2.33	.15	.13	.19	.23	.28	10.44
1960	.21	.17	2.50	2.09	4.49	4.49	2.32	1.42	.33	.17	.31	.12	18.62

## Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1957	1507	1557	225	May 21, 1957	-	-	-	-	-
1958	1557	308	Mar. 23, 1958	0.6	15.1	0.487	6.61	17.4	7.64
1959	1627	1,170	Jan. 22, 1959	.8	24.0	.774	10.44	27.3	11.91
1960	1707	1,480	Mar. 30, 1960	.9	42.4	1.37	18.62	-	-



## 2205. Dyke Creek at Wellsville, N. Y.

Location.--Lat 42°07'14", long 77°56'13", near center of span on upstream side of Miller Street Bridge at Wellsville, Allegany County, 0.6 mile upstream from Genesee River and 1.2 miles downstream from Trapping Brook.

Drainage area.--71.4 sq mi.

Records available.--August 1955 to September 1960.

Gage.--Wire-weight gage. Crest-stage gage since June 19, 1956. Datum of gage is 1,492.18 ft above mean sea level, datum of 1929. Prior to Apr. 17, 1957, at datum 7.18 ft lower; Apr. 17 to Sept. 30, 1957, at datum 11.23 ft lower than present datum; both at site 0.2 miles downstream.

Average discharge.--5 years (1955-60), 105 cfs.

Extremes.--1955-60: Maximum discharge, 5,230 cfs June 15, 1960 (gage height, 16.10 ft, from graph based on gage readings), from rating curve extended above 2,400 cfs by logarithmic plotting; minimum observed, 1.0 cfs Sept. 9, 1957 (occurred during period of channel improvement).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-	-	-	-	10.3	3.35	-
1956	142	152	88.8	23.5	71.1	426	304	162	42.7	65.7	39.4	90.6	134
1957	26.9	57.0	173	126	80.6	153	345	120	22.8	13.9	3.27	1.91	93.7
1958	3.55	5.29	27.8	19.2	23.7	121	441	112	103	35.5	28.4	86.3	83.6
1959	43.3	107	49.9	184	139	221	239	56.4	17.6	14.1	3.25	2.59	89.3
1960	28.4	141	206	134	117	189	220	213	216	10.6	11.7	4.32	124

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-	-	-	-	0.17	0.05	-
1956	2.29	2.37	1.43	0.38	1.07	6.88	4.75	2.61	0.67	1.06	.64	1.42	25.57
1957	.43	.89	2.80	2.04	1.18	2.48	5.40	1.95	.36	.22	.05	.03	17.81
1958	.06	.08	.45	.31	.35	1.95	6.90	1.80	1.61	.57	.46	1.35	15.89
1959	.70	1.67	.81	2.97	2.03	3.57	3.74	.91	.27	.23	.05	.04	16.99
1960	.46	2.20	3.33	2.16	1.76	3.06	3.44	3.43	3.37	.17	.19	.07	23.64

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-
1955	1437	-	-	-	-	-	-	-	-
1956	1437	5,110	Mar. 8, 1956	2.4	134	1.88	25.57	124	23.60
1957	1507	-	Jan. 23, 1957	1.0	93.7	1.31	17.81	75.1	14.28
1958	1557	2,080	Apr. 6, 1958	5.0	83.6	1.17	15.89	97.1	18.48
1959	1627	3,950	Jan. 22, 1959	1.8	89.3	1.25	16.99	104	19.80
1960	1707	5,230	June 15, 1960	3.3	124	1.74	23.64	-	-

## STREAMS TRIBUTARY TO LAKE ONTARIO

## 2210. Genesee River at Wellsville, N. Y.

Location.--Lat 42°07'20", long 77°57'00", near center of span on upstream side of West Pearl Street Bridge at Wellsville, Allegany County, a quarter of a mile downstream from Dyke Creek.

Drainage area.--288 sq mi.

Records available.--August 1955 to September 1958.

Gage.--Wire-weight gage. Crest-stage gage since June 19, 1956. Datum of gage is 1,473.00 ft above mean sea level, datum of 1929. Prior to Oct. 1, 1957, at datum 5.00 ft higher.

Extremes.--1955-58: Maximum discharge, 15,800 cfs Mar. 8, 1956 (gage height, 17.65 ft, present datum, from graph based on gage readings); minimum daily, 18 cfs Sept. 9, 1957.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1955	-	-	-	-	-	-	-	-	-	-	67.3	25.4	-
1956	655	696	364	106	279	1,689	1,373	678	232	219	140	335	564
1957	106	228	708	485	337	620	1,366	478	90.9	55.2	25.0	24.4	377
1958	25.0	37.3	189	93.0	94.4	426	1,925	572	348	344	105	278	369

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1955	-	-	-	-	-	-	-	-	-	-	0.27	0.10	-
1956	2.62	2.70	1.46	0.43	1.05	6.76	5.32	2.71	0.90	0.88	.56	1.30	26.69
1957	.42	.88	2.84	1.94	1.22	2.48	5.29	1.91	.35	.22	.10	.09	17.74
1958	.10	.14	.76	.37	.34	1.71	7.46	2.29	1.35	1.38	.42	1.08	17.40

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1955	1437	-	-	-	-	-	-	-	-
1956	1437	15,800	Mar. 8, 1956	23	564	1.96	26.69	509	24.05
1957	1507	5,820	Jan. 23, 1957	18	377	1.31	17.74	310	14.60
1958	1557	7,200	Apr. 7, 1958	22	369	1.28	17.40	-	-

## 2215. Genesee River at Scio, N. Y.

Location.--Lat 42°09'50", long 77°58'50", on left bank 0.4 mile upstream from Vandermark Creek and three-quarters of a mile upstream from Scio, Allegany County.

Drainage area.--309 sq mi.

Records available.--June 1916 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,438.83 ft above mean sea level, datum of 1929. Prior to Aug. 11, 1938, staff gage and Aug. 11 to Oct. 11, 1938, water-stage recorder, at same site at datum 1.0 ft higher.

Average discharge.--44 years (1916-60), 392 cfs.

Extremes.--1916-60: Maximum discharge, 23,300 cfs Nov. 25, 1950 (gage height, 11.22 ft); minimum, 5.8 cfs Sept. 4, 1939; minimum gage height, 0.09 ft Sept. 14, 15, 1959.

Revisions.--The momentary maximum discharges have been revised for the water years listed; the resulting revised figures given herewith supersede those published in WSP 1307:

Water year	Date	Discharge (cfs)	Water year	Date	Discharge (cfs)
1918	Mar. 14, 1918	13,100	1946	May 28, 1946	17,900
1919	May 22, 1919	13,900	1947	Apr. 5, 1947	10,600
1936	Mar. 12, 1936	8,550	1948	Mar. 22, 1948	13,300
1942	July 18, 1942	11,200	1950	Mar. 28, 1950	13,900

Remarks.--Records of chemical analyses and water temperatures for the period October 1954 to September 1955, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	380	1,224	891	792	906	1,075	930	164	173	332	48.8	43.2	577
1952	32.9	268	529	1,322	620	1,149	1,034	536	135	39.0	36.2	38.8	479
1953	64.5	199	463	447	462	872	535	801	287	115	57.4	44.5	345
1954	33.6	113	275	260	599	862	894	560	343	43.6	29.9	21.2	318
1955	57.4	54.6	264	337	258	1,413	253	109	56.1	30.9	72.8	27.7	246
1956	658	718	391	118	304	1,807	1,452	727	250	231	146	352	597
1957	116	233	751	557	355	669	1,516	529	97.7	60.6	27.1	26.5	412
1958	27.0	39.7	204	103	102	491	2,014	623	381	368	113	283	395
1959	151	346	211	983	643	857	1,029	311	85.5	51.4	20.5	16.8	390
1960	137	503	804	514	491	688	1,022	826	746	95.6	62.7	33.6	493

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.42	4.42	3.32	2.95	3.05	4.01	3.36	0.61	0.63	1.24	0.18	0.16	25.35
1952	.12	.97	1.97	4.93	2.16	4.29	3.73	2.00	.49	.15	.13	.14	21.08
1953	.24	.72	1.73	1.67	1.56	3.63	1.93	1.87	1.04	.42	.21	.16	15.18
1954	.13	.41	1.03	.97	2.02	2.54	3.19	2.09	1.24	.16	.11	.08	13.97
1955	.21	.20	.99	1.26	.87	5.27	.91	.41	.20	.12	.27	.10	10.81
1956	2.45	2.59	1.46	.44	1.06	6.74	5.24	2.71	.90	.86	.54	1.27	26.26
1957	.43	.88	2.80	2.08	1.20	2.50	5.47	1.97	.35	.23	.10	.10	18.11
1958	.10	.14	.76	.38	.34	1.83	7.27	2.33	1.37	1.37	.42	1.02	17.33
1959	.56	1.25	.79	3.67	2.17	3.20	3.72	1.16	.31	.19	.08	.06	17.16
1960	.51	1.82	3.00	1.92	1.71	2.57	3.69	3.08	2.69	.36	.23	.12	21.70

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	551	24.21
1951	1207	*23,300	Nov. 25, 1950	28	577	1.87	25.35	438	19.25
1952	1237	*7,500	Mar. 11, 1952	21	479	1.55	21.08	470	20.71
1953	1277	*8,750	Mar. 24, 1953	24	345	1.12	15.18	320	14.06
1954	1337	5,360	Mar. 2, 1954	16	318	1.03	13.97	314	13.80
1955	1387	*6,730	Mar. 1, 1955	15	246	.796	10.81	362	15.91
1956	1437	16,900	Mar. 8, 1956	26	597	1.93	26.26	543	23.87
1957	1507	5,240	Jan. 23, 1957	20	412	1.33	18.11	341	15.00
1958	1557	7,950	Apr. 7, 1958	24	395	1.28	17.33	431	18.93
1959	1627	19,500	Jan. 22, 1959	12	390	1.26	17.16	452	19.89
1960	1707	12,800	June 15, 1960	22	493	1.60	21.70	-	-

\* Revised.

## STREAMS TRIBUTARY TO LAKE ONTARIO

2220. Caneadea Creek at Caneadea, N. Y.

Location.--Lat 42°23'10", long 78°09'45", on left bank at Caneadea, Allegany County, 800 ft upstream from unnamed tributary and 0.6 mile upstream from mouth.

Drainage area.--61.5 sq mi.

Records available.--July 1949 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,240.42 ft above mean sea level, datum of 1929, supplementary adjustment of 1943.

Average discharge.--11 years (1949-60), 91.5 cfs (adjusted for storage).

Extremes.--1949-60: Maximum discharge, 9,600 cfs June 15, 1960 (gage height, 10.74 ft), from rating curve extended above 770 cfs on basis of hydraulic study of flow over Rushford Dam; minimum, 0.7 cfs Nov. 11, 13, 1954; minimum daily, 0.9 cfs Nov. 13, 14, 1954; minimum gage height, 1.63 ft Oct. 21, 1949, July 20-22, 1960.

Remarks.--Considerable regulation by Rushford Lake (capacity, 1,106,000,000 cu ft) 2 miles above station.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	102	151	268	172	140	97.7	171	36.9	44.2	13.1	4.70	141	111
1952	234	59.1	117	54.1	223	170	107	79.5	34.9	7.29	39.4	60.3	98.5
1953	219	102	90.1	2.79	106	116	3.15	53.9	53.7	17.8	19.4	336	92.7
1954	81.6	36.5	57.7	2.83	125	5.13	151	84.5	10.6	5.60	5.68	147	58.6
1955	144	53.1	104	98.6	2.94	6.20	75.9	21.3	5.75	5.74	7.53	4.64	44.6
1956	124	166	414	1.97	46.9	180	256	160	46.2	32.2	114	84.1	136
1957	27.1	39.1	213	278	251	4.66	49.0	173	19.7	23.4	4.15	9.64	90.3
1958	71.8	4.16	15.5	37.0	31.7	6.31	151	58.1	75.7	24.5	10.7	241	88.5
1959	16.4	2.47	90.0	254	218	120	96.9	62.5	9.52	12.3	20.7	230	93.5
1960	31.3	167	84.0	235	207	221	28.4	58.1	367	2.10	2.52	21.5	118

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.82	3.12	2.53	3.26	3.41	4.14	3.00	0.64	0.82	0.19	0.07	-0.10	21.90
1952	1.65	1.62	2.37	4.51	2.49	4.85	2.97	1.51	.58	.10	.32	.30	23.27
1953	.20	.52	1.43	1.79	1.82	4.54	1.74	2.14	.72	.42	.30	.87	16.49
1954	.19	.59	1.51	1.59	2.50	2.78	4.24	1.52	.34	.10	.09	.20	15.65
1955	.32	.32	1.08	1.30	1.59	5.61	1.38	.30	.09	.09	.14	.07	12.29
1956	2.16	2.02	2.88	.39	1.88	6.85	5.92	2.91	.80	.67	2.20	1.51	30.19
1957	.47	.79	3.33	2.53	1.71	2.19	4.51	3.29	.42	.37	.08	.19	19.88
1958	.20	.32	1.28	.72	.81	1.86	6.53	1.44	1.39	.39	.20	1.39	16.53
1959	.52	1.56	1.17	3.21	2.47	4.22	4.43	1.04	.26	.20	.12	.14	19.34
1960	2.54	2.45	3.95	2.89	2.55	3.98	3.66	1.34	3.42	.30	.03	.13	27.24

Note.--Figures are adjusted for change in contents in Rushford Lake; negative figure indicates that natural losses from Rushford Lake exceeded inflow.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	98.6	106	23.34
1951	1207	1,590	Sept. 25, 1951	2.4	111	99.2	1.61	21.90	102	95.5	21.07
1952	1237	1,110	Feb. 29, 1952	1.5	98.5	105	1.71	23.27	98.4	89.4	19.78
1953	1277	1,180	Sept. 14, 1953	1.2	92.7	74.6	1.21	16.49	73.0	75.3	16.63
1954	1337	1,600	Apr. 28, 1954	1.4	58.6	70.9	1.15	15.65	69.2	68.3	15.08
1955	1387	548	Dec. 17, 1954	.9	44.6	55.7	.906	12.29	78.5	79.9	17.63
1956	1437	1,700	Oct. 15, 1955	1.0	136	136	2.21	30.19	100	125	27.72
1957	1507	1,090	May 20, 1957	2.2	90.3	90.1	1.47	19.88	74.5	77.4	17.09
1958	1557	971	Sept. 15, 1958	2.3	88.5	74.9	1.22	16.53	90.0	81.5	17.98
1959	1627	1,130	Feb. 20, 1959	1.9	93.5	87.6	1.42	19.34	108	113	25.03
1960	1707	9,600	June 15, 1960	1.4	118	123	2.00	27.24	-	-	-

## 2230. Genesee River at Portageville, N. Y.

Location.--Lat 42°34'10", long 78°02'45", on left bank at Portageville, Wyoming County, 300 ft downstream from small tributary, 350 ft downstream from Pennsylvania Railroad bridge, and 0.7 mile upstream from Upper Falls.

Drainage area.--982 sq mi.

Records available.--August 1908 to September 1960. Prior to December 1945 published as "at St. Helena." Records published for both sites December 1945 to September 1950.

Gage.--Water-stage recorder. Datum of gage is 1,082.60 ft above mean sea level (levels by Corps of Engineers). Prior to Aug. 24, 1911, chain gage and Aug. 24, 1911, to Sept. 30, 1946, water-stage recorder, at site 8 miles downstream at different datum. Both recorders in operation Dec. 16, 1945, to Sept. 30, 1950.

Average discharge.--52 years (1908-60), 1,236 cfs (unadjusted).

Extremes.--1908-60: Maximum discharge, 44,400 cfs May 17, 1916 (gage height, 12.81 ft, site and datum then in use); maximum gage height, 21.70 ft Mar. 7, 1956; minimum discharge, 18 cfs Oct. 5, 17, 1913 (gage height, 1.70 ft, site and datum then in use).

Remarks.--Some seasonal regulation by Rushford Lake (capacity, 1,106,000,000 cu ft) since July 1928. Diurnal fluctuation at low flow caused by powerplants.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	928	3,297	2,820	2,491	2,930	3,230	2,778	606	557	565	120	250	1,679
1952	294	914	1,669	3,327	1,800	3,409	2,601	1,317	446	110	122	148	1,347
1953	370	588	1,307	1,249	1,479	3,135	1,523	1,702	910	557	336	519	1,140
1954	204	441	984	933	2,065	1,872	3,123	1,607	709	140	94.5	220	1,023
1955	332	237	1,007	1,060	918	4,099	1,079	339	148	69.8	180	76.0	799
1956	1,990	1,887	1,841	409	1,322	5,220	4,666	2,239	678	537	661	924	1,849
1957	353	704	2,381	1,989	1,465	1,844	3,929	1,869	396	362	103	105	1,289
1958	146	125	574	719	319	1,545	5,071	1,490	1,326	581	224	826	1,077
1959	404	1,032	803	2,622	1,991	2,871	3,465	971	517	211	96.9	294	1,250
1960	998	1,824	2,721	1,940	1,857	2,400	3,253	2,077	2,125	245	163	100	1,637

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*1.02	*3.77	*2.80	*2.93	*3.17	*3.94	*3.15	*0.71	*0.63	*0.66	*0.14	*0.12	*23.04
1952	.17	1.07	1.97	4.13	1.89	4.11	3.02	1.55	.50	.13	.12	.12	18.78
1953	.19	.58	1.52	1.57	1.57	3.83	1.84	2.07	1.02	.66	.39	.26	15.50
1954	.16	.50	1.18	1.19	2.21	2.37	3.64	1.88	.81	.16	.11	.10	14.31
1955	.24	.23	1.13	1.21	1.07	5.16	1.23	.39	.17	.08	.21	.09	11.21
1956	2.33	2.08	1.62	.50	1.52	6.35	5.38	2.62	.77	.64	.78	1.05	25.64
1957	.39	.81	2.74	2.22	1.39	2.30	4.69	2.20	.45	.42	.12	.12	17.81
1958	.10	.16	.74	.46	.36	1.92	6.00	1.77	1.51	.68	.26	.75	14.71
1959	.49	1.27	.91	2.98	2.03	3.49	4.10	1.13	.37	.25	.10	.08	17.21
1960	1.29	2.04	3.34	2.18	1.95	2.81	3.89	2.45	2.21	.30	.19	.10	22.75

\* Not previously published.

Note.--Figures adjusted for change in contents in Rushford Lake.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year					
		Observed			Adjusted a/			Observed			Adjusted a/		
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches	Mean	Mean
		Discharge	Date										
1950	-	-	-	-	-	-	-	-	1,605	*1,612	*22.29	-	-
1951	1207	31,900	Nov. 26, 1950	82	1,679	*1,667	*1.70	*23.04	1,357	1,350	18.66	-	-
1952	1237	23,200	Mar. 12, 1952	58	1,347	1,354	1.38	16.76	1,297	1,288	17.86	-	-
1953	1277	21,000	Mar. 24, 1953	86	1,140	1,122	1.14	15.50	1,086	1,088	15.05	-	-
1954	1337	15,400	Apr. 28, 1954	63	1,023	1,036	1.05	14.31	1,019	1,019	14.07	-	-
1955	1387	20,700	Mar. 1, 1955	48	799	810	.825	11.21	1,129	1,131	15.64	-	-
1956	1437	36,100	Mar. 7, 1956	63	1,849	1,849	1.88	25.64	1,674	1,698	23.55	-	-
1957	1507	19,700	Apr. 6, 1957	76	1,289	1,288	1.31	17.81	1,072	1,075	14.86	-	-
1958	1557	19,300	Apr. 6, 1958	62	1,077	1,083	1.08	14.71	1,193	1,184	16.38	-	-
1959	1627	33,300	Jan. 22, 1959	60	1,250	1,244	1.27	17.20	1,529	1,534	21.20	-	-
1960	1707	27,800	Mar. 31, 1960	70	1,637	1,642	1.67	22.75	-	-	-	-	-

\* Not previously published.

a Adjusted for change in contents in Rushford Lake.

## 2240. Mount Morris Reservoir near Mount Morris, N. Y.

Location.--Lat 42°44'00", long 77°54'40", at Mount Morris Dam on Genesee River, 2½ miles northwest of Mount Morris, Livingston County, 5 miles upstream from Canaseraga Creek, and 40 miles upstream from mouth.

Drainage area.--1,077 sq mi (measured by Corps of Engineers).

Records available.--January 1952 to September 1960.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (levels by Corps of Engineers). Prior to Apr. 8, 1952, reference point at same site and datum.

Extremes.--1952-60: Maximum elevation, 719.4 ft Apr. 5, 1960 (contents, 215,980 acre-ft); minimum, 585.2 ft Sept. 14, 1952 (contents, 643.6 acre-ft).

Remarks.--Reservoir is formed by a concrete gravity-type dam with overflow spillway, completed by Corps of Engineers in 1951 for flood control; first used for flood regulation on Nov. 24, 1951. Usable capacity, 337,000 acre-ft between elevations 585.0 ft (sill of conduits) and 760.0 ft (crest of spillway). Dead storage, 609 acre-ft. Floods are controlled by the operation of nine gates. Water is stored during high flows and released when downstream conditions warrant.

Contents, in acre-feet, on last day of month												
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1952	-	-	6,276	1,470	1,704	1,820	1,125	4,316	4,617	4,708	4,708	868
1953	868	955	933	1,600	1,600	2,309	1,600	6,069	4,660	804	4,617	4,948
1954	4,948	912	1,062	1,314	1,730	2,092	2,278	4,660	4,660	4,230	4,708	4,101
1955	3,843	868	2,544	890	4,948	2,247	1,418	3,800	4,574	4,531	4,617	4,359
1956	4,402	1,522	1,083	976	1,880	1,790	10,340	3,334	4,531	4,488	4,660	4,488
1957	4,900	1,210	1,826	1,358	2,374	1,880	2,123	5,044	4,708	4,517	4,445	4,574
1958	4,660	847	1,083	1,019	1,470	4,230	2,340	1,730	4,574	5,712	4,316	4,445
1959	4,804	912	912	67,470	1,522	4,574	2,185	1,104	4,402	4,488	4,804	4,316
1960	3,929	1,880	2,000	1,444	1,470	116,940	1,314	1,910	4,617	4,101	3,683	4,144

## 2250. Canaseraga Creek near Dansville, N. Y.

Location.--Lat 42°33'40", long 77°42'55", on left bank just downstream from Ossian Street Bridge, half a mile downstream from Mill Creek and 1 mile west of Dansville, Livingston County.

Drainage area.--153 sq mi. At site used October 1917 to September 1919, October 1938 to September 1940, 155 sq mi.

Records available.--July 1910 to December 1912, July 1915 to June 1917, October 1917 to September 1919 (published as "at Cumminsville"), March 1919 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 640.00 ft above mean sea level (levels by New York State Conservation Commission). Prior to Oct. 19, 1920, staff gage at or within 1 mile of present site at various datums. Oct. 19, 1920, to Sept. 30, 1938, water-stage recorder at present site and datum, and Oct. 1, 1938, to Oct. 8, 1940, at site 0.9 mile downstream at datum 15.70 ft lower.

Average discharge.--45 years (1910-12, 1915-16, 1917-19, 1920-60), 154 cfs.

Extremes.--1910-12, 1915-60: Maximum discharge at present site, 8,830 cfs July 23, 1940 (gage height, 13.1 ft, from floodmark), from rating curve extended above 900 cfs on basis of contracted-opening measurement of peak flow; maximum gage height at present site, 13.68 ft Mar. 7, 1956; maximum discharge at former site, 9,110 cfs July 23, 1940 (gage height, 9.93 ft), from rating curve extended above 2,100 cfs on basis of slope-area measurement of peak flow; minimum daily, 3 cfs Apr. 28, 1912.

Monthly and yearly mean discharge, in cubic feet per second													
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	82.4	310	276	282	430	492	369	129	155	68.6	34.6	34.4	220
1952	28.5	94.0	131	312	218	381	355	163	76.2	32.2	32.3	29.4	154
1953	36.1	69.8	154	165	179	373	206	215	127	74.7	57.9	32.3	141
1954	29.0	50.3	79.8	108	243	194	402	230	66.4	33.0	26.5	23.5	123
1955	26.4	30.4	88.5	93.4	108	508	181	69.7	28.8	20.5	21.9	19.1	100
1956	222	149	150	68.8	177	605	599	304	116	79.5	86.1	103	222
1957	49.1	61.3	183	188	165	253	472	319	93.5	87.8	32.4	29.3	161
1958	26.5	28.7	39.4	31.8	36.6	186	619	150	186	73.3	34.4	40.1	121
1959	45.2	95.3	92.3	250	190	374	464	119	56.6	37.2	27.5	22.0	147
1960	159	166	392	222	209	382	386	297	246	55.9	37.0	26.9	215

Monthly and yearly runoff, in inches, of Canaseraga Creek near Dansville, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.62	2.26	2.08	2.12	2.93	3.71	2.69	0.97	1.13	0.52	0.26	0.25	19.54
1952	.21	.69	.98	2.35	1.53	2.87	2.58	1.22	.56	.24	.24	.21	13.69
1953	.27	.51	1.16	1.24	1.22	2.81	1.51	1.62	.92	.56	.44	.24	12.50
1954	.22	.37	.60	.81	1.65	1.46	2.93	1.73	.48	.25	.20	.17	10.87
1955	.20	.22	.67	.70	.73	3.83	1.32	.53	.21	.15	.17	.14	8.87
1956	1.67	1.09	1.13	.52	1.25	4.56	4.37	2.29	.85	.60	.65	.75	19.73
1957	.37	.45	1.38	1.42	1.12	1.90	3.44	2.40	.68	.66	.24	.21	14.27
1958	.20	.21	.30	.24	.25	1.40	4.51	1.13	1.35	.55	.26	.29	10.69
1959	.34	.69	.70	1.68	1.29	2.82	3.38	.90	.41	.28	.21	.16	13.06
1960	1.20	1.21	2.95	1.67	1.47	2.88	2.82	2.24	1.79	.42	.28	.20	19.13

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	182	16.14
1951	1207	6,150	Mar. 30, 1951	21	220	1.44	19.54	186	16.46
1952	1237	5,630	Mar. 11, 1952	18	154	1.01	13.69	155	13.75
1953	1277	3,780	Mar. 24, 1953	24	141	.922	12.50	132	11.75
1954	1337	5,240	Apr. 27, 1954	20	123	.804	10.87	121	10.77
1955	1387	3,990	Mar. 1, 1955	14	100	.654	8.87	132	11.67
1956	1437	4,500	Mar. 7, 1956	18	222	1.45	19.73	203	18.04
1957	1507	2,970	Apr. 6, 1957	21	161	1.05	14.27	144	12.78
1958	1557	2,910	Apr. 6, 1958	18	121	.791	10.69	132	11.71
1959	1627	6,000	Jan. 22, 1959	18	147	.961	13.06	188	16.69
1960	1707	5,170	Mar. 30, 1960	20	215	1.41	19.13	-	-

2255. Canaseraga Creek at Groveland, N. Y.

Location.--Lat 42°39'45", long 77°46'10", on left bank at downstream side of highway bridge at Groveland, Livingston County, 0.2 mile downstream from small tributary.

Drainage area.--181 sq mi.

Records available.--August 1915 to September 1916 (gage heights and discharge measurements only) and February 1917 to March 1920 (no winter records in 1917, 1918, 1920), published as "at Groveland Station"; October 1955 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 565.42 ft above mean sea level (levels by Corps of Engineers). Prior to Mar. 30, 1916, inclined staff gage at site 400 ft upstream at datum about 5.42 ft lower. Mar. 30, 1916, to Mar. 31, 1920, chain gage on downstream side of bridge at practically same datum as inclined staff gage.

Average discharge.--6 years (1918-19, 1955-60), 199 cfs.

Extremes.--1917-20, 1955-60: Maximum discharge observed, 4,380 cfs May 22, 1919 (gage height, 18.05 ft); minimum, 18 cfs Oct. 2, 5, 1955 (gage height, 1.96 ft).

Remarks.--Overflow of left bank occurs upstream at extremely high stages. Water returns to channel below station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	253	186	177	88.2	216	673	683	362	137	94.0	102	128	258
1957	57.6	70.3	247	247	222	315	551	422	114	107	35.5	31.0	202
1958	30.0	34.9	48.3	36.9	44.7	225	694	178	224	85.0	41.2	48.5	141
1959	56.8	118	111	288	234	439	549	148	64.9	41.7	30.9	24.6	175
1960	183	184	447	267	250	364	452	353	277	68.2	45.1	31.9	244

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1956	1.61	1.15	1.13	0.56	1.28	4.29	4.21	2.31	0.85	0.60	0.65	0.79	19.43
1957	.37	.43	1.57	1.57	1.28	2.01	3.40	2.69	.70	.68	.23	.19	15.12
1958	.19	.22	.31	.23	.26	1.44	4.28	1.13	1.38	.54	.26	.30	10.54
1959	.36	.73	.71	1.84	1.35	2.80	3.39	.94	.40	.27	.20	.15	13.14
1960	1.17	1.13	2.85	1.70	1.49	2.32	2.79	2.25	1.71	.43	.29	.20	18.33

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1956	1437	3,380	Mar. 7, 1956	18	258	1.43	19.43	238	17.91
1957	1507	2,810	Apr. 6, 1957	23	202	1.12	15.12	179	13.47
1958	1557	2,880	Apr. 6, 1958	21	141	.779	10.54	155	11.62
1959	1627	2,610	Apr. 2, 1959	22	175	.967	13.14	220	16.49
1960	1707	2,800	Mar. 30, 1960	27	244	1.35	18.33	-	-

a Adjusted for diversion.

## 2270. Canaseraga Creek at Shakers Crossing, N. Y.

Location.--Lat 42°44'15", long 77°50'30", on left bank at upstream side of highway bridge at Shakers Crossing, 1 mile upstream from mouth and 1½ miles northeast of Mount Morris, Livingston County.

Drainage area.--333 sq mi.

Records available.--July 1915 to September 1922 (gage heights only), November 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 545.30 ft above mean sea level (levels by Corps of Engineers). Prior to November 1958, at site 40 ft downstream at datum 5.30 ft lower.

Extremes.--1958-60: Maximum discharge, 4,350 cfs Apr. 1, 1960 (gage height, 11.99 ft); minimum, 23 cfs Sept. 10, 1959; minimum gage height, 2.84 ft Sept. 9, 1960.  
1915-22: Maximum gage height, 23.62 ft (present datum) May 17, 1916 (backwater from Genesee River).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	165	166	358	404	708	861	199	86.0	54.0	36.0	29.0	-
1960	238	276	843	468	464	494	911	512	433	85.7	50.8	35.1	400

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	0.55	0.57	1.24	1.46	2.45	2.88	0.69	0.29	0.19	0.12	0.10	-
1960	0.83	.92	2.92	1.62	1.50	1.71	3.05	1.77	1.45	.30	.18	.12	16.37

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	2,900	Apr. 2, 1959	-	-	-	-	336	13.90
1960	1707	4,350	Apr. 1, 1960	25	400	1.20	16.37	-	-



2275. Genesee River at Jones Bridge, near Mount Morris, N. Y.

Location.--Lat 42°45'55", long 77°50'25", on right bank at Jones Bridge, 1½ miles downstream from Canaseraga Creek and 3½ miles northeast of Mount Morris, Livingston County.

Drainage area.--1,419 sq mi.

Records available.--May 1903 to April 1906, August 1908 to April 1914, July 1915 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 540.00 ft above mean sea level (levels by New York State Conservation Commission). Prior to Sept. 11, 1915, chain gage on bridge at datum 2.73 ft lower.

Average discharge.--50 years (1908-13, 1915-60), 1,615 cfs (unadjusted).

Extremes.--1903-6, 1908-14, 1915-60: Maximum discharge, 55,100 cfs May 17, 1916 (gage height, 25.44 ft); minimum, 12 cfs July 23, 1955 (gage height, 0.22 ft, partly obstructed intake); minimum daily, 30 cfs Aug. 8, 1909.

Remarks.--Diurnal fluctuation at low flow caused by powerplants. Flow regulated to some extent by Rushford Lake (capacity, 1,106,000,000 cu ft) since July 1928 and, at high flows, since November 1951 by Mount Morris Reservoir (see p. 286). Records of chemical analyses and water temperatures for the period October 1954 to September 1956 are published in reports of the Geological Survey (site 1 mile downstream).

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,022	3,810	3,412	3,308	4,288	4,102	3,987	965	822	689	189	299	2,224
1952	344	1,054	1,942	4,330	2,396	4,732	3,538	1,621	622	169	180	228	1,764
1953	419	720	1,593	1,505	1,855	4,036	2,099	2,258	1,233	742	405	593	1,455
1954	261	592	1,179	1,260	2,985	2,456	4,423	2,395	926	205	136	265	1,409
1955	405	312	1,175	1,382	1,206	5,749	1,567	477	191	87.6	212	105	1,078
1956	2,382	2,170	2,045	639	2,052	7,384	6,273	3,185	886	669	768	1,122	2,465
1957	438	823	2,776	2,790	2,082	2,659	5,178	2,668	621	556	153	154	1,739
1958	184	215	674	784	383	2,185	6,517	1,948	1,845	750	336	904	1,391
1959	496	1,259	987	2,455	3,568	3,776	4,724	1,272	395	263	136	314	1,621
1960	1,290	2,082	3,740	2,596	2,445	1,365	6,267	2,776	2,626	361	228	123	2,150

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	*0.78	*3.01	*2.66	*2.69	*3.19	*3.43	*3.13	*0.78	*0.65	*0.56	*0.15	*0.12	*21.15
1952	.16	.87	1.65	3.61	1.76	3.92	2.82	1.36	.49	.14	.13	.09	17.00
1953	.17	.51	1.28	1.31	1.36	3.39	1.71	1.94	.94	.56	.38	.25	13.80
1954	.15	.41	.98	1.09	2.21	2.12	3.55	1.97	.73	.16	.12	.09	13.58
1955	.22	.18	.94	1.08	1.01	4.87	1.24	.41	.16	.07	.17	.08	10.43
1956	1.93	1.63	1.44	.53	1.62	6.15	5.10	2.49	.71	.55	.63	.88	23.66
1957	.36	.60	2.23	2.15	1.43	2.25	4.23	2.21	.49	.45	.12	.12	16.64
1958	.10	.13	.59	.37	.30	1.89	5.26	1.69	1.49	.62	.25	.58	13.17
1959	.42	1.00	.78	2.81	1.69	3.19	3.80	1.01	.36	.21	.10	.07	15.44
1960	1.13	1.58	3.14	2.04	1.81	2.63	3.54	2.27	1.96	.30	.18	.09	20.67

\* Not previously published.

Note.--Figures are adjusted for change in contents in Rushford Lake and Mount Morris Reservoir.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30										Calendar year		
		Observed					Adjusted a/					Observed		Adjusted a/
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date											
1950	-	-	-	-	-	-	-	-	-	-	-	2,039	*2,046	*19.58
1951	1207	26,000	Nov. 27, 1950	100	2,224	*2,212	*1.56	*21.15	1,815	1,817	17.36	1,815	1,817	17.36
1952	1237,1277	9,500	Apr. 6, 1952	84	1,764	1,772	1.25	17.00	1,713	1,697	16.28	1,713	1,697	16.28
1953	1277	10,800	Mar. 27, 1953	89	1,455	1,442	1.02	13.80	1,396	1,398	13.38	1,396	1,398	13.38
1954	1337	13,800	Apr. 28, 1954	61	1,409	1,420	1.00	13.58	1,398	1,399	13.38	1,398	1,399	13.38
1955	1387,1437	12,800	Mar. 6, 1955	43	1,078	1,090	.768	10.43	1,473	1,472	14.09	1,473	1,472	14.09
1956	1437	11,900	Mar. 17, 1956	34	2,465	2,466	1.74	23.66	2,252	2,278	21.85	2,252	2,278	21.85
1957	1507	11,600	Apr. 7, 1957	86	1,739	1,739	1.23	16.64	1,489	1,491	14.27	1,489	1,491	14.27
1958	1557	10,700	Apr. 15, 1958	104	1,391	1,378	.971	13.17	1,530	1,522	14.55	1,530	1,522	14.55
1959	1627	12,100	Jan. 22, 1959	95	1,621	1,615	1.14	15.44	1,990	1,997	19.09	1,990	1,997	19.09
1960	1707	10,400	Apr. 20, 1960	69	2,150	2,155	1.52	20.67	-	-	-	-	-	-

\* Not previously published.

a Adjusted for change in contents in Rushford Lake and Mount Morris Reservoir.

## 2285. Genesee River at Avon, N. Y.

Location.--Lat 42°55'05", long 77°45'30", on left bank at downstream side of bridge on U.S. Highway 20 (State Highway 5), 0.3 mile west of Avon, Livingston County, and 0.8 mile downstream from Conesus Creek.

Drainage area.--1,666 sq mi.

Records available.--August 1955 to September 1960.

Gage.--Water-stage recorder; wire-weight gage used for stages below 23.7 ft. Datum of gage is 500.00 ft above mean sea level (levels by Corps of Engineers).

Average discharge.--5 years (1955-60), 2,105 cfs.

Extremes.--1955-60: Maximum discharge, 15,600 cfs Mar. 7, 1956 (gage height, 37.20 ft, from graph based on gage readings); minimum, 56 cfs Oct. 5, 1955 (gage height, 13.73 ft, from graph based on gage readings).

Remarks.--Diurnal fluctuation at low flow caused by powerplants. Flow regulated to some extent by Rushford Lake (capacity, 1,106,000,000 cu ft), and, at high flows, by Mount Morris Reservoir (see p.286).

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-	-	-	-	230	111	-
1956	2,427	2,307	2,339	719	2,531	8,916	7,209	3,800	1,051	736	714	1,213	2,831
1957	472	857	2,872	3,014	2,332	3,065	5,536	2,993	716	625	171	162	1,899
1958	183	227	670	826	397	2,546	6,980	2,118	1,931	832	353	907	1,495
1959	540	1,324	1,109	2,568	4,029	4,487	5,503	1,452	478	302	157	322	1,837
1960	1,462	2,355	4,534	3,137	3,022	1,813	6,816	2,925	2,786	408	260	175	2,465

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-	-	-	-	0.16	0.07	-
1956	1.67	1.48	1.43	0.51	1.69	6.30	4.97	2.55	0.72	0.51	.50	.81	23.14
1957	.33	.53	1.97	1.98	1.38	2.19	3.84	2.11	.48	.43	.12	.11	15.47
1958	.08	.12	.50	.34	.26	1.88	4.79	1.47	1.33	.59	.23	.50	12.07
1959	.39	.90	.75	2.47	1.73	3.21	3.76	.99	.36	.21	.10	.06	14.93
1960	1.08	1.53	3.23	2.11	1.92	2.55	3.38	2.04	1.78	.29	.17	.11	20.19

Note.--Figures are adjusted for change in contents in Rushford Lake and Mount Morris Reservoir.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Observed				Adjusted a/		Observed		Adjusted a/	
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	-	-	-	-	-	-	-	-
1954	-	-	-	-	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-	-	-	-	-
1956	1437	15,600	Mar. 7, 1956	63	2,831	2,831	1.70	23.14	2,592	2,617	21.39
1957	1507	12,400	Apr. 7, 1957	115	1,899	1,899	1.14	15.47	1,635	1,637	13.34
1958	1557	10,800	Apr. 16, 1958	122	1,495	1,492	.890	12.07	1,653	1,644	13.41
1959	1627	9,720	Apr. 9, 1959	104	1,837	1,831	1.10	14.93	2,291	2,298	18.73
1960	1707	9,820	Apr. 17, 1960	129	2,465	2,470	1.48	20.19	-	-	-

a Adjusted for change in contents in Rushford Lake and Mount Morris Reservoir.

## 2289.5. Canadice Lake near Hemlock, N. Y.

Location.--Lat 42°44'25", long 77°34'15", upstream from weir at outlet, in Ontario County, 4 miles southeast of Hemlock, Livingston County.

Drainage area.--12.6 sq mi.

Records available.--April 1903 to September 1960.

Gage.--Hook gage. Datum of gage is 1,093.00 ft above mean sea level (furnished by city of Rochester).

Remarks.--Subsequent to May 1949, discharge from lake below elevation 1,092.00 ft augmented by pumps. Available storage below elevation 1,092.00 ft, 287,058,980 cu ft.

Cooperation.--Records of contents, in cubic feet, furnished by Department of Public Works, city of Rochester, rounded off by Geological Survey.

Contents, in millions of cubic feet, on last day of month

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1951	122.6	157.3	233.0	300.9	382.0	482.1	500.9	485.0	480.1	454.4	428.8	402.3
1952	363.9	370.5	358.7	402.8	433.7	494.4	497.6	497.8	473.1	422.5	370.9	330.7
1953	294.1	294.0	296.6	306.7	306.0	370.4	372.9	393.9	376.5	348.0	331.4	297.4
1954	289.7	299.9	299.4	311.8	331.8	348.1	465.6	494.6	494.3	434.6	370.3	314.6
1955	291.8	290.7	325.2	347.1	408.2	499.9	500.9	483.1	429.0	357.2	307.8	289.9
1956	354.1	356.2	362.1	349.5	392.2	499.9	508.5	501.2	486.8	446.4	415.1	385.5
1957	351.2	324.9	351.7	368.8	379.5	429.1	499.0	497.1	485.7	445.8	392.1	342.0
1958	297.8	290.1	294.6	304.4	323.5	400.9	497.7	468.4	453.1	406.3	401.1	410.1
1959	421.6	451.0	448.7	437.9	386.5	457.6	496.6	493.2	456.3	414.4	323.9	298.0
1960	295.0	303.4	386.3	419.3	463.0	516.6	497.6	501.1	490.8	402.1	310.9	290.6

## 2290. Canadice Lake Outlet near Hemlock, N. Y.

Location.--Lat 42°44'25", long 77°34'15", upstream from weir at outlet of Canadice Lake, Ontario County, 4 miles southeast of Hemlock, Livingston County.

Drainage area.--12.6 sq mi.

Records available.--April 1903 to September 1960.

Gage.--Hook gage. Datum of gage is 1,093.00 ft above mean sea level (furnished by city of Rochester). Gage readings have been reduced to elevations above mean sea level.

Average discharge.--57 years (1903-60), 11.9 cfs (unadjusted).

Cooperation.--Records furnished by Department of Public Works, city of Rochester.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	18.4	16.6	4.26	1.95	6.54	10.2	21.6	12.3	9.84	8.30	7.14	8.56	10.5
1952	11.8	.024	12.2	7.52	7.88	17.9	33.5	14.0	7.45	15.3	15.6	15.0	13.2
1953	11.7	3.01	8.94	10.1	16.8	15.5	15.1	15.7	14.1	13.8	16.5	12.4	12.8
1954	2.06	1.53	7.69	9.62	21.1	22.8	6.15	8.77	7.74	17.7	21.5	20.2	12.2
1955	9.32	1.29	7.88	2.33	.297	10.2	18.1	9.46	16.2	22.3	20.4	5.46	10.4
1956	18.98	11.4	12.4	11.5	13.0	23.0	68.4	30.4	6.85	13.7	12.1	13.1	18.7
1957	12.6	12.3	14.4	15.3	11.5	5.77	8.76	19.2	4.18	14.5	15.5	17.5	12.6
1958	13.6	1.99	.001	.001	.001	.001	26.3	20.4	54.1	24.2	.589	0	10.1
1959	.254	0	10.7	30.2	34.8	8.49	21.8	15.2	12.6	12.9	28.5	8.42	15.2
1960	4.67	6.55	10.4	9.18	7.06	20.8	23.6	15.5	11.0	26.3	31.3	4.91	14.3

\* Correction.

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.71	2.65	2.98	2.50	3.31	4.36	2.55	0.58	0.71	-0.12	-0.22	-0.15	19.85
1952	-.24	.23	.71	2.19	1.73	3.71	3.08	1.28	-.18	-.33	-.34	-.05	11.81
1953	-.12	.26	.91	1.27	1.37	3.62	1.42	2.15	.65	.29	.94	-.06	12.70
1954	-.08	.48	.69	1.31	2.42	2.64	4.56	1.79	.67	-.42	-.23	-.12	13.72
1955	.08	.08	1.90	.96	2.11	4.07	1.64	.26	-.41	-.41	.18	-.13	10.31
1956	3.01	1.08	1.34	.62	2.57	5.78	6.35	2.53	.11	-.13	.04	.08	23.38
1957	.05	.19	2.23	1.98	1.32	2.22	3.16	1.69	-.09	.03	-.41	-.16	12.21
1958	-.26	-.09	.16	.33	.65	2.65	5.64	.87	2.49	.62	-.16	.34	13.24
1959	.42	1.00	.90	2.39	1.12	3.21	3.26	1.09	-.14	-.25	-.48	-.14	12.38
1960	.33	.87	3.78	1.97	2.10	3.74	1.44	1.54	.62	-.62	-.25	-.26	15.26

Note.--Negative figures indicate that natural losses from lake exceeded inflow.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30										Calendar year		
		Observed					Adjusted			Observed		Adjusted		
		Discharge	Maximum	Minimum	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Mean	Mean	Runoff in inches	Mean
		Date		day										
1950	1174	-	-	-	-	-	-	-	-	12.1	15.3	16.50		
1951	1207	-	-	-	-	10.5	18.4	1.46	19.85	9.21	13.2	14.22		
1952	1237	-	-	-	-	13.2	10.9	.867	11.81	13.2	11.2	12.15		
1953	1277	-	-	-	-	12.8	11.8	.935	12.70	11.7	11.8	12.75		
1954	1337	-	-	-	-	12.2	12.7	1.01	13.72	12.8	13.6	14.68		
1955	1387	-	-	-	-	10.4	9.57	.760	10.31	11.5	12.7	13.69		
1956	1437	-	-	-	-	18.7	21.7	1.72	23.38	19.2	18.9	20.42		
1957	1507	-	-	-	-	12.6	11.1	.681	12.21	10.7	8.86	9.55		
1958	1557	-	-	-	-	10.1	12.3	.976	15.24	9.73	14.6	15.75		
1959	1627	-	-	-	-	15.2	11.5	.913	12.38	16.0	14.0	15.04		
1960	1707	-	-	-	-	14.3	14.1	1.12	15.26	-	-	-		

## 2295. Honeoye Creek at Honeoye Falls, N. Y.

Location.--Lat 42°57'25", long 77°35'20", on right bank 25 ft downstream from highway bridge at Honeoye Falls, Monroe County, and 13 miles upstream from mouth.

Drainage area.--197 sq mi.

Records available.--October 1945 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 609.98 ft above mean sea level (levels by Corps of Engineers).

Average discharge.--15 years (1945-60), 176 cfs (adjusted for storage and diversion).

Extremes.--1945-60: Maximum discharge, 4,630 cfs Mar. 28, 1950 (gage height, 6.42 ft), from rating curve extended above 2,100 cfs by logarithmic plotting; minimum, 0.06 cfs Aug. 28, 1949; minimum gage height, 0.35 ft Aug. 28, 1949, Sept. 14, 15, 1952.

Remarks.--Some diversion from and regulation by Hemlock and Canadice Lakes for water supply of city of Rochester. Diurnal fluctuation at low flow caused by mills above station.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	14.0	127	271	199	397	395	357	114	62.7	25.3	4.05	1.62	162
1952	2.77	11.6	13.8	156	166	321	305	156	34.9	12.1	4.56	.69	98.5
1953	1.20	6.08	27.8	71.5	123	267	137	186	178	57.9	51.8	10.9	93.0
1954	4.50	23.7	37.8	60.9	207	258	385	260	63.3	12.2	2.41	2.25	107
1955	4.70	10.9	132	110	146	512	193	62.9	9.13	1.04	3.67	.81	99.0
1956	150	106	154	85.0	251	649	716	408	81.1	15.0	3.66	5.69	218
1957	4.66	6.31	47.5	115	130	198	288	236	49.1	18.6	4.17	2.02	91.4
1958	1.91	4.59	7.79	3.55	10.3	228	442	118	123	80.2	15.2	11.1	87.2
1959	24.3	70.6	67.3	205	159	354	475	77.5	31.0	8.91	1.06	1.43	123
1960	24.2	34.2	326	189	196	320	428	228	148	13.1	3.48	.72	159

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.30	1.43	2.49	1.91	3.09	3.61	2.79	0.90	0.72	0.21	-0.01	-0.01	17.43
1952	0	1.16	.30	1.55	1.43	3.01	2.64	1.25	.27	0	-.03	0	10.58
1953	-.01	.15	.45	.78	1.06	2.59	1.27	1.75	1.29	.46	.72	.11	10.62
1954	.03	.27	.44	.69	1.81	2.23	3.47	2.18	.68	.05	.001	.01	11.86
1955	.07	.11	1.27	.99	1.29	4.29	1.68	.51	.01	-.06	.06	-.04	10.18
1956	1.67	.92	1.28	.74	2.07	5.14	4.63	2.52	.48	.12	.11	-.10	19.78
1957	.06	.11	.87	1.24	1.12	1.81	2.37	1.68	.38	.19	-.07	0	9.76
1958	-.03	.02	.08	.10	.16	2.04	4.07	1.05	1.38	.68	.07	.15	9.77
1959	.23	.68	.60	1.89	1.26	2.70	3.21	.88	.25	.06	-.07	-.02	11.67
1960	.30	.46	3.02	1.66	1.59	2.62	2.73	1.74	1.02	.06	.04	-.04	15.20

Note.--Negative figures indicate evaporation and seepage exceeded natural flow.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30								Calendar year		
		Observed				Adjusted				Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches		Mean	Mean	Runoff in inches
		Discharge	Date									
1950	-	-	-	-	-	-	-	-	-	111	183	12.60
1951	1297	-	-	-	-	162	253	1.28	17.43	130	198	13.67
1952	1237	1,980	Feb. 22, 1951	0.4	162	153	.777	10.58	99.1	155	10.71	
1953	1277	2,080	June 22, 1953	.4	93.0	154	.782	10.82	95.6	156	10.77	
1954	1337	1,890	May 2, 1954	.4	107	172	.873	11.86	114	182	12.57	
1955	1387	3,790	Mar. 1, 1955	.3	99.0	148	.751	10.18	121	183	12.60	
1956	1437	3,880	Mar. 7, 1956	.7	218	286	1.45	19.78	189	245	16.95	
1957	1507	1,700	May 20, 1957	1.0	91.4	142	.721	9.76	87.7	129	9.79	
1958	1557	1,090	Apr. 8, 1958	1.1	87.2	148	.721	9.77	99.6	163	11.21	
1959	1627	2,690	Jan. 22, 1959	.3	123	189	.858	11.87	142	202	13.94	
1960	1707	3,700	Mar. 30, 1960	.6	159	220	1.12	15.20	-	-	-	-

2305. Oatka Creek at Garbutt, N. Y.

Location.--Lat 43°00'30", long 77°47'25", on right bank 40 ft downstream from highway bridge at Garbutt, Genesee County, 2 miles southwest of Scottsville, and 3½ miles up-stream from mouth.

Drainage area.--208 sq mi.

Records available.--October 1945 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 560.89 ft above mean sea level (levels by Corps of Engineers).

Average discharge.--15 years (1945-60), 209 cfs.

Extremes.--1945-60: Maximum discharge, 6,920 cfs Mar. 31, 1960 (gage height, 8.64 ft); minimum, 3.3 cfs Sept. 11, 12, 1958; minimum gage height, 1.88 ft June 19, 1959, result of regulation.

Remarks.--Records of chemical analyses and water temperatures for the period October 1959 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	36.6	160	322	368	564	703	732	204	92.0	56.2	35.7	29.3	273
1952	26.9	42.7	67.4	349	348	730	362	210	62.1	36.1	25.9	24.0	190
1953	23.4	24.7	54.2	103	197	386	215	278	124	64.0	54.5	32.6	130
1954	26.6	34.2	80.2	115	423	395	595	237	80.1	38.8	30.3	26.9	171
1955	57.1	77.8	212	218	221	857	427	129	51.5	34.3	27.7	21.8	195
1956	128	140	265	117	327	1,048	891	539	130	58.7	67.0	67.6	315
1957	52.0	60.2	243	351	322	370	532	340	100	74.7	36.4	30.3	209
1958	28.9	28.5	55.2	29.0	33.4	383	714	191	144	94.5	37.1	48.4	149
1959	50.1	84.3	95.6	255	338	679	761	148	62.2	38.5	30.0	23.1	213
1960	37.7	73.9	349	334	423	508	755	226	145	51.6	41.6	30.2	247

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.20	0.86	1.79	2.04	2.82	3.90	3.93	1.13	0.49	0.31	0.20	0.16	17.83
1952	.15	.23	.37	1.93	1.80	4.05	1.94	1.17	.35	.20	.14	.13	12.44
1953	.13	.13	.30	.57	.99	2.14	1.15	1.54	.66	.35	.30	.17	8.43
1954	.15	.18	.44	.64	2.12	2.19	3.19	1.31	.43	.21	.17	.14	11.17
1955	.32	.42	1.18	1.21	1.11	4.75	2.29	.71	.28	.19	.15	.12	12.73
1956	.71	.75	1.47	.65	1.70	5.81	4.78	2.99	.70	.33	.37	.36	20.62
1957	.29	.32	1.35	1.95	1.61	2.05	2.85	1.89	.54	.41	.20	.16	13.62
1958	.16	.15	.31	.16	.17	2.12	3.83	1.06	.77	.52	.21	.26	9.72
1959	.28	.45	.53	1.41	1.69	3.77	4.08	.82	.35	.21	.17	.12	13.86
1960	.21	.40	1.93	1.85	2.19	2.82	4.05	1.25	.78	.29	.23	.16	16.16

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	214	14.01
1951	1207	2,480	Dec. 5, 1950	26	273	1.51	17.83	241	15.73
1952	1237	2,960	Mar. 12, 1952	20	190	.913	12.44	187	12.25
1953	1277	1,080	Mar. 28, 1953	16	130	.625	8.43	133	8.64
1954	1337	2,260	Feb. 17, 1954	23	171	.822	11.17	189	12.32
1955	1387	5,310	Mar. 2, 1955	19	195	.938	12.73	211	13.74
1956	1437	5,880	Mar. 8, 1956	19	315	1.51	20.62	300	19.65
1957	1507	3,500	Jan. 24, 1957	25	209	1.00	13.62	188	12.28
1958	1557	2,320	Apr. 8, 1958	16	149	.716	9.72	159	10.36
1959	1627	3,240	Apr. 3, 1959	21	213	1.02	13.86	232	15.14
1960	1707	6,920	Mar. 31, 1960	23	247	1.19	16.16	-	-

## 2310. Black Creek at Churchville, N. Y.

Location.--Lat 43°06'00", long 77°53'00", on right bank at east end of Carrol Street in Churchville, Monroe County, 60 ft downstream from main-line tracks of New York Central Railroad and 1 mile upstream from unnamed tributary.

Drainage area.--123 sq mi.

Records available.--October 1945 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 552.45 ft above mean sea level (levels by Corps of Engineers).

Average discharge.--15 years (1945-60), 109 cfs.

Extremes.--1945-60: Maximum discharge, 4,880 cfs Mar. 31, 1960 (gage height, 9.44 ft); minimum, 0.3 cfs Aug. 5-7, Sept. 15, 1959 (gage height, 0.93 ft).

Remarks.--Prior to May 1952, small diversion by New York Central Railroad Co. and slight regulation by pumping operations above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	15.6	69.6	130	165	359	384	406	112	68.6	33.2	8.90	11.2	145
1952	8.45	32.5	36.4	183	183	367	178	93.5	19.2	5.87	5.15	6.30	95.1
1953	5.50	13.3	22.5	33.4	70.4	186	74.9	143	52.8	9.63	12.6	4.08	52.3
1954	5.40	12.6	18.5	25.2	243	206	319	101	22.2	6.28	6.88	8.61	79.8
1955	31.8	57.1	163	115	118	402	249	64.2	14.1	5.14	7.33	3.76	103
1956	56.8	59.4	104	67.7	268	609	435	325	90.8	34.0	26.1	49.0	177
1957	25.6	26.4	71.5	185	188	220	321	168	43.1	21.8	6.04	6.82	106
1958	8.92	18.0	34.5	12.8	15.4	360	245	78.5	26.6	12.6	5.13	8.53	69.3
1959	15.8	23.3	22.4	199	286	433	331	57.7	22.3	6.26	2.62	1.66	116
1960	11.2	18.8	163	188	277	301	496	144	45.0	8.60	9.70	4.31	138

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.15	0.63	1.21	1.55	3.04	3.60	3.68	1.05	0.62	0.31	0.08	0.10	16.02
1952	.08	.29	.34	1.72	1.60	3.44	1.61	.88	.17	.06	.05	.06	10.30
1953	.05	.12	.21	.31	.60	1.74	.68	1.34	.48	.09	.12	.04	5.78
1954	.05	.11	.17	.24	2.06	1.94	2.89	.94	.20	.06	.06	.06	8.80
1955	.30	.52	1.53	1.08	1.00	3.76	2.26	.60	.13	.05	.07	.05	11.33
1956	.53	.54	.97	.63	2.35	5.71	3.94	3.04	.82	.32	.24	.44	19.53
1957	.24	.24	.67	1.71	1.59	2.06	2.91	1.58	.39	.20	.06	.06	11.71
1958	.08	.16	.32	.12	.13	3.37	2.23	.74	.24	.12	.05	.08	7.64
1959	.15	.21	.21	1.87	2.42	4.06	3.00	.54	.20	.06	.02	.02	12.76
1960	.11	.17	1.53	1.76	2.43	2.82	4.50	1.35	.41	.08	.09	.04	15.29

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	1207	1,430	Feb. 21, 1951	0.7	145	1.18	16.02	119	13.18	
1952	1237	1,620	Mar. 12, 1952	2.2	93.1	.757	10.30	134	14.74	
1953	1277	745	Mar. 28, 1953	2.1	52.3	.425	5.78	90.1	9.97	
1954	1357	1,660	Feb. 18, 1954	2.2	79.8	.649	8.80	51.9	5.73	
1955	1387	1,780	Mar. 2, 1955	1.4	103	.837	11.33	98.0	10.82	
1956	1437	2,960	Mar. 8, 1956	3.3	177	1.44	19.53	99.9	11.02	
1957	1507	1,910	Jan. 24, 1957	3.0	106	.862	11.71	169	18.64	
1958	1557	835	Apr. 8, 1958	2.1	69.3	.563	7.64	101	11.12	
1959	1627	1,700	Apr. 3, 1959	.3	116	.943	12.76	69.3	7.65	
1960	1707	4,880	Mar. 31, 1960	1.2	138	1.12	15.29	127	14.00	

## 2320. Genesee River at Driving Park Avenue, Rochester, N. Y.

Location.--Lat 43°10'50", long 77°37'40", on right bank at Rochester, Monroe County, 40 ft downstream from plant 5 of Rochester Gas & Electric Corp. and 100 ft upstream from Driving Park Avenue Bridge.

Drainage area.--2,467 sq mi.

Records available.--December 1919 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 247 ft above mean sea level, Erie (Barge) Canal datum. Prior to Apr. 4, 1927, water-stage recorder and chain gage in plant 5 at datum 3.00 ft higher. Apr. 4, 1927, to June 19, 1956, water-stage recorder at present site at datum 3.00 ft higher.

Average discharge.--40 years (1920-60), 2,787 cfs.

Extremes.--1919-60: Maximum discharge, 34,400 cfs Mar. 19, 1942; maximum gage height, 17.08 ft Apr. 2, 1940 (present datum); minimum discharge, less than 10 cfs, occurred during low-water periods in some years when powerplant was shut down; minimum daily, 219 cfs Aug. 14, 1927.

Maximum discharge known, about 54,000 cfs Mar. 18, 1865.

Remarks.--Extensive diurnal fluctuation caused by powerplants above station. New York State Erie (Barge) Canal crosses river 5.4 miles above station. Water diverted by the canal from Lake Erie is discharged into river from the west, the canal again diverting a smaller amount of water from river to the east. Additional regulation is provided by Rushford Lake and Mount Morris Reservoir. Records of chemical analyses for the period October 1954 to September 1955, and water temperatures for the period October 1954 to September 1960, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,422	4,476	5,195	4,727	6,771	7,400	7,845	2,365	1,610	1,265	551	662	3,666
1952	732	1,574	2,399	5,465	4,088	8,046	6,119	3,011	1,368	657	532	607	2,886
1953	857	1,123	2,295	2,323	2,483	5,650	3,598	3,970	2,388	1,313	966	982	2,329
1954	659	1,063	1,997	1,721	4,626	4,225	7,390	4,391	1,665	691	595	701	2,446
1955	928	908	2,312	2,498	1,853	9,117	3,562	1,590	641	425	604	451	2,032
1956	3,714	3,428	3,239	1,114	3,792	12,390	10,460	6,305	2,024	1,283	1,241	1,850	4,237
1957	852	1,234	3,963	3,581	3,121	4,334	7,349	4,570	1,382	1,151	542	538	2,716
1958	595	651	1,023	810	665	3,846	3,924	3,358	2,753	1,408	679	1,288	2,166
1959	993	1,876	1,838	3,112	5,337	6,739	7,912	2,550	1,003	697	474	666	2,744
1960	1,845	2,712	5,865	4,231	4,446	3,366	10,070	4,494	4,070	998	733	597	3,606

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	3,202	17.60
1951	1207	20,200	Feb. 22, 1951	311	3,666	1.49	20.17	3,131	17.23
1952	1237	17,700	Mar. 12, 1952	286	2,886	1.17	15.92	2,949	15.72
1953	1277	17,100	Mar. 25, 1953	483	2,328	.944	12.80	2,272	12.50
1954	1337	17,500	Feb. 17, 1954	449	2,446	.991	13.45	2,493	13.70
1955	1397	19,100	Mar. 2, 1955	340	2,082	.844	11.44	2,604	14.32
1956	1437	24,300	Mar. 8, 1956	417	4,237	1.72	23.38	3,976	21.39
1957	1507	17,000	Apr. 8, 1957	456	2,716	1.10	14.93	2,396	13.17
1958	1557	14,900	Apr. 7, 1958	316	2,166	.878	11.91	2,369	13.03
1959	1627	17,700	Apr. 2, 1959	370	2,744	1.11	15.09	3,227	17.75
1960	1707	25,800	Mar. 31, 1960	492	3,606	1.46	19.89	-	-

## 2320.5. Allen Creek near Rochester, N. Y.

Location.--Lat 43°07'49", long 77°31'08", on right bank 525 ft downstream from New York Central Railroad bridge, near Rochester, Monroe County, 1 mile upstream from Irondequoit Creek.

Drainage area.--30.1 sq mi, flow from 2.1 sq mi not contributing.

Records available.--November 1959 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 323.54 ft above mean sea level.

Extremes.--Maximum discharge during period, 5,040 cfs Mar. 30 (gage height, 6.06 ft), from rating curve extended above 1,300 cfs by logarithmic plotting; minimum, 4.0 cfs Sept. 28, 29 (gage height, 1.25 ft, backwater from aquatic vegetation).



Monthly and yearly mean discharge, in cubic feet per second, of Allen Creek near Rochester, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	-	\$9.01	59.6	34.6	62.9	151	68.1	32.0	16.7	7.18	10.3	6.29	-

\* Not previously published; estimated on basis of records for nearby stations.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	-	\$0.33	2.28	1.35	2.25	5.03	2.53	1.23	0.62	0.28	0.39	0.23	-

\* Not previously published; estimated on basis of records for nearby stations.

2321. Sterling Creek at Sterling, N. Y.

Location.--Lat 43°19'30", long 76°38'50", on right bank at Sterling, Cayuga County, 25 ft downstream from bridge on State Highway 104A, 1.8 miles southwest of Sterling Valley and 1.9 miles upstream from Sterling Valley Creek.

Drainage area.--44.4 sq mi.

Records available.--April 1957 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 264.69 ft above mean sea level, datum of 1929.

Extremes.--1957-60: Maximum discharge, 1,490 cfs Apr. 4, 1960 (gage height, 5.13 ft); minimum, 0.6 cfs Sept. 26, 1957; minimum gage height, 1.63 ft Sept. 30, 1960 (backwater from aquatic vegetation).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	39.1	16.8	9.50	3.59	1.20	-
1958	1.45	5.91	16.9	25.5	43.6	240	167	41.5	46.7	23.6	6.19	43.7	55.4
1959	52.1	105	82.0	152	98.0	224	166	49.0	9.79	24.5	4.67	2.33	80.7
1960	13.7	56.0	186	88.1	144	88.4	264	75.1	43.7	4.62	3.25	2.36	80.2

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	1.02	0.42	0.25	0.09	0.03	-
1958	0.04	0.15	0.44	0.66	1.10	6.24	4.20	1.08	1.17	.61	.16	1.10	16.95
1959	1.35	2.63	2.13	3.95	2.30	5.81	4.17	1.27	.25	.64	.12	.06	24.68
1960	.35	1.41	4.82	2.29	3.49	2.30	6.62	1.95	1.10	.12	.08	.06	24.59

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1957	1507	-	-	-	-	-	-	-	-
1958	1557	625	Mar. 28, 1958	0.8	55.4	1.25	16.95	73.4	22.43
1959	1627	770	Jan. 22, 1959	1.4	80.7	1.82	24.68	82.2	25.15
1960	1707	1,490	Apr. 4, 1960	1.9	80.2	1.81	24.59	-	-

## 2330. Cayuga Inlet near Ithaca, N. Y.

Location.--Lat 42°23'35", long 76°32'40", on left bank half a mile upstream from Butter-nut Creek and 5 miles south of Ithaca, Tompkins County.

Drainage area.--36.7 sq mi.

Records available.--March 1937 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 437.16 ft above mean sea level (levels by Corps of Engineers).

Average discharge.--23 years (1937-60), 39.1 cfs.

Extremes.--1937-60: Maximum discharge, 4,110 cfs Aug. 13, 1942 (gage height, 7.58 ft), from rating curve extended above 1,600 cfs on basis of slope-area measurements at gage heights 5.5 and 7.58 ft; minimum, 1.7 cfs July 22, 1955; minimum gage height, 0.42 ft Aug. 30, 31, Sept. 1, 2, 1939, July 22, 1955.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	26.9	54.9	94.0	69.0	112	104	72.2	24.1	16.7	12.9	5.66	4.80	49.4
1952	4.92	14.0	40.8	61.8	52.9	100	71.7	48.0	16.2	19.3	8.79	5.68	38.7
1953	7.60	20.1	67.7	57.0	42.8	75.4	59.1	50.9	17.2	8.58	12.3	4.26	35.1
1954	4.75	8.93	12.4	15.5	52.0	56.6	63.4	66.3	16.8	5.30	4.93	5.23	25.8
1955	5.43	14.0	47.0	33.9	51.4	120	33.9	16.7	5.47	3.77	8.43	4.31	28.7
1956	106	62.6	30.4	20.9	39.3	170	180	50.8	18.1	13.7	6.97	13.7	59.3
1957	10.5	11.7	44.4	39.5	33.8	68.3	100	45.5	17.3	9.80	4.37	5.21	32.5
1958	5.81	6.74	17.9	16.3	21.0	98.7	248	73.3	25.5	30.4	9.32	10.7	46.9
1959	11.3	20.6	20.5	66.6	44.3	85.1	85.4	23.2	9.26	6.56	4.95	3.74	31.5
1960	20.6	52.7	94.9	48.5	66.8	86.7	105	77.1	31.8	10.1	7.38	6.55	50.6

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.85	1.67	2.95	2.17	3.18	3.27	2.19	0.76	0.51	0.40	0.18	0.15	18.28
1952	.15	.43	1.28	2.57	1.56	3.14	2.18	1.51	.49	.61	.28	.17	14.37
1953	.24	.61	2.13	1.79	1.21	2.31	1.80	1.60	.52	.27	.39	.13	13.00
1954	.15	.27	.39	.49	1.47	1.78	1.93	2.08	.51	.17	.15	.16	9.55
1955	.17	.43	1.48	1.07	1.46	3.78	1.03	.53	.17	.12	.26	.13	10.63
1956	3.33	1.90	.95	.66	1.16	5.33	5.47	1.60	.55	.43	.22	.42	22.02
1957	.33	.36	1.39	1.24	.96	2.15	3.05	1.43	.53	.31	.14	.16	12.05
1958	.18	.20	.56	.51	.60	3.10	7.53	2.30	.77	.96	.29	.33	17.33
1959	.36	.63	.64	2.09	1.26	2.61	2.60	.73	.28	.21	.16	.11	11.68
1960	.65	1.60	2.98	1.52	1.96	2.72	3.19	2.42	.97	.32	.23	.20	18.76

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	47.6	17.62
1951	1207	1,380	Nov. 25, 1950	3.5	49.4	1.35	18.28	39.7	14.67
1952	1237	988	Mar. 11, 1952	4.1	38.7	1.05	14.37	41.7	15.49
1953	1277	1,400	Dec. 11, 1952	3.1	35.1	.956	13.00	29.3	10.83
1954	1337	858	May 4, 1954	2.6	25.8	.703	9.55	29.2	10.82
1955	1387	732	Mar. 1, 1955	1.9	28.7	.782	10.63	39.8	14.73
1956	1437	2,470	Mar. 7, 1956	3.9	59.3	1.62	22.02	48.3	17.92
1957	1507	920	Apr. 5, 1957	3.0	32.5	.986	12.05	29.5	10.91
1958	1557	1,200	Apr. 7, 1958	4.0	46.9	1.28	17.33	48.7	18.02
1959	1627	1,570	Jan. 22, 1959	3.2	31.5	.858	11.68	41.3	15.28
1960	1707	1,240	Mar. 30, 1960	4.3	50.6	1.38	18.76	-	-

## 2340. Fall Creek near Ithaca, N. Y.

Location.--Lat 42°27'20", long 76°28'30", on left bank in Forest Home, half a mile upstream from Cornell University Dam, 1½ miles northeast of Ithaca, Tompkins County, and 2 miles upstream from mouth.

Drainage area.--124 sq mi.

Records available.--July 1908 to June 1909 (gage heights only), February 1925 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 794.81 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). July 1908 to June 1909 chain gage at bridge 1¼ miles downstream at different datum.

Average discharge.--35 years (1925-60), 186 cfs.

Extremes.--1925-60: Maximum discharge, 15,500 cfs July 8, 1935 (gage height, 9.52 ft), from average of computed flow over each of four dams; minimum, about 3 cfs Aug. 25, 1927 (gage height, 0.18 ft).

Remarks.--Cornell University diverts a mean annual discharge of about 2 cfs, 1 mile above gage for water-supply purposes.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	88.0	221	418	342	447	468	328	90.4	96.7	92.1	28.6	21.2	219
1952	19.4	70.6	171	351	213	586	279	245	73.0	93.3	45.3	25.4	165
1953	38.1	95.5	285	234	247	313	267	215	53.5	23.4	18.2	13.3	150
1954	13.1	29.4	55.5	76.1	312	270	305	263	107	30.2	23.4	36.7	125
1955	26.5	179	376	209	249	695	196	90.5	31.7	15.5	21.1	14.3	176
1956	26.6	259	175	107	215	646	805	219	79.7	94.0	32.1	75.2	247
1957	70.5	82.7	275	202	184	277	318	192	82.0	71.2	39.0	44.2	153
1958	31.2	55.1	203	131	131	441	952	323	295	113	55.4	79.7	234
1959	104	180	108	299	207	367	437	100	41.2	37.1	22.1	13.6	159
1960	99.1	317	453	210	348	322	604	233	130	34.7	23.1	38.2	233

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.82	1.99	3.89	3.18	3.76	4.35	2.96	0.84	0.87	0.86	0.27	0.19	23.98
1952	.18	.64	1.59	3.27	1.85	3.59	2.51	2.28	.68	.42	.23	.12	18.09
1953	.35	.86	2.65	2.18	2.07	2.91	2.41	2.00	.48	.22	.17	.12	16.42
1954	.12	.26	.52	.71	2.62	2.51	2.74	2.44	.97	.28	.22	.33	13.72
1955	.25	1.61	3.49	1.94	2.09	6.46	1.76	.84	.29	.14	.20	.13	19.20
1956	2.47	2.33	1.63	1.00	1.87	6.00	7.25	2.03	.72	.87	.30	.68	27.15
1957	.66	.74	2.56	1.87	1.55	2.58	2.86	1.79	.74	.66	.36	.40	16.77
1958	.29	.50	1.89	1.22	1.10	4.10	8.56	3.00	2.66	1.05	.51	.72	25.60
1959	.97	1.62	1.00	2.78	1.73	3.42	3.95	.93	.37	.34	.21	.12	17.42
1960	.92	2.85	4.21	1.95	3.03	3.00	5.44	2.16	1.17	.32	.22	.34	25.61

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	233	-	25.49
1951	1207	3,340	Dec. 4, 1950	13	219	1.77	23.98	180	19.69	
1952	1237	2,980	Mar. 11, 1952	15	165	1.33	18.09	178	19.54	
1953	1277	3,000	Dec. 11, 1952	7.6	150	1.21	16.42	123	13.46	
1954	1337	3,430	May 4, 1954	8.8	125	1.01	13.72	166	18.17	
1955	1387	2,940	Mar. 1, 1955	8.2	176	1.42	19.20	195	20.28	
1956	1437	5,030	Mar. 7, 1956	13	247	1.99	27.15	225	24.68	
1957	1507	1,650	Jan. 23, 1957	16	153	1.23	16.77	141	15.49	
1958	1557	3,020	Apr. 6, 1958	18	234	1.89	25.60	242	26.51	
1959	1627	4,710	Jan. 22, 1959	10	159	1.28	17.42	199	21.81	
1960	1707	4,570	Mar. 30, 1960	15	233	1.88	25.61	-	-	

## 2342. Mud Creek at East Victor, N. Y.

Location--Lat 42°58'32", long 77°22'58", on left bank at bridge on State Highway 96, 0.3 mile upstream from Fish Creek at East Victor, Ontario County.

Drainage area--64.1 sq mi.

Records available--Occasional low-flow measurements for water year 1957. April 1958 to September 1960 (no winter records).

Gage--Water-stage recorder. Altitude of gage is 560 ft (from topographic map).

Extremes--1958-60: Maximum discharge recorded, 896 cfs Apr. 7, 1958 (gage height, 5.39 ft); minimum daily determined, 0.1 cfs Sept. 6, 1959.

Monthly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	236	38.5	51.1	28.9	2.07	5.82	-
1959	14.8	27.1	-	-	-	-	-	-	-	1.66	.34	.27	-
1960	10.0	-	-	-	-	-	-	105	33.4	4.04	2.96	.46	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	4.11	0.69	0.89	0.52	0.04	0.10	-
1959	0.27	0.47	-	-	-	-	-	-	-	.03	.006	.005	-
1960	.18	-	-	-	-	-	-	1.89	.58	.07	.05	.008	-

## 2350. Canandaigua Lake Outlet at Chapin, N. Y.

Location.--Lat 42°55'00", long 77°14'00", on left bank at Chapin, Ontario County, 500 ft upstream from highway bridge and 3 miles downstream from Canandaigua Lake.

Drainage area.--199 sq mi.

Records available.--November 1939 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 673.6 ft above mean sea level (levels by Corps of Engineers).

Average discharge.--20 years (1940-60), 150 cfs (unadjusted).

Extremes.--1939-60: Maximum discharge, 1,100 cfs Mar. 17, 1942 (gage height, 4.64 ft); minimum, 4.6 cfs Sept. 17, 1948; minimum gage height, 1.15 ft Feb. 3, 1950.

Remarks.--Flow regulated by Canandaigua Lake from which water is diverted for municipal supply by villages of Newark and Palmyra. Monthly runoff adjusted for change in contents in Canandaigua Lake since October 1945.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	37.7	125	426	335	384	562	526	191	84.3	119	32.0	26.9	237
1952	45.1	37.2	58.5	78.3	212	423	504	175	129	57.8	30.4	28.8	147
1953	20.2	26.8	51.3	57.4	78.7	175	269	323	123	24.9	49.3	43.6	104
1954	24.1	25.9	26.9	22.4	41.7	142	421	389	55.9	37.3	34.4	32.2	105
1955	28.7	20.0	24.5	26.8	46.1	574	357	54.3	20.7	21.5	38.7	26.9	104
1956	142	258	218	152	228	736	716	528	120	25.1	48.9	50.7	269
1957	36.2	35.8	46.3	101	194	255	371	264	78.3	55.4	48.1	39.9	127
1958	20.7	14.1	16.8	14.2	25.9	61.6	498	264	140	280	40.9	38.7	118
1959	29.7	47.0	42.7	85.3	356	566	524	117	73.9	65.4	47.2	37.2	146
1960	33.8	23.4	207	387	225	285	534	329	214	56.5	51.6	30.6	198

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.41	1.42	1.87	1.84	2.81	3.70	2.43	0.70	0.99	0.19	-0.18	-0.14	16.04
1952	-0.22	.16	.46	1.26	1.41	3.05	2.49	1.42	.25	-1.10	-0.06	-0.22	9.90
1953	-0.27	.17	.54	.79	.84	2.25	1.11	1.68	.47	.05	.08	-.21	7.50
1954	-0.15	.05	.01	.16	1.10	1.47	2.60	1.70	.47	-.21	-.24	-.12	6.84
1955	-0.08	.003	.58	.39	.94	4.09	1.52	.51	-1.10	-0.31	.50	-.32	7.32
1956	2.62	.63	.91	.56	2.13	5.13	4.39	2.04	.27	.01	.09	-.10	18.68
1957	-0.08	-0.02	.73	.84	.88	1.78	2.47	1.84	.28	.18	-.21	-.07	8.62
1958	-0.27	-.21	.21	.02	.51	1.65	4.01	.86	1.25	.96	-.10	.08	8.77
1959	.03	.37	.16	1.49	1.24	2.76	2.87	.77	.05	-.05	-.11	-.24	9.34
1960	.38	.38	2.91	1.47	1.47	2.72	2.39	2.42	.77	.01	.12	-.22	14.82

Note.--Negative figures indicate evaporation and seepage exceeded natural flow.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	143	165	11.27
1951	1207	827	Mar. 30, 1951	14	237	235	1.18	16.04	199	187	12.74
1952	1237	782	Apr. 5, 1952	17	147	145	.729	9.90	144	145	9.94
1953	1277	639	Mar. 28, 1953	11	104	110	.553	7.50	102	102	6.97
1954	1337	643	May 1, 1954	12	105	100	.503	6.84	104	109	7.43
1955	1387	820	Mar. 1, 1955	7.0	104	107	.538	7.32	149	161	10.98
1956	1437	1,070	Mar. 7, 1956	11	269	273	1.37	18.68	227	221	15.15
1957	1507	532	May 21, 1957	19	127	128	.633	8.62	121	113	7.72
1958	1557	640	Apr. 16, 1958	7.0	118	129	.648	8.77	124	141	9.60
1959	1627	664	Apr. 11, 1959	21	146	137	.688	9.34	158	182	12.45
1960	1707	1,000	Mar. 30, 1960	10	198	216	1.09	14.82	-	-	-

## 2352.5. Flint Creek at Phelps, N. Y.

Location--Lat 42°57'27", long 77°04'55", on right bank 25 ft downstream from Eagle Street Bridge at Phelps, Ontario County, 1 mile upstream from Canandaigua Lake Outlet.

Drainage area--101 sq mi.

Records available--October 1959 to September 1960.

Gage--Water-stage recorder. Datum of gage is 523.14 ft above mean sea level, datum of 1929.

Extremes--Maximum discharge during year, 2,940 cfs Mar. 30 (gage height, 5.83 ft); minimum, 0.5 cfs Sept. 12 (gage height, 1.29 ft).

Remarks--Small diversion by Phelps Cement Products, Inc., located a quarter of a mile upstream, during periods of low ground-water level.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	45.6	72.6	314	136	165	199	356	207	80.5	8.39	6.80	1.66	135

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.52	0.80	3.59	1.55	1.76	2.27	3.93	2.37	0.89	0.10	0.08	0.02	17.88

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1960	1707	2,940	Mar. 30, 1960	0.6	133	1.32	17.88	-	-		

## 2353. Owasco Inlet at Moravia, N. Y.

Location--Lat 42°43'05", long 76°26'17", on right bank 575 ft downstream from highway bridge on State Highway 38 and 1 mile west of Moravia, Cayuga County.

Drainage area--108 sq mi.

Records available--Occasional low-flow measurements, water years 1950, 1956-59, January to September 1960.

Gage--Water-stage recorder. Altitude of gage is 720 ft (from topographic map).

Extremes--January to September 1960: Maximum discharge about 6,400 cfs Mar. 31, from rating curve extended above 170 cfs by logarithmic plotting; maximum gage height, 11.92 ft Feb. 11 (backwater from Owasco Lake); minimum discharge, 9.0 cfs Sept. 9 (gage height, 1.70 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	-	-	-	351	298	336	548	216	111	30.8	19.7	22.7	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	-	-	-	3.74	2.98	3.59	5.66	2.30	1.15	0.33	0.21	0.23	-

## 2355. Owasco Lake Outlet near Auburn, N. Y.

Location.--Lat 42°56'45", long 76°36'05", on left bank 2½ miles downstream from center of Auburn, Cayuga County, and 4 miles downstream from State dam at outlet of Owasco Lake.

Drainage area.--208 sq mi.

Records available.--November 1912 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 533.92 ft above mean sea level, datum of 1929, supplementary adjustment of 1943.

Average discharge.--47 years (1913-60), 285 cfs.

Extremes.--1912-60: Maximum discharge, 2,090 cfs Mar. 19, 1936, Apr. 9, 1940, Apr. 4, 1950; maximum gage height, 4.88 ft Mar. 19, 1936, Apr. 9, 1940; minimum discharge, about 2 cfs Dec. 5, 1936; minimum gage height, 1.325 ft Dec. 3, 1953; minimum daily discharge, 5 cfs Nov. 11, 1934.

Remarks.--Diurnal fluctuation caused by mills in Auburn; seasonal regulation at State dam. Water supply for Auburn taken from Owasco Lake, part of which returns as sewage to outlet above gaging station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	92.7	236	807	582	596	759	562	265	160	104	45.2	51.2	354
1952	53.5	131	190	335	506	499	486	360	280	69.3	45.4	40.2	248
1953	42.2	87.2	100	262	415	382	470	411	222	73.9	50.2	28.5	210
1954	17.7	14.6	13.5	16.5	99.2	477	515	544	207	147	89.9	87.1	186
1955	63.6	90.2	251	589	264	1,130	413	222	149	85.7	77.3	73.5	285
1956	94.0	235	428	259	320	955	1,008	396	270	111	79.5	86.7	353
1957	128	140	179	380	384	514	352	252	217	273	144	98.0	255
1958	81.8	68.1	91.6	230	306	542	1,272	451	416	197	130	97.2	322
1959	94.1	284	263	341	536	544	764	188	94.8	85.7	77.0	64.1	276
1960	59.8	150	655	598	515	392	1,080	370	274	135	94.8	78.6	366

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	384	25.07
1951	1207	1,270	Dec. 11, 1950	27	354	1.70	23.11	290	18.91
1952	1237	879	Feb. 6, 1952	17	248	1.19	16.26	236	15.46
1953	1277	596	May 15, 1953	20	210	1.01	13.73	195	12.74
1954	1337	1,160	May 5, 1954	12	186	.894	12.17	217	14.13
1955	1387	1,830	Mar. 12, 1955	17	285	1.37	18.61	315	20.54
1956	1437	1,780	Apr. 8, 1956	46	353	1.70	23.13	327	21.43
1957	1507	800	Apr. 25, 1957	59	255	1.23	16.63	237	15.51
1958	1557	1,900	Apr. 8, 1958	25	322	1.55	21.03	356	23.20
1959	1627	1,280	Apr. 9, 1959	20	276	1.33	17.98	295	19.24
1960	1707	1,970	Apr. 5, 1960	53	366	1.76	23.92	-	-

## 2375. Seneca River at Baldwinsville, N. Y.

Location.--Lat 43°09'25", long 76°19'55", on left bank 200 ft downstream from highway bridge in Baldwinsville, Onondaga County, and 400 ft downstream from navigation dam of New York State Erie (Barge) Canal system.

Drainage area.--3,130 sq mi.

Records available.--November 1949 to September 1960 in reports of the Geological Survey. November 1898 to December 1908 prior to construction of Erie (Barge) Canal, not equivalent to later records at same site because of extensive development of Erie (Barge) Canal system. January 1909 to September 1925 (gage heights only) in reports of State engineer and surveyor.

Gage.--Water-stage recorder. Datum of gage is 362.60 ft above mean sea level, New York State Erie (Barge) Canal datum. Prior to Dec. 31, 1908, staff gages on dam at same site at different datum. Auxiliary water-stage recorder 1,500 ft downstream from base gage at same datum.

Average discharge.--10 years (1950-60), 3,448 cfs.

Extremes.--1949-60: Maximum daily discharge, 17,200 cfs Apr. 4, 1960; maximum gage height, 9.21 ft Apr. 4, 1960; minimum daily discharge, 237 cfs Nov. 10, 1957; minimum gage height, 0.81 ft Aug. 10, 1952.

Remarks.--Discharge from 1898 to 1908 determined on basis of head on dam, flow through ten mills nearby, lockages at Oswego Canal lock, estimated leakage of dam, wheel gates, flumes, and penstocks; not adjusted for inflow from Lake Erie through Erie Canal. Discharge since November 1949, computed by using fall as determined by auxiliary water-stage recorder as a factor, represents total discharge at Baldwinsville and includes flow in Baldwin and Erie (Barge) Canals.

A large amount of natural storage and some artificial regulation is afforded by many large lakes and the Erie (Barge) Canal system in river basin. Large diurnal fluctuations at low and medium flow caused by powerplants above station. Seneca River basin receives water from Erie (Barge) Canal through lock 32 near Pittsford. During part of year, entire flow from 45 sq mi of Mud Creek drainage area may be diverted from Chemung River basin in Keuka Lake in Oswego River basin. Records of chemical analyses for the period October 1957 to September 1958 and water temperatures for the period October 1957 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2,752	3,740	8,780	7,420	7,398	9,390	7,415	2,829	2,460	2,516	1,422	1,282	4,772
1952	1,409	1,614	2,309	4,527	5,861	7,222	4,822	3,782	2,664	1,691	1,257	1,576	3,220
1953	1,272	993	2,631	3,436	3,765	4,147	3,942	4,445	2,042	1,071	1,422	1,340	2,537
1954	1,116	1,519	1,870	805	2,171	3,925	4,150	5,657	2,313	1,223	1,132	1,093	2,232
1955	1,108	1,569	3,032	5,331	2,793	10,146	4,614	1,368	1,436	1,243	1,197	1,358	2,942
1956	4,652	6,941	4,174	3,440	4,355	11,650	11,330	7,069	2,105	1,682	1,571	1,874	5,086
1957	1,394	1,824	2,980	3,909	3,274	5,085	4,624	3,268	2,462	1,630	1,515	1,515	2,847
1958	859	675	964	1,939	2,530	5,951	9,173	5,049	4,287	2,760	2,088	1,252	3,090
1959	1,959	3,215	3,707	3,083	4,685	7,512	6,462	1,437	1,006	1,273	1,573	1,502	3,104
1960	1,756	3,089	7,146	8,283	6,488	4,820	10,651	4,722	5,194	1,681	1,167	1,049	4,655

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.01	1.33	3.23	2.73	2.46	3.46	2.64	1.04	0.88	0.93	0.52	0.46	20.69
1952	.52	.58	.85	1.67	2.02	2.66	1.72	1.39	.95	.62	.46	.56	14.00
1953	.47	.35	.97	1.27	1.25	1.53	1.40	1.64	.73	.39	.52	.48	11.00
1954	.41	.47	.69	.30	.72	1.45	1.48	2.08	.82	.45	.42	.39	9.68
1955	.41	.56	1.12	1.96	.93	3.74	1.64	.50	.51	.46	.44	.48	12.75
1956	1.79	2.47	1.54	1.27	1.50	4.29	4.04	2.60	.75	.62	.58	.67	22.12
1957	.51	.65	1.10	1.44	1.09	1.87	1.65	1.20	.88	.61	.60	.54	12.34
1958	.32	.24	.36	.71	.84	2.04	3.27	1.86	1.53	1.02	.77	.45	13.41
1959	.71	1.15	1.37	1.14	1.56	2.77	2.30	.53	.36	.47	.58	.54	13.48
1960	.64	1.10	2.63	3.05	2.24	1.77	3.80	1.74	1.85	.62	.43	.37	20.24

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Maximum day		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	3,982	17.27
1951	1207	11,800	Feb. 24, 1951	788	4,772	1.52	20.69	3,935	17.07
1952	1237	10,700	Mar. 14, 1952	555	3,220	1.03	14.00	3,184	13.84
1953	1277	8,800	Mar. 29, 30	549	2,537	.811	11.00	2,486	10.78
1954	1337	9,080	May 5, 1954	373	2,232	.713	9.68	2,350	10.20
1955	1387	11,900	Mar. 18, 1955	894	2,942	.940	12.75	3,798	16.46
1956	1437	16,700	Mar. 12, 1956	1,050	5,086	1.62	22.12	4,272	18.58
1957	1507	7,430	Jan. 24, 1957	610	2,847	.910	12.34	2,536	11.00
1958	1557	10,700	Apr. 24, 1958	237	3,090	.987	13.41	3,624	15.72
1959	1627	11,500	Apr. 4, 1959	420	3,104	1.992	13.48	3,368	14.62
1960	1707	17,200	Apr. 4, 1960	611	4,655	1.49	20.24	-	-

† Corrected.



## 2380. Onondaga Reservoir near Nedrow, N. Y.

Location.--Lat 42°55'55", long 76°10'25", at Onondaga Dam on Onondaga Creek, 3½ miles southwest of Nedrow, Onondaga County, 4 miles south of Syracuse, and 10½ miles upstream from Onondaga Lake.

Drainage area.--68.1 sq mi (measured by Corps of Engineers).

Records available.--June 1949 to September 1952 (monthly elevations and contents), October 1952 to September 1960.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (levels by Corps of Engineers).

Extremes.--1949-60: Maximum elevation, 485.9 ft Apr. 1, 1960 (contents, 5,960 acre-ft); no contents at times.

Remarks.--Reservoir is formed by a rolled earthfill dam, completed by Corps of Engineers in August 1949 for flood control; first used for flood regulation about a year prior to completion. Usable capacity, 18,200 acre-ft between elevations 457.0 ft (conduit invert at intake) and 504.5 ft (crest of spillway). No dead storage. The flood-control works consist of a pressure conduit and a side-channel spillway and are not provided with gates. Water is stored during high flows and released gradually.

Contents, in acre-feet on last day of month

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1951	0	5	2	4	24	216	6	0	0	0	0	0
1952	0	0	34	4	0	9	0	1	0	0	0	0
1953	0	0	0	9	4	20	1	0	0	0	0	0
1954	0	0	0	0	15	13	7	0	0	0	18	0
1955	0		338	0	46	42	0	0	0	0	0	0
1956	7	0	0	0	7	10	40	16	0	0	0	0
1957	0	0	2	4	21	2	0	0	0	1	0	0
1958	0	0	0	1	74	338	21	0	0	0	0	0
1959	1	0	0	16	50	74	2	0	0	0	0	0
1960	2	3	21	0	4	5,728	4	12	0	0	0	0

## 2390. Onondaga Creek at Dorwin Avenue, Syracuse, N. Y.

Location.--Lat 42°59'00", long 76°09'05", on left bank 550 ft upstream from Dorwin Avenue Bridge, at Syracuse, Onondaga County, and 4 miles downstream from Onondaga Reservoir.

Drainage area.--88.9 sq mi.

Records available.--May 1951 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 413.59 ft above mean sea level (levels by Corps of Engineers).

Average discharge.--9 years (1951-60), 116 cfs (adjusted).

Extremes.--1951-60: Maximum discharge, 2,130 cfs Mar. 31, 1960 (gage height, 5.06 ft); minimum, 9.5 cfs Sept. 16, 1959 (gage height, 1.15 ft).

Remarks.--High flow regulated by Onondaga Reservoir (see above).

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	64.0	86.2	42.9	34.3	-
1952	33.5	87.4	144	214	140	265	160	136	63.8	50.4	23.9	16.6	111
1953	26.3	29.1	91.0	93.4	160	194	127	157	45.8	22.8	23.8	17.3	81.9
1954	17.5	26.6	36.9	65.2	212	154	235	192	56.0	20.1	21.2	29.7	87.8
1955	24.7	82.8	216	137	143	428	161	66.8	36.4	23.6	20.0	16.5	113
1956	50.1	76.8	106	70.0	153	419	434	165	71.3	38.2	24.2	39.0	137
1957	34.9	46.1	131	187	142	215	157	104	72.2	83.5	108	36.8	110
1958	27.9	33.4	92.7	95.6	99.1	322	486	187	252	86.4	35.2	48.0	147
1959	65.0	101	86.8	237	158	290	307	71.2	37.8	27.3	20.2	15.4	118
1960	38.7	87.3	256	147	253	201	457	112	66.8	32.6	31.9	28.1	142

Monthly and yearly runoff, in inches (adjusted), of Onondaga Creek at Dorwin Avenue, Syracuse, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	\$0.80	\$1.12	\$0.56	\$0.43	-
1952	\$0.43	\$1.10	\$1.87	\$2.77	\$1.70	\$3.44	\$2.00	\$1.76	\$0.80	\$0.65	\$0.31	\$0.21	\$17.04
1953	.34	.37	1.18	1.21	1.87	2.52	1.59	2.04	.58	.30	.31	.22	12.53
1954	.23	.33	.48	.85	2.48	1.99	2.94	2.49	.70	.26	.28	.37	13.40
1955	.32	1.04	2.87	1.71	1.68	5.55	2.01	.87	.46	.31	.26	.21	17.29
1956	.65	.96	1.37	.91	1.86	5.43	5.45	2.13	.89	.50	.31	.49	20.95
1957	.45	.60	1.70	2.43	1.67	2.78	1.97	1.34	.91	1.08	1.40	.46	16.79
1958	.36	.42	1.20	1.21	1.18	4.23	6.03	2.42	3.16	1.12	.43	.60	22.36
1959	.84	1.27	1.13	3.08	1.86	3.77	3.83	.92	.47	.35	.26	.19	17.97
1960	.50	1.10	3.32	1.90	3.07	3.82	4.52	1.45	.84	.42	.41	.35	21.70

\* Not previously published.

Note.--Figures are adjusted for change in contents in Onondaga Reservoir.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	-	-
1951	1207	-	-	-	-	-	-	-	-	-	-
1952	1237	1,170	Mar. 11, 1952	13	111	\$111	\$1.25	\$17.04	102	101	15.53
1953	1277	581	Dec. 12, 1952	13	81.9	81.9	.921	12.53	76.4	76.4	11.68
1954	1337	868	May 4, 1954	12	87.8	87.8	.988	13.40	108	109	16.59
1955	1387	1,050	Mar. 1, 1955	14	113	113	1.27	17.29	105	105	16.04
1956	1437	1,440	Mar. 8, 1956	14	137	137	1.54	20.95	135	135	20.72
1957	1507	1,290	Aug. 4, 1957	26	110	110	1.24	16.79	105	105	16.02
1958	1557	1,350	June 2, 1958	18	147	147	1.65	22.36	155	155	23.62
1959	1627	1,960	Jan. 22, 1959	13	118	118	1.33	17.97	129	129	19.65
1960	1707	2,130	Mar. 31, 1960	20	142	142	1.60	21.70	-	-	-

\* Not previously published.

2400. Onondaga Creek at Temple Street, Syracuse, N. Y.

Location.--Lat 43°02'25", long 76°09'20", on right bank 150 ft upstream from Temple Street Bridge at Syracuse, Onondaga County.

Drainage area.--Not determined because of uncertainty regarding origin of storm-water flow within city storm-sewer system.

Records available.--June 1949 to September 1951.

Gage.--Water-stage recorder. Datum of gage is 353.4 ft above mean sea level (levels by city of Syracuse).

Extremes.--1949-51: Maximum discharge, 2,560 cfs Mar. 28, 1950 (gage height, 12.6 ft, from floodmark), from rating curve extended above 1,000 cfs by logarithmic plotting; minimum, 18 cfs July 12, 1949; minimum gage height, 1.87 ft July 9, 1949.

Remarks.--Extensive diurnal fluctuation caused by gristmill. High flow regulated by Onondaga Reservoir above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	79.6	131	308	320	417	378	333	145	81.1	104	55.4	45.3	199

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge							
		Date							
1950	-	-	-	-	-	-	-	184	-
1951	1207	1,680	Feb. 21, 1951	35	199	-	-	-	-

## 2401. Harbor Brook at Syracuse, N. Y.

Location.--Lat 43°02'06", long 76°11'17", on right bank 145 ft downstream from Velasco Road Bridge, at Syracuse, Onondaga County, 3 miles upstream from mouth at Onondaga Lake.

Drainage area.--9.47 sq mi.

Records available.--June 1959 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 394.79 ft above mean sea level, datum of 1929.

Extremes.--1959-60: Maximum discharge, 354 cfs Mar. 30, 1960 (gage height, 6.97 ft); minimum, 1.8 cfs Sept. 23, 1959 (gage height, 2.00 ft).

Remarks.--Flow includes some sewage and storm sewer inflow, some of which originates outside of basin.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	-	-	-	-	-	-	-	-	4.05	3.01	2.35	-
1960	3.91	4.09	16.1	12.4	18.2	21.6	26.2	9.13	7.11	4.40	3.84	3.29	10.8

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	-	-	-	-	-	-	-	-	0.49	0.37	0.28	-
1960	0.48	0.48	1.96	1.51	2.08	2.63	3.09	1.11	0.84	.54	.47	.39	15.58

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1707	-	-	-	-	-	-	-	-
1960	1707	354	Mar. 30, 1960	2.2	10.8	1.14	15.58	-	-

## 2402. Ninemile Creek at Camillus, N. Y.

Location.--Lat 43°02'20", long 76°18'30", on right bank 150 ft downstream from highway bridge on Main Street in Camillus, Onondaga County, 7 miles upstream from Onondaga Lake.

Drainage area.--87.6 sq mi.

Records available.--July 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 398.56 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge, 2,760 cfs Mar. 30, 1960 (gage height, 8.25 ft); minimum, 25 cfs Oct. 22, 1959; minimum gage height, 1.43 ft Aug. 29, 1960 (backwater from aquatic vegetation).

Remarks.--Flow regulated by Otisco Lake.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	77.7	51.0	57.2	-
1959	63.7	76.0	66.9	153	153	256	336	78.5	49.9	39.2	35.0	30.4	111
1960	37.4	53.0	152	162	241	277	320	115	84.0	44.0	42.4	38.6	130

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	1.02	0.67	0.73	-
1959	0.84	0.97	0.88	2.02	1.82	3.37	4.27	1.03	0.64	.52	.46	.39	17.21
1960	.49	.68	2.00	2.14	2.96	3.64	4.08	1.51	1.07	.56	.56	.49	20.20

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1557	-	-	-	-	-	-	-	-
1959	1627	2,040	Jan. 22, 1959	26	111	1.27	17.21	114	17.69
1960	1707	2,760	Mar. 30, 1960	26	130	1.48	20.20	-	-

## 2425. East Branch Fish Creek at Taberg, N. Y.

Location.--Lat 43°18'05", long 75°37'10", on left bank at downstream side of bridge on State Highway 69 at Taberg, Oneida County, just downstream from Furnace Creek, 2½ miles upstream from confluence of East and West Branches near Blossvale.

Drainage area.--189 sq mi.

Records available.--April 1923 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 491.12 ft above mean sea level, datum of 1929. Prior to Oct. 6, 1923, staff gage at same site and datum.

Average discharge.--37 years (1923-60), 545 cfs (unadjusted).

Extremes.--1923-60: Maximum discharge, 13,600 cfs Oct. 2, 1945 (gage height, 10.90 ft); minimum, 4.9 cfs Aug. 15, 1949.

Remarks.--Diurnal fluctuation at low flow caused by small power operations upstream and diversions from basin for water supply of cities of Rome and Oneida (since Oct. 26, 1926). Annual discharge adjusted for diversion for water supply of city of Rome.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	350	822	530	622	563	982	2,329	357	244	262	166	275	623
1952	238	628	812	640	441	583	1,835	765	204	230	87.5	116	547
1953	267	469	985	538	565	1,664	934	840	149	78.0	125	99.5	553
1954	72.1	265	632	300	1,108	961	2,103	632	330	64.1	79.2	235	559
1955	205	535	620	309	201	1,019	2,394	322	181	73.5	56.4	81.9	499
1956	803	610	371	182	169	403	1,905	1,244	315	264	137	395	566
1957	270	392	677	535	364	678	1,216	535	323	389	87.5	146	468
1958	165	359	1,228	419	221	356	1,083	503	538	317	279	664	509
1959	679	524	361	616	439	453	2,489	575	156	157	111	76.7	551
1960	664	1,099	812	375	538	275	2,734	517	297	90.6	50.5	49.7	621

Yearly discharge, in cubic feet per second, of East Branch Fish Creek at Taberg, N. Y.

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	573	593	42.62	
1951	1207	7,800	Mar. 31, 1951	63	623	641	3.39	46.04	621	640	45.93
1952	1237	7,110	Apr. 6, 1952	27	547	566	2.99	40.75	543	561	40.42
1953	1277	10,200	Dec. 11, 1952	8.0	553	571	3.02	41.01	498	516	37.08
1954	1337	8,790	Apr. 17, 1954	28	559	577	3.05	41.42	591	609	43.74
1955	1387	6,600	Apr. 15, 1955	18	499	517	2.74	37.11	535	552	39.67
1956	1437	5,510	Apr. 16, 1956	36	566	584	3.09	42.06	529	547	39.43
1957	1507	4,540	Jan. 23, 1957	29	468	489	2.59	35.09	501	521	37.42
1958	1557	10,500	Dec. 21, 1957	55	509	528	2.79	37.94	495	515	36.97
1959	1627	4,600	Apr. 20, 1959	26	551	571	3.02	41.01	635	655	47.04
1960	1707	5,170	Apr. 24, 1960	29	621	641	3.39	46.13	-	-	-

2435. Oneida Creek at Oneida, N. Y.

Location.--Lat 43°05'50", long 75°38'20", on right bank 70 ft upstream from bridge on State Highway 365A at Oneida, Madison County, and 500 ft downstream from Sconondoa Creek.

Drainage area.--112 sq mi.

Records available.--October 1949 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 409.33 ft above mean sea level (Corps of Engineers bench mark).

Average discharge.--11 years (1949-60), 158 cfs.

Extremes.--1949-60: Maximum discharge, 7,440 cfs Mar. 28, 1950 (gage height, 13.78 ft); maximum gage height, 14.30 ft Jan. 22, 1959 (backwater from ice); minimum discharge, 13 cfs Aug. 3, 6, Sept. 10, 1955; minimum gage height, 1.30 ft Aug. 3, 6, 1955.

Remarks.--Slight diurnal fluctuation at low flow caused by small mills above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	57.1	112	247	358	406	411	393	115	62.3	225	76.9	62.4	209
1952	51.9	161	211	281	169	355	214	128	58.2	55.4	23.0	19.5	144
1953	29.1	36.0	132	148	257	295	186	270	60.4	32.6	46.5	24.9	126
1954	29.7	35.7	60.5	102	314	202	271	216	75.3	27.1	25.3	31.1	114
1955	30.5	164	304	171	180	582	255	77.2	38.3	28.2	22.5	20.4	156
1956	128	157	141	82.7	154	460	596	171	96.7	55.3	33.7	50.7	177
1957	38.7	44.7	155	173	132	199	191	94.9	48.8	54.5	191	37.5	113
1958	34.1	56.0	172	145	146	378	526	236	207	85.1	43.8	74.7	175
1959	116	167	136	332	232	379	368	93.1	66.6	34.0	28.8	23.6	164
1960	76.5	233	289	199	287	323	501	194	99.0	39.0	38.6	39.6	193

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.59	1.11	2.54	3.69	3.77	4.23	3.92	1.18	0.62	2.32	0.79	0.62	25.38
1952	.53	1.60	2.17	2.89	1.63	3.65	2.13	1.31	.58	.57	.24	.19	17.49
1953	.30	.36	1.36	1.52	2.39	3.04	1.86	2.78	.60	.34	.48	.25	15.28
1954	.31	.36	.62	1.05	2.92	2.08	2.70	2.22	.75	.28	.26	.31	13.86
1955	.31	1.64	3.13	1.76	1.67	5.99	2.54	.79	.38	.29	.23	.20	18.93
1956	1.32	1.56	1.45	.85	1.49	4.73	5.94	1.76	.96	.57	.35	.51	21.49
1957	.40	.44	1.59	1.78	1.23	2.03	1.90	.98	.49	.56	.37	.37	13.74
1958	.55	.56	1.77	1.49	1.36	3.89	5.24	2.43	2.06	.88	.45	.74	21.22
1959	1.19	1.66	1.40	3.41	2.16	3.91	3.67	.96	.66	.35	.30	.23	19.90
1960	.79	2.32	2.97	2.05	2.76	3.33	5.00	2.00	.99	.40	.40	.39	23.40

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	183	22.14
1951	1207	5,270	July 18, 1951	34	209	1.87	25.38	210	25.44
1952	1237	3,020	Mar. 11, 1952	16	144	1.29	17.49	125	15.21
1953	1277	1,880	Dec. 11, 1952	17	126	1.12	15.28	120	14.55
1954	1337	1,960	Feb. 17, 1954	16	114	1.02	13.66	146	17.65
1955	1387	3,000	Mar. 11, 1955	15	156	1.39	18.93	150	18.18
1956	1437	4,440	Apr. 4, 1956	20	177	1.58	21.49	161	19.59
1957	1507	6,480	Aug. 4, 1957	18	113	1.01	13.74	115	13.99
1958	1557	2,020	June 2, 1958	25	175	1.56	21.22	189	22.79
1959	1627	6,500	Jan. 22, 1959	19	164	1.46	19.90	179	21.73
1960	1707	5,130	Mar. 30, 1960	22	193	1.72	23.40	-	-

## 2440. Chittenango Creek near Chittenango, N. Y.

Location.--Lat 43°01'25", long 75°51'30", on right bank at upstream side of county highway bridge, 50 ft west of State Highway 13, 1.6 miles south of Chittenango, Madison County, 12 miles upstream from Butternut Creek, and 23 miles upstream from mouth.

Drainage area.--67.7 sq mi.

Records available.--August 1950 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 489.54 ft above mean sea level, datum of 1929.

Average discharge.--10 years (1950-60), 116 cfs.

Extremes.--1950-60: Maximum discharge, 2,690 cfs Feb. 11, 1960 (gage height, 6.54 ft); maximum gage height, 7.18 ft Apr. 4, 1956; minimum discharge, 9.8 cfs Oct. 11, 1953; minimum gage height, 1.265 ft Oct. 15, 1952.  
Flood of Mar. 29, 1950, reached a stage of 6.8 ft (backwater from debris present), from floodmarks (discharge, 2,760 cfs, by slope-area method).

Remarks.--Flow regulated by storage in Cazenovia Lake and Erieville Reservoir.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1950	-	-	-	-	-	-	-	-	-	-	-	-	-
1951	46.1	93.3	183	253	284	286	299	96.4	38.9	95.5	63.2	38.4	147
1952	31.3	133	158	201	142	249	184	103	53.8	50.5	21.3	25.6	113
1953	21.6	40.5	91.1	114	176	245	149	156	54.0	30.9	28.9	15.6	93.3
1954	26.6	36.3	51.5	73.7	201	156	167	158	65.2	24.3	17.4	27.5	82.9
1955	18.2	109	195	144	111	380	191	52.7	36.2	22.1	17.2	18.6	108
1956	72.4	102	110	68.9	101	297	474	142	80.9	42.2	28.8	49.8	130
1957	36.1	43.6	131	143	141	173	118	67.6	52.7	43.2	112	29.2	90.8
1958	24.2	41.1	115	88.9	92.3	176	577	206	232	96.4	38.2	64.7	145
1959	93.6	121	97.1	187	148	223	319	65.9	46.2	30.1	26.8	22.0	114
1960	64.5	186	234	156	210	200	332	112	68.8	27.6	44.6	39.6	139

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	1207	-	-	-	-	-	-	-	-
1951	1207	2,600	July 28, 1951	22	147	2.17	29.53	147	29.49
1952	1237	1,300	Mar. 11, 1952	14	113	1.67	22.67	98.7	19.85
1953	1277	1,070	Feb. 21, 1953	14	93.3	1.38	18.70	90.0	18.04
1954	1337	1,200	Feb. 17, 1954	10	82.9	1.22	16.63	100	20.13
1955	1387	1,770	Mar. 11, 1955	12	108	1.60	21.69	105	21.05
1956	1437	2,630	Apr. 4, 1956	16	130	1.92	26.22	124	25.00
1957	1507	2,400	Aug. 3, 1957	21	90.8	1.34	18.21	88.2	17.68
1958	1557	2,110	June 1, 1958	20	145	2.14	29.17	156	31.36
1959	1627	2,290	Jan. 22, 1959	17	114	1.68	22.95	129	25.85
1960	1707	2,690	Feb. 11, 1960	18	139	2.05	27.95	-	-

Note.--Monthly figures of discharge per square mile and runoff in inches, previously published in water-supply papers, do not represent natural runoff because of storage above station. These figures are not published herein.

## 2448. Butternut Creek near Jamesville, N. Y.

Location.--Lat 42°56'05", long 76°03'45", on left bank 15 ft downstream from highway bridge on Walberger Road near Jamesville, Onondaga County, 125 ft downstream from unnamed tributary, and 2.2 miles upstream from Jamesville Reservoir.

Drainage area.--32.7 sq mi.

Records available.--Occasional low-flow measurements, water years 1956-58. July 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 717.93 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge, 1,200 cfs Mar. 30, 1960; maximum gage height, 6.22 ft Jan. 21, 1959 (ice jam); minimum discharge, 2.0 cfs Sept. 27, 1959 (gage height, 2.26 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	33.3	13.8	20.8	-
1959	27.0	43.1	35.7	80.1	59.2	106	123	27.0	13.6	8.72	6.39	4.46	44.2
1960	15.2	43.1	98.4	55.2	91.9	88.3	141	44.9	31.2	10.3	13.2	10.3	53.4

Monthly and yearly runoff, in inches, of Butternut Creek near Jamesville, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	1.17	0.49	0.70	-	-
1959	0.95	1.47	1.19	2.82	1.89	3.74	4.19	0.95	0.46	.31	.23	.15	18.35
1960	.53	1.47	3.47	1.95	3.03	3.11	4.83	1.58	1.06	.56	.47	.35	22.22

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1958	1557	-	-	-	-	-	-	-	-	-	-
1959	1627	1,190	Jan. 22, 1959	3.0	44.2	1.35	18.55	48.7	20.21	-	-
1960	1707	1,200	Mar. 30, 1960	6.2	53.4	1.63	22.22	-	-	-	-

2450. Limestone Creek at Fayetteville, N. Y.

Location.--Lat 43°01'45", long 76°00'50", on left bank 100 ft downstream from Genesee Street Bridge at Fayetteville, Onondaga County, and 8 miles upstream from mouth.

Drainage area.--85.7 sq mi, not including 15.7 sq mi of Middle Branch Tioughnioga Creek basin, flow from which may be completely diverted into Limestone Creek basin through DeRuyter Reservoir.

Records available.--November 1939 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 427.62 ft above mean sea level (levels by Corps of Engineers).

Average discharge.--20 years (1940-60), 141 cfs.

Extremes.--1939-60: Maximum discharge, 7,010 cfs Mar. 28, 1950 (gage height, 7.78 ft), from rating curve extended above 3,500 cfs by logarithmic plotting; minimum, 12 cfs Oct. 4, 1953; minimum gage height, 1.23 ft Aug. 20, 1949.

Remarks.--Canal diverts from Limestone Creek 3 miles above station and returns water to creek 400 ft above station. Flow regulated by DeRuyter Reservoir.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	52.1	105	279	308	350	341	309	109	51.5	111	65.1	47.0	176
1952	41.3	115	179	260	163	318	177	142	66.5	58.4	30.3	24.0	131
1953	31.6	43.4	111	138	214	259	162	179	55.5	36.3	36.9	24.0	107
1954	27.3	32.5	51.5	97.9	267	181	244	186	72.7	27.9	21.5	26.0	102
1955	27.9	87.0	229	137	151	476	186	67.4	51.2	31.6	26.0	26.9	125
1956	65.3	107	123	79.1	158	413	519	172	95.7	49.3	34.6	49.6	155
1957	42.7	57.1	172	191	156	204	152	69.2	53.5	59.8	142	38.9	113
1958	38.6	60.9	126	97.6	102	325	498	210	249	112	44.4	65.5	161
1959	89.3	133	114	243	164	311	295	79.3	48.0	27.9	20.7	24.5	129
1960	57.6	172	281	162	306	317	365	145	112	40.2	56.8	42.8	171

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	\$0.70	\$1.56	\$3.76	\$4.15	\$4.26	\$4.58	\$4.02	\$1.47	\$0.67	\$1.49	\$0.88	\$0.61	27.95
1952	\$0.56	\$1.49	\$2.40	\$3.50	\$2.05	\$4.27	\$2.30	\$1.91	\$0.87	\$0.79	\$0.41	\$0.31	20.86
1953	\$0.43	\$0.56	\$1.50	\$1.85	\$2.59	\$3.48	\$2.11	\$2.40	\$0.72	\$0.49	\$0.50	\$0.31	16.94
1954	\$0.37	\$0.42	\$0.69	\$1.32	\$3.24	\$2.43	\$3.18	\$2.50	\$0.95	\$0.38	\$0.29	\$0.34	16.11
1955	\$0.38	\$1.13	\$3.08	\$1.85	\$1.84	\$6.41	\$2.42	\$0.91	\$0.67	\$0.43	\$0.35	\$0.35	19.82
1956	.88	1.40	1.66	1.06	1.98	5.55	6.75	2.31	1.25	.66	.47	.65	24.62
1957	.57	.74	2.31	2.57	1.90	2.74	1.97	1.20	.70	.80	1.91	.51	17.92
1958	.52	.79	1.70	1.31	1.24	4.57	6.48	2.82	3.24	1.50	.60	.85	25.42
1959	1.20	1.73	1.53	3.27	2.00	4.18	3.84	1.07	.62	.38	.28	.32	20.42
1960	.77	2.24	3.78	2.18	3.85	4.26	4.75	1.96	1.46	.54	.76	.56	27.11

\* Not previously published.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	-	-
1951	1207	2,460	Feb. 21, 1951	30	-	2.05	27.95	161	25.55	-	-
1952	1237	2,570	Mar. 11, 1952	22	131	1.53	20.86	168	26.58	-	-
1953	1277	1,180	Feb. 21, 1953	22	107	1.25	16.94	101	15.93	-	-
1954	1337	2,010	Feb. 17, 1954	18	102	1.19	16.11	121	19.22	-	-
1955	1387	2,190	Mar. 1, 1955	21	125	1.46	19.82	121	19.17	-	-
1956	1437	3,990	Apr. 4, 1956	25	155	1.81	24.62	153	24.30	-	-
1957	1507	3,800	Aug. 4, 1957	22	113	1.32	17.92	109	17.31	-	-
1958	1557	2,260	June 1, 1958	27	161	1.88	25.42	170	26.87	-	-
1959	1627	4,030	Jan. 22, 1959	16	129	1.51	20.42	144	22.75	-	-
1960	1707	6,060	Mar. 30, 1960	30	171	2.00	27.11	-	-	-	-

## 2465. Oneida River at Caughdenoy, N. Y.

Location.--Lat 43°14'45", long 76°10'15", on left bank at point of diversion to New York State Erie (Barge) Canal, 1.6 miles downstream from Oneida Lake and 2.6 miles up-stream from Caughdenoy, Oswego County.

Drainage area.--1,377 sq mi; at site used 1902-9, 1,433 sq mi (revised).

Records available.--September 1902 to December 1909 (published as "near Euclid"), January 1910 to December 1912, October 1947 to September 1960. Records for calendar year 1913, published in WSP 354 are not published in WSP 1307 since they do not include unknown diversion through lock 23 on landline cutoff.

Gage.--Water-stage recorder. Datum of gage is 362.00 ft above mean sea level, New York State Erie (Barge) Canal bench mark. Prior to June 5, 1907, headwater readings and June 5, 1907, to Dec. 31, 1909, staff-gage readings at Oak Orchard State Dam, at different datum. Jan. 1, 1910, to Dec. 31, 1912, staff gage at site 2.5 miles downstream at different datum. Oct. 9, 1947, to Nov. 7, 1951, water-stage recorder at site 2.5 miles downstream at different datum; since Nov. 7, 1951, used as auxiliary gage. Since Nov. 9, 1951, auxiliary water-stage recorder 2.6 miles downstream and 180 ft downstream from navigation dam of New York State Erie (Barge) Canal.

Average discharge.--23 years (1902-12, 1947-60), 2,586 cfs.

Extremes.--1947-60: Maximum daily discharge, 9,160 cfs Apr. 7, 1950; minimum daily, 62 cfs July 29, 1950.

Remarks.--Jan. 1, 1910, to Dec. 31, 1912: Flow over dam computed on basis of coefficient determined for model of dam of same general type; flow through gate and diversion through lock culverts estimated by theoretical calculations.

1947-60: Record represents total discharge at Caughdenoy, including flow in Oneida and Erie (Barge) Canals. A large amount of natural storage by Oneida Lake. Considerable seasonal regulation by operation of gates in Oneida and Erie (Barge) Canals. Occasional large diurnal fluctuations caused by seiche in Oneida Lake. Water may be diverted into or received from Mohawk River basin through summit level of Erie (Barge) Canal between New London and Utica. Nearly all of flow from 16 sq mi of the Tioh-nioga River basin may be diverted into DeRuyter Reservoir, in Oswego River basin. Records of chemical analyses and water temperatures for the period October 1957 to September 1958 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1,137	2,087	3,992	4,567	4,442	5,888	6,554	3,206	1,129	2,298	1,197	1,141	3,130
1952	1,231	2,543	3,740	3,854	3,763	3,416	5,158	2,267	1,335	1,275	288	343	2,428
1953	939	1,348	3,746	2,499	2,853	3,577	3,590	4,040	520	557	566	660	2,073
1954	526	4,400	2,784	1,764	2,987	4,460	5,603	4,148	1,335	586	198	605	2,109
1955	1,032	2,290	3,965	3,492	1,873	5,681	6,540	1,302	1,373	448	277	231	2,577
1956	2,531	3,174	3,072	1,844	1,658	3,747	6,496	4,143	1,651	580	802	2,038	2,642
1957	1,039	1,200	3,765	2,715	2,417	3,202	2,511	1,882	901	1,188	1,439	186	1,873
1958	519	1,273	3,501	2,955	2,244	2,990	4,615	2,928	2,976	1,336	882	2,467	2,587
1959	1,567	2,752	3,945	2,670	3,365	3,341	6,950	2,791	832	954	237	380	2,472
1960	2,143	3,550	5,423	3,645	3,316	2,661	7,410	3,661	1,237	817	487	397	2,690

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.95	1.69	3.34	3.82	3.36	4.93	5.31	2.68	0.91	1.92	1.00	0.92	30.83
1952	1.03	2.06	3.13	3.23	2.95	2.86	4.18	1.90	1.08	1.07	.24	.28	24.01
1953	.79	1.09	3.14	2.09	2.14	2.99	2.91	3.38	.42	.47	.47	.53	20.42
1954	.44	.32	2.31	1.48	2.26	3.73	4.54	3.47	1.08	.49	.17	.49	20.78
1955	.86	1.86	3.32	2.92	1.42	4.76	5.30	1.09	1.11	.38	.23	.19	23.44
1956	2.12	2.57	2.57	1.54	1.30	3.14	5.26	3.47	1.34	.49	.67	1.65	26.12
1957	.87	.97	3.15	2.27	1.83	2.68	2.03	1.58	.74	.99	1.20	.15	18.46
1958	.43	1.03	2.93	2.47	1.70	2.50	3.74	2.45	2.41	1.12	.74	2.00	23.52
1959	1.31	2.23	3.30	2.24	2.54	2.80	5.63	2.34	.67	.80	.20	.31	24.37
1960	1.79	2.88	4.54	3.05	2.60	2.23	6.00	3.07	1.00	.68	.41	.32	28.57

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Maximum day		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	2,758	27.19
1951	1207	8,730	Apr. 5, 7, 1951	104	3,130	2.27	30.83	3,154	31.07		
1952	1237	6,490	Apr. 13, 1952	143	2,428	1.76	24.01	2,306	22.81		
1953	1277	6,710	May 5, 1953	251	2,073	1.51	20.42	1,876	18.47		
1954	1337	6,750	Apr. 19, 1954	184	2,109	1.53	20.78	2,409	23.75		
1955	1387	7,800	Mar. 26, 1955	198	2,377	1.73	23.44	2,501	24.66		
1956	1437	8,120	Apr. 18, 1956	187	2,642	1.92	26.12	2,413	23.85		
1957	1507	4,900	Dec. 5, 1956	159	1,873	1.36	18.46	1,812	17.86		
1958	1557	5,640	Apr. 11, 1958	151	2,387	1.73	23.52	2,635	25.97		
1959	1627	8,360	Apr. 11, 1959	170	2,472	1.80	24.37	2,712	26.74		
1960	1707	8,580	Apr. 7, 1960	345	2,890	2.10	28.57	-	-		



## 2490. Oswego River at lock 7, Oswego, N. Y.

Location.--Lat 43°27'00", long 76°30'25", on right bank at lock 7 in Oswego, Oswego County, three-quarters of a mile upstream from mouth.

Drainage area.--5,181 sq mi.

Records available.--October 1900 to April 1906, October 1933 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Prior to January 1904, published as "above Minetto" or "near Minetto." January 1904 to April 1906, published as "at Battle Island." Records for April 1897 to September 1900, published in WSP 65 and for October 1927 to September 1928 published in WSP 664, have been found to be unreliable and should not be used.

Gage.--Water-stage recorder. Datum of gage is 246.00 ft above mean sea level, New York State Oswego (Barge) Canal datum. Prior to 1933, staff gage at site about 6 miles upstream at different datum.

Average discharge.--27 years (1933-60), 6,473 cfs.

Extremes.--1933-60: Maximum discharge, 37,500 cfs Mar. 28, 1936, includes mean daily discharge of canals; maximum gage height, 13.46 ft Apr. 10, 1940; minimum discharge (river only), 30 cfs Nov. 6, 1944; minimum daily, 353 cfs Aug. 14, 1949; minimum gage height, 0.97 ft Aug. 24, 1934.

Remarks.--This record represents total discharge at Oswego and includes flow in Hydraulic and Oswego (Barge) Canals. Prior to 1933, flow in Oswego (Barge) Canal not included. A large amount of natural storage and some artificial regulation is afforded by the many large lakes and the Erie (Barge) and Oswego (Barge) Canal systems in the river basin. Large diurnal fluctuations at low and medium flow by powerplants above station. Oswego River basin receives water from Erie (Barge) Canal through lock 32 near Pittsford. Water may be diverted into or received from Mohawk River basin through summit level of Erie (Barge) Canal between New London and Utica. During part of year entire flow from 45 sq mi of Mud Creek drainage area may be diverted from Chemung River basin into Lake Keuka in Oswego River basin. Nearly all of flow from 16 sq mi of the Tiohgnioiga River basin may be diverted into DeRuyter Reservoir, in Oswego River basin. Records of chemical analyses and water temperatures for the period October 1955 to September 1958 are published in reports of the Geological Survey (Oswego River at lock 5, Minetto, N. Y.)

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	4,137	6,573	14,510	13,600	13,670	18,230	16,490	6,704	3,930	5,210	2,785	2,485	9,007
1952	2,673	4,692	6,958	10,080	10,920	12,830	11,430	6,381	4,265	3,081	1,594	1,902	6,386
1953	2,228	2,310	7,375	6,667	8,051	9,210	8,417	9,492	2,862	1,768	2,132	1,967	5,199
1954	1,689	1,787	5,121	3,066	6,968	9,805	11,940	11,050	4,045	1,894	1,453	1,866	5,045
1955	2,051	4,282	8,478	9,897	5,494	19,020	12,570	2,794	2,865	1,733	1,510	1,578	6,037
1956	7,929	11,360	8,236	6,148	7,162	18,920	21,000	12,560	4,223	2,355	2,448	4,454	8,894
1957	2,716	3,340	8,207	8,071	6,799	10,070	7,925	5,564	3,663	3,767	3,506	1,869	5,461
1958	1,496	2,210	5,428	5,670	5,591	11,120	16,533	9,338	8,464	4,655	3,176	4,583	6,514
1959	4,057	7,111	8,985	7,702	9,851	13,720	16,680	4,918	2,194	2,789	1,893	1,994	6,796
1960	4,215	7,143	14,250	13,430	11,890	8,708	21,230	9,126	6,617	2,704	1,633	1,592	8,536

† Corrected.

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.93	1.43	3.27	3.06	2.78	4.10	3.59	1.51	0.66	1.17	0.63	0.54	23.87
1952	.60	1.02	1.57	2.27	2.30	2.89	2.49	1.44	.93	.69	.36	.41	16.97
1953	.50	.50	1.66	1.50	1.64	2.07	1.83	2.14	.62	.40	.48	.43	13.77
1954	.38	.39	1.15	.69	1.42	2.21	2.60	2.49	.88	.43	.33	.41	13.38
1955	.46	.93	1.91	2.23	1.12	4.28	2.74	.63	.63	.39	.34	.34	16.00
1956	1.78	2.47	1.85	1.38	1.51	4.26	4.57	2.83	.92	.53	.55	.97	23.62
1957	.61	.73	1.85	1.82	1.38	2.27	1.73	1.25	.80	.85	.79	.41	14.49
1958	.34	.48	1.22	1.28	1.14	2.50	3.60	2.10	1.84	1.05	.71	1.00	17.26
1959	.91	1.55	2.02	1.73	2.00	3.09	3.63	1.11	.48	.63	.43	.43	18.01
1960	.95	1.56	3.21	3.02	2.50	1.96	4.62	2.05	1.44	.61	.41	.35	22.68

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	7,555	-	20.03
1951	1207	23,500	Feb. 22, 1951	1,300	9,007	1.76	23.87	8,087	21.43	
1952	1237	18,700	Mar. 12, 1952	540	6,386	1.25	16.97	6,188	16.44	
1953	1277	18,000	Mar. 28, 1953	560	5,199	1.02	13.77	4,919	13.03	
1954	1337	20,000	May 9, 1954	360	5,045	.985	13.38	5,566	14.76	
1955	1387	23,600	Mar. 23, 1955	440	6,037	1.18	16.00	7,097	18.80	
1956	1437	26,800	Mar. 12, 1956	875	8,894	1.74	23.62	7,814	20.71	
1957	1507	15,200	Mar. 15, 1957	827	5,461	1.07	14.49	5,028	13.34	
1958	1557	19,100	Apr. 23, 1958	445	6,514	1.27	17.26	7,437	19.70	
1959	1627	23,100	Apr. 6, 1959	873	6,796	1.33	18.01	7,259	19.25	
1960	1707	31,200	Apr. 4, 1960	707	8,536	1.67	22.68	-	-	

## 2507.5. Sandy Creek near Adams, N. Y.

Location.--Lat 43°48'48", long 76°04'30", on left bank 250 ft upstream from highway bridge, a quarter of a mile downstream from unnamed tributary, 2½ miles downstream from Adams, Jefferson County, and 10 miles upstream from mouth.

Drainage area.--128 sq mi.

Records available.--August 1957 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 523.71 ft above mean sea level, datum of 1929.

Extremes.--1957-60: Maximum discharge, 6,100 cfs Apr. 2, 1959 (gage height, 9.40 ft); minimum, 1.8 cfs Sept. 11, 1960; minimum daily, 2.2 cfs Sept. 7, 11, 1960.

Remarks.--Diurnal fluctuation at low flow caused by mills above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	-	-	-	-	59.9	-
1958	40.8	299	594	180	112	375	449	181	114	102	150	367	247
1959	257	225	141	411	266	366	1,054	180	59.6	58.0	46.2	12.0	272
1960	105	374	469	176	440	345	1,006	168	196	29.4	10.0	3.96	275

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	-	-	-	-	0.61	-
1958	0.37	2.61	5.35	1.62	0.91	3.38	3.92	1.63	1.00	0.92	1.35	3.20	26.26
1959	2.31	1.96	1.27	3.70	2.16	5.10	9.19	1.62	.52	.52	.42	.10	28.87
1960	.95	3.26	4.23	1.58	3.71	3.11	8.77	1.52	1.71	.26	.09	.03	29.22

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1957	1557	-	-	-	-	-	-	-	-
1958	1557	4,350	Dec. 21, 1957	18	247	1.93	26.26	221	23.47
1959	1627	6,100	Apr. 2, 1959	4.7	272	2.12	28.87	300	31.77
1960	1707	6,040	Mar. 31, 1960	2.2	275	2.15	29.22	-	-

## 2520. Black River Canal (flowing south) near Boonville, N. Y.

Location.--Lat 43°27'20", long 75°19'25", on left bank at lock 69, 200 ft downstream from bridge on State Highway 46 and 2 miles south of Boonville, Oneida County.

Records available.--September 1915 to September 1960 (canal seasons only prior to October 1942 and since October 1957).

Gage.--Water-stage recorder and concrete control. Datum of gage is 1,105.56 ft above mean sea level, datum of 1929. Prior to June 7, 1929, station was operated as a slope station on summit level of canal. Auxiliary water-stage recorder with concrete control on right bank of Lansingkill spillway, 100 ft downstream from spillway headgates, 600 ft upstream from lock 70, and half a mile upstream from lock 69.

Extremes.--1915-60: Maximum daily discharge recorded, 323 cfs Nov. 30, 1915; practically no flow at times when no water is being diverted.

Remarks.--This record shows combined flow in Black River Canal and Lansingkill spillway, and represents total diversion from Black River at Forestport, through Forestport feeder, into Mohawk River basin. Discharge during periods when no water was diverted, made up of leakage through headgates and runoff from area draining into canal above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	43.2	53.7	0.33	0.30	0.36	0.77	12.5	49.8	16.8	26.2	51.4	73.7	27.5
1952	62.4	45.6	9.36	2.78	2.35	2.65	2.93	38.3	32.4	33.1	37.0	65.4	27.9
1953	56.9	55.4	9.28	2.58	2.61	3.11	3.31	4.94	34.1	40.7	49.4	41.8	25.7
1954	54.7	72.0	10.1	2.25	3.19	2.51	9.93	.86	1.75	26.2	45.3	62.7	24.3
1955	57.4	18.6	1.08	.65	.73	2.45	1.32	37.2	66.1	59.1	33.6	50.1	27.5
1956	48.3	1.00	.38	.20	.43	1.22	1.51	2.82	2.40	3.05	2.99	6.17	5.94
1957	2.04	1.78	.24	.30	.14	.23	.62	.91	39.8	14.7	7.29	2.21	5.84
1958	1.41	4.05	8.09	-	-	-	2.31	22.8	8.30	7.01	3.90	2.35	-
1959	1.99	1.35	-	-	-	-	2.91	24.7	3.16	7.93	3.02	14.5	-
1960	8.46	.91	-	-	-	-	-	1.15	1.76	.54	3.89	10.2	-

## 2525. Black River near Boonville, N. Y.

Location.--Lat 43°30'35", long 75°18'25", on left bank at downstream side of county highway bridge, three-quarters of a mile upstream from Sugar River and 2 miles northeast of Boonville, Oneida County.

Drainage area.--295 sq mi.

Records available.--January 1911 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 935.50 ft above mean sea level, datum of 1929. Prior to Sept. 27, 1933, chain and staff gages at same site and datum.

Average discharge.--49 years (1911-60), 684 cfs.

Extremes.--1911-60: Maximum discharge, 12,400 cfs Mar. 28, 1913 (gage height, about 12.5 ft, from floodmarks); minimum observed, about 5 cfs Aug. 26, 1918 (gage height, 2.40 ft); minimum daily, 7 cfs Aug. 26, 1918.

Remarks.--Flow slightly regulated by several headwater reservoirs. Forestport feeder diverts water from State Pond at Forestport. That portion of diverted water which does not pass down Black River Canal (flowing south) returns to Black River below station through Mill Creek sluiceway.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	348	922	754	653	753	1,034	2,826	702	560	629	295	290	810
1952	245	809	1,085	893	687	823	2,472	938	392	517	305	223	781
1953	289	406	812	638	720	1,762	1,247	1,202	286	180	298	256	676
1954	171	301	709	461	1,204	1,178	2,171	861	631	200	194	333	697
1955	274	572	671	444	308	1,217	2,791	640	434	204	144	162	654
1956	509	685	398	275	288	426	2,002	1,459	813	348	217	827	685
1957	486	532	761	746	483	876	1,169	882	511	690	174	232	630
1958	281	498	1,314	481	321	435	1,404	686	675	355	248	496	600
1959	758	646	349	749	624	575	2,556	849	429	350	266	210	695
1960	949	1,480	1,129	673	722	432	2,704	689	450	274	187	208	821

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	757	34.85
1951	1207	7,190	Mar. 31, 1951	132	810	2.75	37.30	821	37.76
1952	1237	5,870	Apr. 6, 1952	140	781	2.65	36.03	728	33.61
1953	1277	6,740	Mar. 25, 1953	122	676	2.29	31.08	648	29.82
1954	1337	6,220	Apr. 18, 1954	110	697	2.36	32.07	725	33.34
1955	1387	5,940	Apr. 16, 1955	115	654	2.22	30.10	660	30.39
1956	1437	5,600	May 31, 1956	138	685	2.32	31.63	701	32.38
1957	1507	3,100	Jan. 25, 1957	114	630	2.14	29.00	657	30.22
1958	1557	8,900	Dec. 21, 1957	170	600	2.03	27.60	571	26.26
1959	1627	4,110	Apr. 20, 1959	152	695	2.36	31.96	846	38.91
1960	1707	6,370	Nov. 7, 1959	138	821	2.78	37.89	-	-

Note.--Monthly figures of discharge per square mile and runoff in inches, previously published in water-supply papers, do not represent natural flow because of diversion through Forestport feeder to Black River Canal (flowing south) and storage above station. These figures are not published herein.

## 2535. Middle Branch Moose River at Old Forge, N. Y.

Location.--Lat 43°42'50", long 74°58'10", on left bank in Old Forge, Herkimer County, 300 ft downstream from bridge on State Highway 28, 400 ft downstream from State dam, and  $1\frac{1}{4}$  miles upstream from North Branch Moose River.

Drainage area.--52.1 sq mi.

Records available.--October 1911 to September 1960. Monthly discharge only for October 1911, published in WSP 1307.

Gage.--Staff gage. Datum of gage is 1,690.63 ft above mean sea level, datum of 1929.

Average discharge.--49 years (1911-60), 105 cfs.

Extremes.--1911-60: Maximum daily discharge, 862 cfs Mar. 23, 1921, from rating curve extended above 450 cfs by logarithmic plotting; minimum daily, 0.1 cfs many times when gates in dam were closed.

Remarks.--Flow regulated by Fulton Chain of Lakes since about 1880.

Monthly and yearly mean discharge, in cubic feet per second, of Middle Branch Moose River at Old Forge, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	213	38.4	56.2	71.8	237	124	198	73.7	58.3	99.6	38.7	194	116
1952	169	11.7	73.7	121	174	208	27.9	119	61.3	41.0	29.3	154	99.2
1953	165	62.3	56.1	76.1	147	147	104	212	32.1	22.3	93.5	207	110
1954	214	84.1	9.92	9.74	73.4	186	186	155	81.3	29.5	23.7	126	98.1
1955	256	111	72.2	159	102	108	24.3	68.8	90.9	28.9	22.0	168	103
1956	111	19.5	176	140	105	75.9	78.7	1.24	85.8	77.1	21.3	99.8	82.6
1957	130	142	32.5	147	179	153	8.52	72.5	72.5	64.3	18.2	209	102
1958	191	55.5	7.19	82.2	201	187	17.7	10.2	87.9	52.1	41.7	129	87.7
1959	146	115	180	150	143	244	141	57.5	51.0	32.8	39.8	149	121
1960	61.9	198	183	220	228	180	125	76.8	82.5	43.8	21.1	98.3	126

Yearly discharge, in cubic feet per second

Daily discharge, in cubic feet per second									
Year	WSP	Water year ending Sept. 30					Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	109	28.43
1951	1207	-	-	13	116	2.23	30.23	111	29.07
1952	1237	-	-	9.9	99.2	1.91	25.96	101	26.53
1953	1277	-	-	19	110	2.12	28.72	112	29.28
1954	1337	-	-	5.7	98.1	1.89	25.61	109	28.51
1955	1387	-	-	11	103	1.98	26.78	91.6	23.90
1956	1437	-	-	.3	82.6	1.59	21.62	82.1	21.47
1957	1507	-	-	7.9	102	1.96	26.53	97.6	25.47
1958	1557	-	-	4.1	87.7	1.69	22.91	104	27.03
1959	1627	-	-	12	121	2.33	31.51	121	31.50
1960	1707	-	-	10	126	2.42	32.99	-	-

2540. Middle Branch Moose River near McKeever, N. Y.

Location.--Lat 43°37'45", long 74°04'55", on right bank half a mile upstream from confluence with South Branch and 1½ miles northeast of McKeever, Herkimer County.

Drainage area.--148 sq mi.

Records available.--October 1925 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,530.29 ft above mean sea level, datum of 1929.

Average discharge.--35 years (1925-60), 327 cfs.

Extremes.--1925-60: Maximum discharge, 2,100 cfs Apr. 27, 1926 (gage height, 6.6 ft); maximum gage height, 7.51 ft Dec. 22, 1958 (backwater from ice); minimum discharge, 27 cfs Aug. 18, 1946 (gage height, 1.73 ft).

Remarks.--Flow regulated to some extent by Fulton Chain of Lakes since about 1880.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	305	298	306	267	445	381	1,033	322	169	291	140	297	353
1952	280	265	388	371	361	375	681	393	228	203	93.6	214	321
1953	265	224	335	299	382	602	532	646	151	73.5	194	279	332
1954	291	173	283	131	476	528	969	539	294	95.2	76.0	191	334
1955	326	255	246	276	166	447	865	272	259	72.1	64.9	211	288
1956	216	207	307	229	183	194	554	634	317	253	75.3	267	286
1957	250	303	275	348	302	393	404	389	223	212	76.8	274	287
1958	256	220	378	278	308	265	452	290	341	174	154	386	291
1959	384	321	330	372	250	321	931	421	200	113	97.2	203	326
1960	351	620	545	427	369	232	981	346	252	143	92.7	157	375

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	319	29.30
1951	1207	1,420	Apr. 16, 1951	88	353	2.39	32.36	355	32.55
1952	1237	1,030	Apr. 9, 1952	77	321	2.17	29.47	311	28.63
1953	1277	1,350	Mar. 28, 1953	57	332	2.24	30.44	324	29.70
1954	1337	1,380	Feb. 23, 1954	62	334	2.26	30.60	342	31.36
1955	1387	1,520	Apr. 17, 1955	53	288	1.95	26.43	280	25.68
1956	1437	1,360	May 2, 1956	63	286	1.93	26.34	294	27.09
1957	1507	929	May 24, 1957	54	287	1.94	26.34	289	26.55
1958	1557	892	Sept. 21, 1958	86	291	1.97	26.71	306	28.09
1959	1627	1,340	Apr. 19, 1959	63	328	2.22	30.12	368	33.78
1960	1707	1,560	Apr. 18, 1960	66	375	2.53	34.49	-	-

## 2545. Moose River at McKeever, N. Y.

Location.--Lat 43°36'40", long 75°06'35", on left bank half a mile west of McKeever, Herkimer County, and 2 miles downstream from confluence of Middle and South Branches.

Drainage area.--365 sq mi.

Records available.--June 1900 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Published as "at Moose River" prior to October 1922.

Gage.--Water-stage recorder. Datum of gage is 1,479.92 ft above mean sea level, datum of 1929. June 5, 1900, to Dec. 31, 1922, staff gage at site 2½ miles downstream at various datums. May 28 to Nov. 2, 1922, staff gage at present site at datum 1 ft higher.

Average discharge.--55 years (1905-60), 830 cfs.

Extremes.--1900-60: Maximum discharge, 18,700 cfs June 3, 1947 (gage height, 17.45 ft, from floodmark), result of failure of dam; minimum, about 42 cfs July 21, 23, 25-27, 1913.

Remarks.--Flow regulated to some extent by Fulton Chain of Lakes since 1880.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	544	1,110	835	673	932	1,019	3,258	838	457	728	303	486	928
1952	441	946	1,153	1,060	834	811	2,643	1,029	489	435	201	290	859
1953	436	597	1,047	698	925	1,940	1,620	1,620	327	184	476	429	859
1954	411	422	929	364	1,356	1,237	2,862	1,227	741	185	143	423	851
1955	481	692	593	523	302	1,157	3,001	713	697	172	161	298	731
1956	691	747	543	360	305	358	1,945	1,773	687	475	147	722	729
1957	496	661	791	803	547	823	1,352	1,060	595	527	143	382	680
1958	323	600	1,720	548	493	449	1,900	800	885	365	285	792	766
1959	1,014	758	649	1,090	421	492	2,969	1,138	490	346	237	297	825
1960	1,245	1,764	1,116	734	722	431	3,346	902	599	250	168	247	956

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	844	31.40
1951	1207	7,420	Mar. 31, 1951	205	928	2.54	34.51	932	34.68
1952	1237	5,750	Apr. 6, 1952	138	859	2.35	32.02	821	30.62
1953	1277	9,140	Dec. 12, 1952	120	859	2.35	31.96	852	30.96
1954	1357	9,250	Feb. 17, 1954	104	851	2.33	31.67	851	31.66
1955	1387	7,120	Apr. 15, 1955	101	731	2.00	27.18	749	27.85
1956	1437	6,570	Apr. 30, 1956	110	729	2.00	27.17	726	27.08
1957	1507	3,940	May 21, 1957	92	680	1.86	25.31	743	27.63
1958	1557	9,150	Dec. 21, 1957	154	766	2.10	28.48	743	27.63
1959	1627	5,630	Apr. 20, 1959	147	825	2.26	30.68	967	35.96
1960	1707	7,320	Apr. 18, 1960	110	956	2.62	35.64	-	-

## 2560. Independence River at Donnattsburg, N. Y.

Location.--43°44'50", long 75°20'05", on right bank at downstream side of highway bridge at Donnattsburg, Lewis County, 1½ miles downstream from Chase Lake Outlet, 4½ miles northeast of Glenfield, and 5 miles upstream from mouth.

Drainage area.--91.7 sq mi.

Records available.--July 1942 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 972.84 ft above mean sea level, datum of 1929. Prior to Sept. 16, 1949, wire-weight gage at same site and datum.

Average discharge.--18 years (1942-60), 195 cfs.

Extremes.--1942-60: Maximum discharge, 3,410 cfs Oct. 2, 1945 (gage height, 8.8 ft, from graph based on gage readings); minimum observed, 18 cfs Sept. 17, 1948, Aug. 4, 5, 1949 (gage height, 2.85 ft).

Remarks.--Records of water temperatures for the period October 1959 to September 1960 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	87.5	285	209	214	172	336	706	158	95.2	97.3	63.5	126	210
1952	95.9	261	255	210	138	180	546	210	99.2	127	51.5	50.3	185
1953	128	188	287	186	184	458	285	332	67.6	50.4	93.8	60.0	194
1954	51.4	91.3	204	128	373	325	613	280	145	44.3	44.4	82.9	197
1955	81.4	186	196	123	75.7	338	710	145	120	36.5	39.6	33.9	174
1956	144	183	113	54.1	54.6	111	628	384	184	127	39.2	138	179
1957	95.5	142	242	169	108	236	317	224	119	123	39.7	76.8	158
1958	54.7	150	324	120	77.2	104	442	215	202	117	66.0	275	179
1959	222	161	113	182	128	147	755	223	90.4	58.1	64.3	60.8	183
1960	267	366	278	159	210	101	764	171	140	70.4	43.1	46.4	217

Monthly and yearly runoff, in inches, of Independence River at Donnattsburg, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.10	3.47	2.63	2.69	1.96	4.23	8.58	1.74	1.16	1.22	0.80	1.53	31.11
1952	1.21	3.18	3.21	2.64	1.62	2.26	6.65	2.64	1.21	1.59	.65	.61	27.47
1953	1.61	2.28	3.61	2.34	2.08	5.75	3.47	4.17	.82	.63	1.18	.73	28.67
1954	.65	1.11	2.56	1.61	4.23	4.09	7.45	3.53	1.77	.56	.56	1.01	29.13
1955	1.02	2.26	2.47	1.55	.86	4.25	8.64	1.82	1.46	.46	.50	.41	25.70
1956	1.81	2.22	1.42	.68	.64	1.40	7.64	4.82	2.24	1.60	.49	1.67	26.63
1957	1.20	1.73	3.04	2.13	1.23	2.97	3.85	2.82	1.45	1.54	.50	.93	23.39
1958	.69	1.83	4.07	1.51	.88	1.30	5.37	2.71	2.46	1.47	.83	3.35	26.47
1959	2.79	1.95	1.41	2.28	1.45	1.85	9.19	2.80	1.10	.73	.81	.74	27.10
1960	3.36	4.45	3.50	2.00	2.47	1.27	9.30	2.15	1.71	.89	.54	.56	32.20

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	179	26.49
1951	1207	2,720	Mar. 31, 1951	28	210	2.29	31.11	213	31.51
1952	1237	2,060	Apr. 6, 1952	22	185	2.02	27.47	184	27.37
1953	1277	2,590	Dec. 12, 1952	21	194	2.12	28.67	172	25.49
1954	1337	1,750	Feb. 22, 1954	27	197	2.15	29.13	206	30.56
1955	1387	1,670	Apr. 15, 1955	20	174	1.90	25.70	172	25.40
1956	1437	1,880	Apr. 30, 1956	25	179	1.95	26.63	183	27.15
1957	1507	1,500	May 21, 1957	28	158	1.72	23.39	162	24.01
1958	1557	1,720	Dec. 21, 1957	36	179	1.95	26.47	176	26.03
1959	1627	1,250	Apr. 18, 1959	30	183	2.00	27.10	218	32.26
1960	1707	1,710	Apr. 4, 1960	28	217	2.37	32.20	-	-

## 2565. Stillwater Reservoir near Beaver River, N. Y.

Location.--Lat 43°53'50", long 75°03'05", in gatehouse at Stillwater Dam on Beaver River,  $\frac{2}{3}$  miles upstream from Moshier Creek and  $\frac{7}{8}$  miles west of Beaver River Post Office, Herkimer County.

Drainage area.--172 sq mi.

Records available.--May 1908 to September 1960. Month-end contents only prior to February 1925, published in WSP 1307.

Gage.--Float-tape gage read once daily and prior to reservoir gate changes. Datum of gage is at mean sea level, adjustment of 1912.

Remarks.--Reservoir originally formed about 1885; enlarged at various times and in 1924 enlarged to a usable capacity of 4,623,000,000 cu ft between elevations 1,650.3 and 1,679.3 ft. Elevation of gate sill of lowest outlet, 1,642.3 ft. Capacity below elevation 1,650.3 ft, 90,000,000 cu ft, is included in records presented herein, but is not ordinarily available for release. Prior to 1956, figures published in annual water-supply papers represented usable contents above elevation 1,650.3 ft. Reservoir is used to regulate flow of Beaver and Black Rivers for control of floods, for power development, and for general welfare of the public.

Cooperation.--Records of gate opening and reservoir elevations furnished by Board of Hudson River-Black River Regulating District.

Contents, in millions of cubic feet, on last day of month

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1951	1,126	1,672	2,003	1,958	1,502	2,356	4,725	4,557	4,225	4,004	3,323	2,538
1952	1,749	2,253	2,930	3,151	2,731	2,380	4,725	4,728	4,433	4,244	3,048	1,987
1953	1,523	1,638	2,398	2,232	2,336	3,917	4,748	4,728	3,999	2,752	1,332	1,209
1954	499	337	1,156	903	2,346	3,441	4,736	4,664	4,461	3,453	2,360	1,828
1955	1,554	1,880	2,106	1,390	431	1,056	4,310	4,503	4,039	3,066	1,980	988
1956	853	933	642	306	34	10	2,569	4,745	4,563	4,323	3,456	3,071
1957	2,068	1,600	1,505	1,264	523	1,112	2,796	3,941	4,266	4,407	3,606	2,746
1958	1,832	1,976	3,075	2,160	1,043	98	2,148	3,174	3,988	4,022	3,637	4,195
1959	3,907	3,426	2,562	2,131	1,512	684	4,268	4,690	3,806	2,826	2,320	1,759
1960	2,505	3,465	3,444	2,728	2,322	1,224	4,635	4,291	3,701	3,075	1,916	1,122

2570. Beaver River below Stillwater Dam, near Beaver River, N. Y.

Location.--Lat 43°53'50", long 75°03'05", in gatehouse at Stillwater Dam,  $2\frac{1}{2}$  miles upstream from Moshier Creek and  $7\frac{1}{2}$  miles west of Beaver River Post Office, Herkimer County.

Drainage area.--172 sq mi.

Records available.--May 1908 to September 1960. Published as "at State dam, near Beaver River" prior to June 1924.

Gage.--Float-tape gage read prior to reservoir gate changes. Datum of gage is at mean sea level, adjustment of 1912. Prior to June 1, 1924, staff gage at present site and datum. June 1, 1924, to Nov. 14, 1929, staff gage at site 1,000 ft downstream at same datum.

Average discharge.--52 years (1908-60), 370 cfs (unadjusted).

Extremes.--1908-60: Maximum discharge, about 3,700 cfs May 3, 1926; practically no flow at times when gates in dam are closed.

Remarks.--Flow completely regulated by Stillwater Reservoir. Runoff adjusted for change in contents in Stillwater Reservoir (see preceding page). Discharge determined from ratings for gates and spillway of Stillwater Dam.

Cooperation.--Records furnished by Board of Hudson River-Black River Regulating District.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	346	211	265	398	528	191	474	363	344	329	384	473	357
1952	440	249	212	334	485	436	177	477	364	333	566	522	383
1953	366	243	166	430	326	177	294	653	387	557	456	440	375
1954	409	236	62.6	304	134	244	903	616	382	492	538	412	396
1955	368	220	369	574	600	399	250	265	404	436	528	496	408
1956	238	286	346	264	230	192	34.4	168	371	349	421	378	275
1957	546	474	514	513	610	197	14.1	15.7	193	243	395	476	348
1958	465	251	269	661	670	548	46.6	15.2	99.2	280	276	333	325
1959	568	585	600	563	612	625	128	410	619	502	360	353	494
1960	110	317	594	610	574	671	325	618	563	463	576	411	486

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.96	2.73	2.61	2.55	2.05	3.42	9.01	2.01	1.40	1.65	0.87	1.11	30.37
1952	.98	2.87	3.12	2.79	1.99	2.04	7.02	3.20	1.62	1.76	.80	.73	28.92
1953	1.29	1.87	3.01	2.47	2.23	5.14	3.99	4.33	1.69	.61	1.00	1.04	27.67
1954	.97	1.13	2.42	1.45	4.43	4.37	9.10	3.95	1.97	.78	.87	1.34	32.78
1955	1.78	2.24	3.04	2.05	1.23	4.24	9.76	2.26	1.46	.49	.82	.73	30.10
1956	1.26	2.05	1.59	1.06	.76	1.22	6.63	6.57	1.95	1.74	.66	1.49	26.98
1957	1.15	1.90	3.21	2.83	1.84	2.80	4.31	2.97	2.06	1.98	.65	.94	26.84
1958	.83	1.99	4.55	2.14	1.26	1.31	5.43	2.67	2.68	1.95	1.58	3.06	29.26
1959	3.08	2.59	1.86	2.69	2.16	2.11	9.80	3.80	1.80	.91	1.15	.83	32.78
1960	2.65	4.46	3.93	2.29	2.59	1.75	10.64	3.28	2.18	1.54	.96	.68	36.95

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	355	333	26.25
1951	1207	-	-	13	357	385	2.24	30.37	364	393	31.04
1952	1237	-	-	15	383	365	2.12	28.92	372	355	28.12
1953	1277	-	-	14	375	351	2.04	27.67	370	350	26.02
1954	1337	-	-	10	396	415	2.41	32.78	417	448	35.32
1955	1387	-	-	11	408	382	2.22	30.10	401	354	27.94
1956	1437	-	-	9	275	341	1.98	26.98	331	358	28.34
1957	1507	-	-	11	348	337	1.96	26.64	302	352	27.75
1958	1557	-	-	9	325	371	2.16	29.26	389	373	29.42
1959	1627	-	-	12	494	416	2.42	32.78	432	460	36.29
1960	1707	-	-	12	486	467	2.72	36.95	-	-	-





Monthly and yearly runoff, in inches, of Deer River at Copenhagen, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.95	4.97	3.54	4.40	2.32	6.88	10.22	1.26	1.06	1.27	0.34	0.88	39.09
1952	.97	4.35	3.86	4.03	2.53	4.03	7.24	3.47	.70	.61	.26	.35	32.40
1953	2.12	3.61	4.81	3.30	2.68	7.98	3.45	4.42	.50	.49	.46	.64	34.46
1954	.59	1.70	4.02	2.18	7.99	6.70	9.55	2.95	1.14	.20	.50	.98	36.30
1955	1.10	3.36	4.00	1.73	.91	7.50	10.52	1.29	.93	.22	.19	.20	31.95
1956	3.96	3.83	2.24	.87	.84	2.50	13.59	6.34	1.58	.37	.21	.85	37.18
1957	.63	1.80	-	-	-	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	213	32.46
1951	1207	4,280	Jan. 4, 1951	13	256	2.88	39.09	248	37.81
1952	1237	2,700	Apr. 6, 1952	3.4	212	2.38	32.40	221	33.76
1953	1277	4,390	Dec. 11, 1952	1.8	226	2.54	34.46	198	30.23
1954	1337	3,600	Feb. 16, 1954	5.1	251	2.82	38.30	265	40.45
1955	1387	a5,980	Mar. 11, 1955	1.6	210	2.36	31.95	220	33.52
1956	1437	a8,590	Apr. 5, 1956	8.9	243	2.73	37.18	-	-
1957	1437	-	-	-	-	-	-	-	-
1958	-	-	-	-	-	-	-	-	-
1959	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-

a Release from upstream ice jam.

2587. Deer River at Deer River, N. Y.

Location.--Lat 43°55'49", long 75°35'31", on left bank 350 ft upstream from bridge on State Highway 26 at Deer River, Lewis County, and 2 miles upstream from mouth.

Drainage area.--98.1 sq mi.

Records available.--October 1956 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 762.36 ft above mean sea level, datum of 1929.

Extremes.--1956-60: Maximum discharge, 7,460 cfs Dec. 21, 1957 (gage height, 6.10 ft); maximum gage height, 9.20 ft Jan. 23, 1957 (ice jam); minimum discharge, 2.4 cfs Sept. 3, 4, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	71.2	156	431	306	210	421	456	171	97.4	178	23.3	56.2	215
1958	45.9	241	522	138	89.8	199	604	208	148	144	194	427	247
1959	290	238	138	446	260	351	1,330	208	71.6	89.5	41.8	22.5	289
1960	219	439	392	168	364	193	1,170	192	190	42.5	13.8	10.3	281

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	0.84	1.77	5.06	3.59	2.23	4.95	5.18	2.01	1.11	2.10	0.27	0.66	29.77
1958	.54	2.74	6.14	1.62	.95	2.34	6.87	2.44	1.69	1.69	2.27	4.85	34.14
1959	3.40	2.70	1.62	5.24	2.76	4.12	15.12	2.45	.81	1.05	.49	.26	40.02
1960	2.58	4.99	4.60	1.98	4.00	2.26	13.30	2.26	2.16	.50	.16	.12	38.91

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1957	1557	7,170	Jan. 23, 1957	8.6	215	2.19	29.77	228	31.52
1958	1557	7,460	Dec. 21, 1957	17	247	2.52	34.14	234	32.44
1959	1627	6,790	Apr. 6, 1959	11	289	2.95	40.02	321	44.47
1960	1707	6,600	Apr. 4, 1960	2.6	281	2.86	38.91	-	-

## STREAMS TRIBUTARY TO LAKE ONTARIO

## 2605. Black River at Watertown, N. Y.

Location.--Lat 43°59'05", long 75°55'30", on downstream side of right abutment of Vanduzee Street Bridge at Watertown, Jefferson County, 3½ miles upstream from Philomel Creek.

Drainage area.--1,876 sq mi.

Records available.--July 1920 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 374.88 ft above mean sea level, datum of 1929. Prior to Sept. 3, 1921, staff gage at same site and datum.

Average discharge.--40 years (1920-60), 3,922 cfs.

Extremes.--1920-60: Maximum discharge, 33,900 cfs Apr. 9, 1928 (gage height, 10.6 ft); minimum, 10 cfs Sept. 2, 1934 (gage height, -0.19 ft); minimum daily, 137 cfs Sept. 4, 1939.

Maximum discharge known, about 39,700 cfs in April 1869 (from New York State Museum Bulletin 85).

Remarks.--Flow partly regulated by Stillwater Reservoir (see p.318 ), Fulton Chain of Lakes, and other reservoirs. Extensive diurnal fluctuation at low and medium flow caused by mills and powerplants in and above Watertown. During canal season, water is diverted out of basin through Forestport Feeder and Black River Canal, flowing south (see p.314 ). Records of chemical analyses for the period October 1955 to September 1956 and water temperatures for the period October 1955 to September 1959 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	2,113	5,050	4,757	4,394	4,575	5,998	14,050	3,950	2,394	2,762	1,631	2,133	4,468
1952	1,993	4,678	5,248	5,187	4,021	5,236	10,500	4,458	2,190	2,146	1,503	1,495	4,048
1953	2,177	2,823	5,377	3,727	4,333	8,549	5,635	6,924	1,779	1,440	1,934	1,652	3,868
1954	1,506	1,941	3,928	2,426	8,468	7,133	12,260	6,458	2,957	1,354	1,250	2,009	4,268
1955	1,917	3,502	4,165	3,367	2,207	7,904	12,770	2,820	2,549	1,198	1,174	1,251	3,734
1956	2,849	3,731	2,532	1,472	1,392	2,854	10,610	7,195	3,971	1,983	1,232	2,795	3,545
1957	2,278	2,802	4,936	4,010	3,016	5,528	5,486	3,953	2,337	2,683	1,162	1,696	3,329
1958	1,628	2,805	6,842	2,874	2,103	3,220	7,166	3,671	3,255	2,014	1,949	4,125	3,473
1959	4,517	4,151	2,791	4,119	3,836	4,436	14,570	4,582	2,322	1,913	1,384	1,323	4,149
1960	4,541	6,655	6,999	3,425	5,123	2,618	15,020	4,111	3,115	1,556	1,271	1,255	4,618

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	4,000	28.94
1951	1207	28,000	Apr. 2, 1951	1,100	4,468	2.38	32.33	4,469	32.33
1952	1237	21,700	Apr. 7, 1952	680	4,048	2.16	29.35	3,922	28.45
1953	1277	24,400	Mar. 27, 1953	536	3,868	2.06	27.97	3,616	26.14
1954	1337	24,500	Feb. 23, 1954	495	4,268	2.28	30.87	4,451	32.20
1955	1387	21,500	Apr. 17, 1955	491	3,734	1.99	27.01	3,693	26.72
1956	1437	18,600	Apr. 7, 1956	845	3,545	1.89	25.71	3,624	26.28
1957	1507	11,500	Jan. 23, 1957	554	3,329	1.77	24.08	3,436	24.86
1958	1557	22,300	Dec. 23, 1957	940	3,473	1.85	25.12	3,485	25.21
1959	1627	24,400	Apr. 6, 1959	751	4,149	2.21	30.02	4,714	34.10
1960	1707	26,200	Apr. 5, 1960	560	4,618	2.46	33.50	-	-

## STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

## 2609. Cranberry Lake at Cranberry Lake, N. Y.

Location.--Lat 44°13'15", long 74°50'55", on right wall of outlet structure, at village of Cranberry Lake, St. Lawrence County.

Drainage area.--144 sq mi.

Records available.--April 1923 to September 1960.

Gage.--Staff gage. Datum of gage is 1,469.75 ft above mean sea level, datum of 1929.

Remarks.--Reservoir used to regulate seasonal flow of Oswegatchie River since 1867. Usable capacity above elevation 1,475.25 ft (corrected) is 2,530,000,000 cu ft, and record herein represents contents above that elevation.

Cooperation.--Record of reservoir elevations and capacity table furnished by Oswegatchie River-Cranberry Reservoir Commission.

Contents, in millions of cubic feet, on last day of month, of Cranberry Lake at Cranberry Lake, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1951	1,263	1,580	1,619	1,544	1,241	1,671	2,530	2,500	2,324	2,338	1,996	1,723
1952	1,460	1,840	1,710	1,388	844	655	2,268	2,485	2,380	2,240	1,814	1,460
1953	1,436	1,588	1,619	1,352	1,208	2,296	2,530	2,500	2,170	1,892	2,022	1,645
1954	1,263	968	1,532	1,340	2,310	1,879	2,515	2,485	2,530	2,212	1,983	2,184
1955	2,061	1,918	1,840	1,142	495	1,021	2,352	2,485	2,226	1,814	1,632	1,307
1956	1,230	1,252	978	706	486	78	1,970	2,590	2,254	1,905	1,532	1,274
1957	1,021	958	1,142	1,274	947	1,340	2,240	2,352	2,410	2,212	1,645	400
1958	209	476	1,508	1,208	821	310	1,762	2,470	2,380	2,380	2,268	2,410
1959	2,128	1,710	1,274	1,532	1,208	675	1,814	2,074	2,184	2,074	2,048	1,762
1960	1,866	2,074	1,970	1,412	1,098	535	2,470	2,500	2,240	2,184	1,866	1,580

### 2610. Oswegatchie River at Cranberry Lake, N. Y.

Location.--Lat 44°13'15", long 74°51'00", on right bank 900 ft downstream from dam at outlet of Cranberry Lake, at village of Cranberry Lake, St. Lawrence County.

Drainage area.--144 sq mi.

Records available.--May 1923 to September 1960. Prior to October 1958, published as East Branch Oswegatchie River at Cranberry Lake.

Gage.--Water-stage recorder. Datum of gage is 1,458.23 ft above mean sea level, datum of 1929. Prior to Oct. 1, 1938, staff gage at site 80 ft upstream at same datum.

Average discharge.--37 years (1923-60), 290 cfs (unadjusted).

Extremes.--1923-60: Maximum discharge, 1,940 cfs May 13, 1943 (gage height, 7.70 ft); minimum daily, about 3 cfs Apr. 9-16, 1931.

Remarks.--Since 1867, flow almost completely regulated by Cranberry Lake. Runoff adjusted for change in contents in Cranberry Lake (see p. 322).

#### Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	186	161	293	358	398	262	702	236	211	223	218	203	286
1952	192	147	371	459	533	309	59.5	273	206	205	209	206	264
1953	167	197	231	388	345	114	347	456	188	185	137	257	250
1954	260	201	115	247	169	680	853	449	249	244	201	171	321
1955	336	407	411	539	481	299	639	232	274	220	158	190	347
1956	204	197	254	226	209	306	106	499	395	221	210	198	253
1957	187	177	181	191	369	141	143	294	212	265	276	674	258
1958	201	86.6	84.0	320	348	367	99.5	32.4	333	203	160	234	205
1959	403	418	355	169	391	463	712	245	91.6	147	143	159	307
1960	195	279	422	445	442	419	515	326	320	203	158	190	326

#### Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.87	2.20	2.46	2.64	1.97	3.38	8.01	1.80	1.11	1.83	0.72	0.76	27.75
1952	.75	2.28	2.58	2.71	2.37	1.91	5.29	2.83	1.29	1.22	.40	.54	24.16
1953	1.26	1.38	2.54	2.31	2.07	4.17	3.39	3.56	.47	.65	1.48	.87	24.15
1954	.94	.67	2.60	1.41	4.12	4.16	8.51	3.50	2.06	1.00	.92	1.92	51.81
1955	2.32	2.72	3.05	2.23	1.55	3.97	8.93	2.25	1.35	.53	.72	.50	30.12
1956	1.40	1.59	1.22	1.00	.91	1.23	6.48	5.84	2.06	.73	.57	.76	23.79
1957	.74	1.18	2.00	1.92	1.69	2.31	3.80	2.69	1.81	1.53	.51	1.50	21.68
1958	1.04	1.47	3.76	1.67	1.56	1.41	5.11	2.38	2.31	1.63	.95	2.23	25.32
1959	2.39	1.99	1.54	2.12	1.86	2.11	8.92	2.74	1.04	.85	1.07	.38	27.01
1960	1.87	2.78	3.07	1.89	2.37	1.67	9.78	2.70	2.39	.77	.31	.62	30.22

#### Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	264	253	23.83
1951	1207	1,430	Apr. 15, 1951	103	286	294	2.04	27.75	292	295	27.83
1952	1237	856	May 26, 1952	28	264	256	1.78	24.16	254	251	23.73
1953	1277	1,170	May 4, 1953	17	250	256	1.78	24.15	249	246	23.18
1954	1337	1,490	Apr. 19, 1954	28	321	338	2.35	31.81	369	379	35.69
1955	1387	1,300	Apr. 21, 1955	83	347	320	2.22	30.12	306	278	26.24
1956	1437	891	June 2, 3, 1956	28	253	252	1.75	23.79	243	249	23.50
1957	1507	962	Sept. 18, 1957	33	258	230	1.60	21.68	243	255	24.03
1958	1557	750	Oct. 1, 1957	22	205	268	1.86	25.32	272	265	24.97
1959	1627	1,130	Apr. 22, 1959	87	307	286	1.99	27.01	284	306	28.81
1960	1707	942	Apr. 27, 28, 1960	87	326	320	2.22	30.22	-	-	-

## 2620. Oswegatchie River near Oswegatchie, N. Y.

Location.--Lat 44°13'25", long 75°04'35", on left bank 300 ft downstream from Flat Rock hydroelectric plant of Niagara Mohawk Power Corp. and  $2\frac{1}{4}$  miles north of Oswegatchie, St. Lawrence County.

Drainage area.--263 sq mi.

Records available.--October 1924 to September 1960. Prior to October 1958, published as East Branch Oswegatchie River near Oswegatchie.

Gage.--Water-stage recorder. Datum of gage is 1,016.52 ft above mean sea level, datum of 1929.

Average discharge.--36 years (1924-60), 524 cfs.

Extremes.--1924-60: Maximum discharge, 4,090 cfs Apr. 12, 1947; maximum gage height, 7.1 ft Apr. 6, 1928; minimum discharge, probably less than 1 cfs during complete shut-down of powerplant; minimum daily, 1 cfs July 25, 1926.

Remarks.--Extensive diurnal fluctuation at low and medium flow caused by powerplant; since 1867, seasonal flow regulated by Cranberry Lake (see p.322).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	268	428	544	616	631	697	1,280	462	329	410	300	268	518
1952	300	376	610	766	732	632	563	493	369	329	246	267	473
1953	359	324	513	616	637	510	647	838	272	270	386	351	476
1954	349	305	431	381	723	1,127	1,466	753	452	401	313	472	596
1955	589	725	732	779	666	865	1,449	443	443	303	244	225	621
1956	359	354	377	315	291	461	885	993	615	329	254	292	461
1957	294	284	421	451	513	510	492	518	396	453	392	719	449
1958	273	258	561	458	415	506	664	339	516	351	242	469	427
1959	637	584	525	402	585	690	1,632	473	276	273	250	242	546
1960	360	554	761	623	699	613	1,446	652	647	319	244	234	594

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	463	23.88	
1951	1207	2,720	Mar. 31, 1951	9.2	518	1.97	26.72	522	26.95	
1952	1237	1,670	May 23, 1952	138	473	1.80	24.48	466	24.08	
1953	1277	2,060	May 4, 1953	5.6	476	1.81	24.56	467	24.08	
1954	1337	2,330	Feb. 17, 1954	6.2	596	2.27	30.75	676	34.91	
1955	1387	2,460	Apr. 20, 1955	3.9	621	2.36	32.04	539	27.61	
1956	1437	1,980	May 31, 1956	5.8	461	1.75	23.84	454	23.52	
1957	1507	2,440	Jan. 23, 1957	3.6	449	1.71	23.19	459	23.70	
1958	1557	2,200	Dec. 21, 1957	2.9	427	1.62	22.06	480	24.79	
1959	1627	2,720	Apr. 9, 1959	3.3	546	2.08	28.16	540	27.85	
1960	1707	2,580	June 1, 1960	3.8	594	2.26	30.74	-	-	

## 2625. West Branch Oswegatchie River near Harrisville, N. Y.

Location.--Lat 44°11'10", long 75°19'55", on right bank just downstream from highway bridge, half a mile northeast of Geers Corners,  $1\frac{1}{2}$  miles downstream from Jenny Creek, and 4 miles downstream from Harrisville, Lewis County.

Drainage area.--258 sq mi.

Records available.--July 1916 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 738.51 ft above mean sea level, datum of 1929. Prior to Nov. 30, 1933, staff gage at same site and datum.

Average discharge.--44 years (1916-60), 511 cfs.

Extremes.--1916-60: Maximum discharge, 6,920 cfs Jan. 9, 1930 (gage height, 9.6 ft); minimum, 25 cfs Sept. 1, 1934 (gage height, 0.86 ft).

Remarks.--Diurnal fluctuation, principally during low flow, caused by pulpmill at Harrisville.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	223	600	662	685	541	851	1,636	396	250	354	139	168	541
1952	164	586	476	657	440	511	1,060	560	285	170	72.2	92.0	422
1953	314	345	660	533	510	890	638	811	151	91.2	259	197	451
1954	156	206	585	316	1,488	985	1,637	773	421	169	134	457	603
1955	555	618	707	506	264	1,316	1,765	393	336	88.2	96.8	84.7	562
1956	306	442	262	160	152	381	1,740	1,729	515	133	78.6	157	458
1957	115	221	653	565	332	803	799	521	404	337	102	132	416
1958	123	380	1,199	334	231	392	1,165	597	498	316	278	516	503
1959	505	428	292	517	396	545	1,944	577	226	177	159	97.7	487
1960	347	668	778	397	651	307	2,245	472	638	174	86.4	75.2	566

Monthly and yearly runoff, in inches, of West Branch Oswegatchie River near Harrisville, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.00	2.60	2.96	3.06	2.19	3.80	7.07	1.77	1.08	1.58	0.62	0.73	28.46
1952	.73	2.53	2.13	2.93	1.84	2.28	4.58	2.50	1.23	.76	.32	.40	22.23
1953	1.40	1.49	2.95	2.38	2.06	3.98	2.76	3.62	.65	.41	1.16	.85	23.71
1954	.70	.89	2.62	1.41	6.00	4.40	7.08	3.45	1.82	.75	.60	1.98	31.70
1955	2.48	2.67	3.16	2.26	1.07	5.88	7.63	1.75	1.45	.39	.43	.37	29.54
1956	1.37	1.91	1.17	.71	.64	1.70	7.52	5.27	2.23	.60	.35	.68	24.15
1957	.51	.96	2.92	2.53	1.34	3.59	3.45	2.33	1.74	1.51	.45	.57	21.90
1958	.55	1.64	5.36	1.49	.93	1.75	5.04	2.67	2.15	1.41	1.24	2.23	26.48
1959	2.26	1.85	1.31	2.31	1.60	2.44	8.41	2.58	.98	.79	.71	.42	25.66
1960	1.55	2.89	3.48	1.78	2.72	1.37	9.71	2.11	2.76	.78	.39	.33	29.87

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	472	24.83	
1951	1207	4,550	Apr. 1, 1951	71	541	2.10	28.46	519	27.29	
1952	1237	2,580	Apr. 7, 1952	38	422	1.64	22.23	430	22.68	
1953	1277	2,700	Dec. 13, 1952	52	451	1.75	23.71	420	22.08	
1954	1337	5,420	Feb. 22, 1954	75	603	2.34	31.70	681	35.80	
1955	1387	4,460	Mar. 12, 1955	42	562	2.18	29.54	488	25.68	
1956	1437	3,980	Apr. 7, 1956	62	458	1.78	24.15	456	24.09	
1957	1507	2,560	Jan. 25, 1957	54	416	1.61	21.90	476	25.06	
1958	1557	4,260	Dec. 22, 1957	68	503	1.95	26.46	463	24.33	
1959	1627	4,140	Apr. 7, 1959	66	487	1.89	25.66	535	28.16	
1960	1707	5,640	Apr. 5, 1960	39	566	2.19	29.87	-	-	

2630. Oswegatchie River near Heuvelton, N. Y.

Location.--Lat 44°36'00", long 75°22'45", on right bank 1½ miles downstream from Beaver Creek and 2½ miles upstream from Heuvelton, St. Lawrence County.

Drainage area.--973 sq mi.

Records available.--June 1916 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 288.85 ft above mean sea level, datum of 1929. Prior to Sept. 16, 1916, staff gage at same site and datum.

Average discharge.--44 years (1916-60), 1,691 cfs.

Extremes.--1916-60: Maximum discharge, 19,600 cfs Apr. 6, 1960 (gage height, 10.36 ft); minimum recorded, 130 cfs Aug. 17, 1949 (gage height, 0.47 ft).

Remarks.--Since 1867, seasonal flow slightly regulated by Cranberry Lake (see p. 322); slight diurnal fluctuation at low and medium flow caused by powerplants. During high stages on Grass River, part of flow of that stream may pass through Upper Lake, Indian Creek and Lower Lake, and enter Oswegatchie River at Rensselaer Falls, 4½ miles above station. Records of chemical analyses and water temperatures for the period October 1955 to September 1956 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	751	2,188	2,296	2,692	2,225	3,317	4,816	1,259	680	1,555	543	522	1,900
1952	559	1,742	1,729	2,878	2,131	2,465	2,823	1,533	942	636	380	410	1,516
1953	983	890	2,058	1,878	1,966	2,844	1,953	3,215	605	412	899	691	1,534
1954	670	870	1,662	1,060	4,800	4,013	5,187	2,746	1,044	744	522	1,316	2,014
1955	2,045	2,546	2,538	2,047	1,288	5,080	4,855	1,242	996	455	379	320	1,986
1956	890	1,149	815	613	575	1,464	5,526	3,724	1,810	544	357	526	1,495
1957	431	552	1,376	1,438	1,283	2,514	1,990	1,506	1,170	831	517	822	1,203
1958	504	757	2,636	1,157	932	2,429	3,083	1,735	1,295	766	710	1,162	1,433
1959	1,492	1,605	1,186	1,529	1,601	2,978	6,573	1,512	678	689	852	863	1,791
1960	1,362	1,893	2,869	1,367	2,371	1,360	7,951	1,734	2,083	613	331	327	2,008

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	1,621	22.61	
1951	1207	8,890	Apr. 3, 1951	315	1,900	1.95	26.49	1,798	25.08	
1952	1237	6,540	Mar. 13, 1952	321	1,516	1.56	21.21	1,510	21.12	
1953	1277	6,840	May 4, 1953	194	1,534	1.58	21.40	1,455	20.31	
1954	1337	15,500	Feb. 23, 1954	320	2,014	2.07	28.09	2,359	32.91	
1955	1387	10,700	Mar. 13, 1955	210	1,986	2.04	27.72	1,626	22.70	
1956	1437	13,500	Apr. 8, 1956	214	1,495	1.54	20.92	1,456	20.36	
1957	1507	4,710	Mar. 17, 1957	187	1,203	1.24	16.76	1,333	18.58	
1958	1557	6,320	Mar. 28, 1958	235	1,433	1.47	19.99	1,463	20.42	
1959	1627	13,700	Apr. 6, 1959	220	1,791	1.84	25.00	1,947	27.16	
1960	1707	19,600	Apr. 6, 1960	135	2,008	2.06	28.10	-	-	

Note.--Monthly figures of discharge per square mile and runoff in inches, previously published in water-supply papers, do not represent natural flow because of storage above station. These figures are not published herein.

## 2640. St. Lawrence River at Ogdensburg, N.Y.

Location.--Lat 44°42'05", long 75°29'40", at Ogdensburg.

Drainage area.--295,200 sq mi, including that of Oswegatchie River.

Records available.--June 1860 to September 1960.. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Discharge since June 1958 determined from ratings of several outflow structures of Lake St. Lawrence. Prior to August 1956, base gage at lock 25 at Iroquois, Ont., and supplementary gages located at Prescott, Ont., at lock 27 above Cardinal, Ont., at lock 24 between Iroquois and Morrisburg, Ont., and lock 23 at Morrisburg, Ont. August 1956 to June 1958, base gage at lock 24 and auxiliary gages located at lock 24 and below Morrisburg. These were gages of the Canadian Hydrographic Service except the supplementary gages in use after August 1956, which are gages of the Hydro-Electric Power Commission of Ontario. The discharge in this reach of river is considered to be the same as discharge at Ogdensburg, N.Y., which is directly opposite Prescott, Ont.

Average discharge.--100 years (1860-1960), 240,000 cfs.

Extremes.--1917-60: Maximum daily discharge, 315,000 cfs May 13, 1952; minimum daily, 139,000 cfs Feb. 7, 1936.

1860-1960: Maximum monthly discharge, 314,000 cfs (revised) May 1870; minimum monthly, 154,000 cfs February 1936.

Remarks.--Records do not include water diverted from Lake Michigan by Illinois and Michigan Canal during period of its operation prior to 1910 and by Chicago Sanitary and Ship Canal, operation of which began in 1900. They include water diverted into Lake Superior from Hudson Bay drainage by the Long Lake project, operation of which began in July 1939, and by the Ogoki project, operation of which began in July 1943. The diversions into Lake Superior amounted to less than 1 percent of the average St. Lawrence River discharge before July 1943, and since that time have averaged about 5,000 cfs.

Cooperation.--These are the official records of the U.S. Lake Survey, Corps of Engineers, which have been coordinated with and concurred in by the counterpart Canadian agencies. Records for October 1950 to September 1954 supersede previously published records for this station, and records for July 1958 to September 1960 supersede previously published provisional records.

Corrections.--In WSP 1307, a few figures of discharge and runoff are listed in error. They should be as follows:

Monthly mean discharge, in thousands of cubic feet per second

May 1870.....	314	November 1880.....	238	July 1884.....	291
October 1874.....	251	May 1893.....	263	December 1889.....	241

Monthly and yearly runoff in inches

November 1880.....	0.90	July 1884.....	1.14	December 1889.....	0.94
Water year 1881.....	10.68	Water year 1884.....	12.47	Water year 1890.....	12.05

Monthly and yearly discharge, in thousands of cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	235	234	240	243	230	262	284	294	292	292	278	269	263
1952	257	252	253	258	265	276	294	302	305	297	284	274	276
1953	264	251	254	254	257	259	272	279	283	276	266	259	264
1954	245	237	239	228	232	254	267	282	279	271	261	254	254
1955	253	254	256	260	246	267	289	294	287	276	265	256	267
1956	254	259	249	238	234	238	257	276	282	274	265	260	257
1957	247	240	236	229	234	241	245	247	248	248	242	234	240
1958	224	218	214	219	212	213	230	229	230	227	223	219	222
1959	215	207	209	178	190	203	247	263	263	252	251	219	223
1960	209	210	214	213	217	227	247	269	290	275	262	234	239

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.92	0.88	0.94	0.95	0.81	1.02	1.07	1.15	1.10	1.14	1.09	1.02	12.09
1952	1.00	.95	.99	1.01	.97	1.08	1.11	1.18	1.15	1.16	1.11	1.04	12.75
1953	1.03	.95	.99	.99	.90	1.01	1.03	1.09	1.07	1.08	1.04	.98	12.16
1954	.96	.90	.93	.89	.82	.99	1.01	1.10	1.06	1.06	1.02	.96	11.70
1955	.99	.96	1.00	1.02	.87	1.04	1.03	1.15	1.09	1.08	1.04	.97	12.30
1956	.99	.97	.97	.93	.86	.93	.97	1.08	1.07	1.07	1.04	.98	11.86
1957	.97	.91	.92	.90	.81	.92	.91	.96	.93	.97	.94	.89	11.03
1958	.88	.82	.84	.86	.75	.83	.87	.90	.87	.89	.87	.83	10.21
1959	.84	.78	.82	.70	.67	.79	.93	1.03	.99	.95	.90	.83	10.23
1960	.81	.79	.83	.83	.79	.89	.93	1.05	1.10	1.07	1.02	.88	10.99

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year	
		Maximum day		Minimum day	Mean	Per square mile	Runoff in inches	Runoff in inches
		Discharge	Date					
1950		-	-	-	-	-	-	243,000
1951		299,000	June 21, 1951	201,000	263,000	0.891	12.09	267,000
1952		315,000	May 13, 1952	239,000	276,000	.935	12.75	277,000
1953		290,000	June 9, 1953	237,000	264,000	.894	12.16	260,000
1954		289,000	May 17, 1954	210,000	254,000	.860	11.70	258,000
1955	1387	299,000	May 5, 8, 18, 1955	236,000	267,000	.904	12.30	267,000
1956	1437	290,000	Nov. 17, 1955	224,000	257,000	.871	11.86	254,000
1957	1507	267,000	(a)	220,000	240,000	.913	11.03	234,000
1958	1557	239,000	Nov. 9, 1957	198,000	222,000	.752	10.21	220,000
1959		265,000	June 19, 1959	164,000	223,000	.755	10.23	223,000
1960		307,000	June 28, 1960	195,000	239,000	.810	10.99	-

a Oct. 8, 1956, June 29, 1957.

## 2642. Little Sucker Brook at Waddington, N. Y.

Location.--Lat 44°50'28", long 75°11'28", on left bank on downstream side of bridge on State Highway 345, 0.6 mile south of Waddington, St. Lawrence County, and 3.9 miles upstream from mouth.

Drainage area.--19.9 sq mi.

Records available.--October 1958 to September 1960 (no winter records).

Gage.--Staff and crest-stage gages. Datum of gage is 252.37 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge observed, 553 cfs Apr. 13, 1960 (gage height, 3.14 ft); maximum gage height observed, 3.84 ft Apr. 1, 1960 (ice jam); no flow at times in every year.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	0.34	1.40	-	-	-	-	57.5	4.28	0.42	0.36	6.04	2.42	-
1960	9.17	20.2	-	-	-	-	148	12.6	13.9	.06	0	0	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	0.02	0.08	-	-	-	-	3.23	0.25	0.02	.02	0.35	0.14	-
1960	.53	1.13	-	-	-	-	8.31	.73	.78	.003	0	0	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum observed		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	283	Apr. 6, 1959	0	-	-	-	-	-
1960	1707	553	Apr. 13, 1960	0	-	-	-	-	-

## 2643. Brandy Brook near Waddington, N. Y.

Location.--Lat 44°49'42", long 75°04'32", on right bank 50 ft downstream from highway bridge, 3.2 miles southeast of Waddington, St. Lawrence County, and 4.4 miles upstream from mouth.

Drainage area.--27.0 sq mi.

Records available.--October 1958 to September 1960 (no winter records).

Gage.--Water-stage recorder. Datum of gage is 255.78 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge recorded, 736 cfs Apr. 4, 1960 (gage height, 7.44 ft); maximum gage height recorded, 7.73 ft Apr. 3, 1960 (ice jam); no flow many times in 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	1.29	-	-	-	-	101	8.27	1.85	1.39	10.1	12.4	-
1960	22.3	27.5	-	-	-	-	277	26.0	21.8	1.50	.10	0	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	0.05	-	-	-	-	4.16	0.35	0.08	0.06	0.43	0.51	-
1960	0.95	1.14	-	-	-	-	11.43	1.11	.90	.06	.004	0	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum recorded		Minimum day recorded	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	255	Apr. 1, 1959	0.3	-	-	-	-	-
1960	1707	736	Apr. 4, 1960	0	-	-	-	-	-

## 2644. Middle Branch Grass River near Clare, N. Y.

Location.--Lat 44°22'34", long 75°03'42", on right bank on downstream side of highway bridge, 1.1 miles upstream from confluence with South Branch and 1.9 miles south of Clare, St. Lawrence County.

Drainage area.--63.6 sq mi.

Records available.--October 1958 to September 1960 (no winter records).

Gage.--Staff and crest-stage gages. Altitude of gage is 810 ft (from topographic map).

Extremes.--1958-60: Maximum discharge observed, about 1,300 cfs Apr. 4, 1960; maximum gage height observed, 9.11 ft Apr. 3, 1959 (ice jam); minimum discharge observed, 16 cfs Sept. 29, 1960 (gage height, 1.99 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	110	95.9	-	-	-	-	539	137	81.8	66.7	86.5	59.6	-
1960	118	120	-	-	-	-	513	134	123	29.6	21.2	33.2	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	1.99	1.68	-	-	-	-	9.46	2.48	1.43	1.21	1.57	1.04	-
1960	2.15	2.11	-	-	-	-	9.00	2.43	2.15	.54	.38	.58	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum observed		Minimum day observed	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	1,120	Apr. 17, 1959	22	-	-	-	-	-
1960	1707	1,300	Apr. 4, 1960	16	-	-	-	-	-

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## 2647. North Branch Grass River near Clare, N. Y.

Location.--Lat 44°25'46", long 75°03'07", on right bank 75 ft upstream from highway bridge, 2.0 miles north of Clare, St. Lawrence County, 3.5 miles upstream from mouth, and 5 miles east of Russell.

Drainage area.--46.3 sq mi.

Records available.--August 1958 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 820 ft (from topographic map).

Extremes.--1958-60: Maximum discharge, about 800 cfs Apr. 5, 1960 (gage height, 7.25 ft, backwater from ice); minimum, 1.9 cfs Aug. 23, 24, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	82.3	-
1959	95.3	89.6	49.5	54.8	50.7	93.2	340	88.2	63.1	54.1	33.1	32.1	86.8
1960	73.2	79.4	112	52.3	59.9	48.4	333	77.2	70.5	12.1	3.75	10.7	77.3

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	1.98	-
1959	2.37	2.16	1.23	1.36	1.14	2.32	8.19	2.20	1.52	1.35	0.82	.77	25.43
1960	1.82	1.91	2.78	1.30	1.40	1.21	8.03	1.92	1.70	.30	.09	.26	22.72

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	652	Apr. 6, 1959	8.4	88.8	1.87	25.43	89.3	26.18
1960	1707	800	Apr. 5, 1960	2.1	77.3	1.67	22.72	-	-

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## 2648. Plumb Brook at Russell, N. Y.

Location.--Lat 44°25'30", long 75°08'03", on left bank on downstream side of highway bridge, 0.15 mile upstream from mouth and 0.8 mile southeast of village of Russell, St. Lawrence County.

Drainage area.--35.2 sq mi.

Records available.--September 1958 to September 1960 (no winter records).

Gage.--Staff and crest-stage gages. Datum of gage is 578.88 ft above mean sea level, adjustment of 1912.

Extremes.--1958-60: Maximum discharge observed, 992 cfs Apr. 4, 1960 (gage height, 4.73 ft); maximum gage height observed, 6.45 ft Mar. 31, 1960 (backwater from ice jam on Grass River); minimum discharge observed, 3.4 cfs Sept. 1, 2, 1960 (gage height, 0.74 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	44.6	-
1959	59.2	55.5	-	-	-	-	241	77.5	41.8	47.6	30.5	28.5	-
1960	61.7	-	-	-	-	-	282	62.2	77.3	17.2	7.72	12.4	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	1.41	-
1959	1.94	1.76	-	-	-	-	7.63	2.54	1.33	1.56	1.00	.90	-
1960	2.02	-	-	-	-	-	8.31	2.04	2.45	.56	.25	.39	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum observed		Minimum day observed	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	754	Apr. 3, 1959	8.4	-	-	-	-	-
1960	1707	992	Apr. 4, 1960	3.4	-	-	-	-	-

## 2650. Grass River at Pyrites, N. Y.

Location.--Lat 44°31'30", long 75°11'50", on left bank 1,000 ft downstream from lower bridge in Pyrites, St. Lawrence County, and half a mile upstream from Harrison Creek.

Drainage area.--335 sq mi.

Records available.--August 1924 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 350.61 ft above mean sea level, datum of 1929.

Average discharge.--36 years (1924-60), 598 cfs.

Extremes.--1924-60: Maximum discharge, about 8,300 cfs Nov. 18, 1927 (gage height, 13.0 ft, from floodmark); minimum daily, 59 cfs Aug. 29 to Sept. 1, 1934.

Remarks.--Diurnal fluctuation at low flow caused by powerplant above station. Records of chemical analyses and water temperatures for the period October 1955 to September 1956 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	*Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	356	731	735	943	733	1,105	1,688	465	267	606	213	194	669
1952	193	575	415	589	447	655	1,295	636	370	222	116	153	471
1953	362	325	627	649	672	1,121	834	1,164	217	231	525	329	589
1954	266	289	592	389	1,102	1,147	2,061	990	535	277	294	757	721
1955	973	831	836	663	346	1,830	2,241	641	356	195	159	135	769
1956	314	341	244	182	188	374	2,118	1,514	579	229	123	215	534
1957	172	224	475	321	339	859	827	515	515	246	117	168	413
1958	152	384	801	278	175	385	1,418	862	533	308	257	456	501
1959	588	570	352	408	382	650	2,552	679	415	337	424	299	637
1960	585	659	850	446	593	417	2,348	680	719	187	109	141	641

Monthly and yearly runoff, in inches, of Grass River at Pyrites, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.22	2.43	2.53	3.24	2.28	3.80	5.62	1.60	0.89	2.09	0.73	0.65	27.08
1952	1.66	1.91	1.43	2.03	1.44	2.25	4.31	2.19	1.23	.77	.40	.51	19.13
1953	1.25	1.08	2.16	2.23	2.09	3.86	2.78	4.01	.72	.79	1.81	1.10	23.88
1954	.92	.96	2.04	1.37	3.43	3.95	6.86	3.41	1.78	.95	1.01	2.52	29.20
1955	3.35	2.77	2.88	2.28	1.07	6.30	7.46	2.20	1.19	.67	.55	.45	31.17
1956	1.08	1.14	.84	.65	.61	1.29	7.05	5.21	1.93	.79	.42	.71	21.70
1957	.59	.75	1.64	1.11	1.06	2.95	2.75	2.35	1.72	.85	.40	.56	16.73
1958	.52	1.28	2.76	1.96	.54	1.33	4.72	2.97	1.78	1.06	.89	1.52	20.33
1959	2.02	1.90	1.21	1.41	1.19	2.24	8.50	2.34	1.38	1.16	1.46	1.00	25.81
1960	2.01	2.20	2.93	1.53	1.91	1.44	7.82	2.34	2.39	.64	.38	.47	26.06

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	1207	5,170	Apr. 1, 1951	126	659	2.00	27.08	581	23.55
1952	1237	3,270	Apr. 7, 1952	71	471	1.41	19.13	615	24.30
1953	1277	3,440	May 3, 1953	104	589	1.76	23.88	483	19.62
1954	1337	4,840	Apr. 9, 1954	154	721	2.15	29.20	575	23.31
1955	1387	6,860	Mar. 11, 1955	90	769	2.30	31.17	846	34.28
1956	1437	5,960	Apr. 30, 1956	91	534	1.59	21.70	623	25.23
1957	1507	2,390	Mar. 16, 1957	62	413	1.23	16.73	532	21.62
1958	1557	2,420	May 13, 1958	86	501	1.50	20.33	452	18.31
1959	1627	5,270	Apr. 7, 1959	95	637	1.90	25.81	515	20.90
1960	1707	8,800	Apr. 4, 1960	76	641	1.91	26.06	686	27.82

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2651. Elm Creek near Hermon, N. Y.

Location.--Lat 44°26'14", long 75°12'52", on left bank 100 ft downstream from highway bridge, 2.3 miles south of Hermon, St. Lawrence County, and 6.8 miles upstream from confluence with Tanner Creek.

Drainage area.--33.0 sq mi.

Records available.--August 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 539.41 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge, 1,090 cfs June 2, 1960 (gage height, 8.55 ft); minimum, 2.3 cfs Aug. 29, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	58.1	58.5	32.1	41.1	33.9	86.0	167	32.3	16.6	19.7	51.3	13.2	50.8
1960	53.5	59.4	88.6	27.5	85.1	53.9	203	38.2	93.9	7.06	3.20	3.69	59.3

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	2.03	1.98	1.12	1.44	1.07	3.00	5.66	1.13	0.56	0.69	1.79	1.25	20.92
1960	1.87	2.01	3.10	.96	2.78	1.88	6.87	1.33	3.17	.25	.11	.45	24.45

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	772	Apr. 6, 1959	3.5	50.8	1.54	20.92	55.3	22.77
1960	1707	1,090	June 2, 1960	2.5	59.3	1.80	24.45	-	-

## 2652. Tanner Creek at Stellaville, N. Y.

Location.--Lat 44°29'04", long 75°15'29", on right bank on downstream side of highway bridge, 0.6 mile west of Stellaville, St. Lawrence County, 1.8 miles northwest of Hermon, and 1.9 miles upstream from mouth.

Drainage area.--32.3 sq mi.

Records available.--September 1950 to September 1960 (no winter records).

Gage.--Staff and crest-stage gages. Altitude of gage is 380 ft (from topographic map).

Extremes.--1958-60: Maximum discharge observed, 1,580 cfs June 2, 1960 (gage height, 6.07 ft), from rating curve extended above 500 cfs by logarithmic plotting; maximum gage height observed, 9.09 ft Mar. 31, 1960 (ice jam); no flow many times.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	20.1	-
1959	49.5	55.2	-	-	-	-	136	21.0	8.69	14.7	51.0	10.1	-
1960	48.7	58.7	-	-	-	-	193	29.9	100	.97	.05	.02	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	0.69	-
1959	1.77	1.91	-	-	-	-	4.68	0.75	0.30	0.53	1.82	.35	-
1960	1.74	2.03	-	-	-	-	6.66	1.07	3.45	.03	.002	.0007	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum observed		Minimum day observed	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	1,420	Aug. 9, 1959	0.2	-	-	-	-	-
1960	1707	1,580	June 2, 1960	0	-	-	-	-	-

## 2653. Little River near Canton, N. Y.

Location.--Lat 44°33'24", long 75°06'56", on right bank on dam abutment, 50 ft downstream from highway bridge, at Brick Chapel, 4.0 miles southeast of Canton, St. Lawrence County, and 7.4 miles upstream from mouth.

Drainage area.--42.4 sq mi.

Records available.--October 1958 to September 1960 (no winter records).

Gage.--Staff and crest-stage gages. Datum of gage is 389.32 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge observed, 3,110 cfs Aug. 9, 1959 (gage height, 8.15 ft), from rating curve extended above 1,300 cfs by logarithmic plotting; minimum observed, 0.4 cfs Sept. 3, 1960 (gage height, 3.33 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	41.9	57.3	-	-	-	-	215	33.1	23.1	31.2	67.6	15.5	-
1960	60.2	73.7	-	-	-	-	277	52.9	55.1	6.35	1.54	2.10	-

## STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

Monthly and yearly runoff, in inches, of Little River near Canton, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	1.14	1.51	-	-	-	-	5.66	0.90	0.61	0.85	1.84	0.41	-
1960	1.64	1.94	-	-	-	-	7.30	1.44	1.45	.17	.04	.06	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum observed		Minimum day observed	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1627	-	-	-	-	-	-	-	-
1959	1627	3,110	Aug. 9, 1959	3.6	-	-	-	-	-
1960	1707	2,160	Apr. 4, 1960	.4	-	-	-	-	-

2654. Grannis Brook at Crary Mills, N. Y.

Location.--Lat 44°34'55", long 75°04'43", on right bank at downstream side of highway bridge, half a mile northwest of Crary Mills, St. Lawrence County, and 0.6 mile upstream from Boyden Brook.

Drainage area.--20.6 sq mi.

Records available.--October 1958 to September 1960 (no winter records).

Gage.--Staff and crest-stage gages. Altitude of gage is 410 ft (from topographic map).

Extremes.--1958-60: Maximum discharge observed, 755 cfs Apr. 4, 1960 (gage height, 3.86 ft); maximum gage height observed, 4.51 ft sometime during period Mar. 16-31, 1959 (ice jam); minimum discharge observed, 1.7 cfs Sept. 6, 7, 1960 (gage height, 0.60 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	20.6	29.0	-	-	-	-	94.8	19.2	15.0	14.8	10.3	7.08	-
1960	30.2	31.6	-	-	-	-	135	28.2	21.9	3.65	2.40	3.20	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	1.15	1.57	-	-	-	-	5.13	1.08	0.61	0.83	0.57	0.38	-
1960	1.69	1.71	-	-	-	-	7.33	1.58	1.19	.20	.13	.17	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum observed		Minimum day observed	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	529	Apr. 2, 1959	2.2	-	-	-	-	-
1960	1707	755	Apr. 4, 1960	1.7	-	-	-	-	-

## 2665. Raquette River at Piercefield, N. Y.

Location.--Lat 44°14'05", long 74°34'20", on left bank half a mile downstream from dam of International Paper Co. at Piercefield, St. Lawrence County, and 1½ miles upstream from Dead Creek.

Drainage area.--722 sq mi.

Records available.--August 1908 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,502.12 ft above mean sea level, datum of 1929. Prior to Oct. 22, 1912, staff or chain gage at same site (datum of chain gage lowered 2 ft Jan. 1, 1911, to present datum).

Average discharge.--52 years (1908-60), 1,284 cfs.

Extremes.--1908-60: Maximum discharge, 8,240 cfs May 16, 1943 (gage height, 12.09 ft); minimum, 4.1 cfs Oct. 12, 1947 (gage height, 0.61 ft), caused by construction work above station; minimum daily, 4.1 cfs Oct. 12, 1947.

Remarks.--Seasonal distribution of flow appreciably modified by natural storage in lakes and ponds above station and by regulation at Bog River Dam. Extensive diurnal fluctuation caused by powerplant at Piercefield.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	439	778	1,666	1,007	1,019	1,225	4,495	2,273	743	1,421	726	446	1,353
1952	347	1,108	1,547	1,189	1,102	1,238	3,243	2,225	1,322	757	563	280	1,240
1953	379	526	1,407	971	1,208	1,772	3,252	2,789	731	336	580	344	1,191
1954	458	275	1,184	681	1,428	2,413	4,223	3,459	1,438	857	474	1,016	1,490
1955	1,155	1,058	1,299	1,181	624	1,681	4,747	2,061	1,269	537	251	265	1,345
1956	687	1,009	665	477	466	461	2,067	4,190	1,950	665	464	430	1,129
1957	511	442	1,282	808	994	1,261	1,482	1,703	1,364	955	437	284	959
1958	583	615	1,655	1,507	682	504	2,169	2,237	1,533	663	739	820	1,144
1959	1,188	1,367	873	714	1,379	932	3,933	2,495	1,239	707	573	795	1,344
1960	1,440	2,215	2,124	1,188	1,071	865	4,164	2,725	1,046	680	448	525	1,538

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,175	22.08
1951	1207	6,160	Apr. 16, 1951	59	1,353	1.87	25.45	1,362	25.62
1952	1237	4,380	Apr. 24, 1952	52	1,240	1.72	23.37	1,183	22.31
1953	1277	5,130	Apr. 3, 1953	63	1,191	1.65	22.40	1,158	21.78
1954	1357	6,860	Apr. 25, 1954	28	1,490	2.06	28.02	1,623	30.53
1955	1587	7,240	Apr. 21, 1955	30	1,345	1.86	25.29	1,247	23.45
1956	1437	5,890	May 7, 1956	139	1,129	1.56	21.27	1,120	21.10
1957	1507	2,350	Apr. 27, 1957	26	959	1.33	18.03	1,011	19.01
1958	1557	4,760	Apr. 28, 1958	173	1,144	1.59	21.52	1,191	22.40
1959	1627	6,280	Apr. 23, 1959	225	1,344	1.86	25.27	1,541	28.97
1960	1707	6,830	Apr. 26, 1960	208	1,538	2.13	29.00	-	-

Note.--Monthly records of discharge per square mile and runoff in inches, previously published in water-supply papers, may be subject to considerable error because of storage above station. These records are not published herein.

## 2675. Raquette River at South Colton, N. Y.

Location.--Lat 44°30'40", long 74°53'00", on left bank 300 ft upstream from bridge on State Highway 56 at South Colton, St. Lawrence County, 500 ft downstream from South Colton powerplant, and three-quarters of a mile upstream from Cold Brook.

Drainage area.--939 sq mi.

Records available.--January 1953 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 882.05 ft above mean sea level, datum of 1929.

Average discharge.--7 years (1953-60), 1,660 cfs.

Extremes.--1953-60: Maximum discharge, 8,330 cfs Apr. 22, 1954 (gage height, 9.07 ft); minimum, 1.5 cfs Aug. 25, 1957 (gage height, 1.50 ft); minimum daily, 4.6 cfs June 2, 1954.

Remarks.--Flow regulated by Carry Falls Reservoir (usable capacity, 5,011,000,000 cu ft) since 1953; considerable natural storage in large lakes above Piercefield.

## STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

Monthly and yearly mean discharge, in cubic feet per second, of Raquette River at South Colton, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-	-	-	-
1953	-	-	-	1,343	1,457	1,784	3,071	3,654	1,208	847	1,007	992	-
1954	1,037	642	1,341	1,039	1,302	2,155	5,568	4,406	1,698	1,310	1,241	1,386	1,927
1955	1,668	1,462	1,809	2,335	1,586	2,377	5,002	2,210	1,724	949	927	906	1,912
1956	837	1,013	1,211	673	650	657	2,848	3,797	2,637	1,043	932	786	1,423
1957	1,205	626	1,274	1,096	1,446	1,384	1,173	1,747	1,596	1,455	1,009	888	1,242
1958	1,019	1,060	1,286	1,624	1,490	1,312	1,706	2,215	2,007	1,546	1,425	1,129	1,485
1959	1,409	1,358	1,500	1,245	1,656	1,893	3,162	3,039	1,589	1,324	967	1,057	1,682
1960	1,191	2,611	2,590	1,900	1,979	1,780	3,540	3,388	1,510	1,143	922	839	1,947

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-	-
1952	-	-	-	-	-	-	-	-	-	-
1953	1277	6,760	May 2, 1953	-	-	-	-	1,533	22.17	-
1954	1337	8,330	Apr. 22, 1954	4.8	1,927	2.05	27.87	2,088	30.20	-
1955	1387	8,050	Apr. 27, 1955	6.0	1,912	2.04	27.65	1,753	25.36	-
1956	1437	6,170	Apr. 25, 1956	6.8	1,423	1.52	20.63	1,428	20.69	-
1957	1507	3,610	June 5, Aug. 22	7.8	1,242	1.32	17.95	1,263	18.26	-
1958	1557	4,020	June 18, 1958	6.4	1,485	1.58	21.47	1,561	22.57	-
1959	1627	6,920	Apr. 29, 1959	10	1,682	1.79	24.32	1,859	26.86	-
1960	1707	7,100	May 2, 1960	10	1,947	2.07	28.23	-	-	-

2677. Parkhurst Brook near Potsdam, N. Y.

Location.--Lat 44°39'11", long 74°58'15", on right bank 60 ft upstream from bridge on State Highways 56 and 72, 0.3 mile upstream from mouth, and 1.2 miles southeast of campus of State University of New York, College of Education, at Potsdam, St. Lawrence County.

Drainage area.--17.8 sq mi.

Records available.--August 1958 to September 1960 (no winter records).

Gage.--Water-stage recorder. Datum of gage is 412.19 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge recorded, 463 cfs Apr. 4, 1960 (gage height, 6.09 ft); maximum gage height recorded, 6.97 ft Apr. 3, 1960 (ice jam); minimum discharge recorded, 1.7 cfs Aug. 29, 1960 (gage height, 2.89 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	8.31	-
1959	12.4	18.0	-	-	-	-	64.3	17.6	17.7	15.3	15.9	7.62	-
1960	23.1	25.2	-	-	-	-	99.0	21.3	16.5	5.03	2.62	3.37	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	0.52	-
1959	0.80	1.13	-	-	-	-	4.03	1.14	1.11	0.99	1.03	.48	-
1960	1.50	1.58	-	-	-	-	6.20	1.38	1.03	.33	.17	.21	-

Yearly discharge, in cubic feet per second

Year	WSP	The season					Calendar year		
		Maximum recorded		Minimum day recorded	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1627	-	-	3.6	-	-	-	-	-
1959	1627	295	Apr. 6, 1959	3.3	-	-	-	-	-
1960	1707	463	Apr. 4, 1960	1.9	-	-	-	-	-

## 2678. Trout Brook at Allen Corners, N. Y.

Location.--Lat 44°47'33", long 75°01'59", on left bank 250 ft upstream from bridge on State Highway 56A, at Allen Corners, St. Lawrence County, and 2 miles southwest of Norfolk.

Drainage area.--56.2 sq mi.

Records available.--September 1958 to September 1960 (no winter records).

Gage.--Water-stage recorder. Altitude of gage is 250 ft (from topographic map).

Extremes.--1958-60: Maximum discharge recorded, 1,010 cfs Sept. 3, 1959 (gage height, 8.14 ft), from rating curve extended above 620 cfs on basis of logarithmic plotting; maximum gage height recorded, 9.66 ft Mar. 21, 1959 (ice jam); no flow for part of Aug. 20, 21, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	1.90	-
1959	13.1	18.8	-	-	-	-	118	25.4	17.5	13.4	108	75.8	-
1960	90.9	76.2	-	-	-	-	-	56.5	34.4	1.53	.36	.77	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	0.04	-
1959	0.27	0.37	-	-	-	-	2.34	0.52	0.35	0.28	2.22	1.51	-
1960	1.86	1.51	-	-	-	-	-	1.16	.68	.03	.007	.02	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum recorded		Minimum day recorded	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1627	-	-	-	-	-	-	-	-
1959	1627	1,010	Sept. 3, 1959	0.4	-	-	-	-	-
1960	1707	655	Apr. 12, 1960	.1	-	-	-	-	-

## 2680. Raquette River at Raymondville, N. Y.

Location.--Lat 44°50'20", long 74°58'45", on right bank 250 ft upstream from old highway bridge at Raymondville, St. Lawrence County, 0.3 mile downstream from Trout Brook, 0.4 mile downstream from powerplant of Niagara Mohawk Power Corp., and 18 miles upstream from mouth.

Drainage area.--1,131 sq mi.

Records available.--November 1943 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 183.33 ft above mean sea level, datum of 1929.

Average discharge.--16 years (1944-60), 2,014 cfs.

Extremes.--1943-60: Maximum discharge, 11,000 cfs Apr. 17, 1954 (gage height, 7.60 ft); maximum gage height, 9.24 ft Feb. 22, 1954 (backwater from ice); minimum discharge, 4.4 cfs Oct. 15, 1951; minimum daily, 7.0 cfs Oct. 15, 1951; minimum gage height, 0.42 ft July 13, 1950.

Remarks.--Extensive diurnal fluctuation caused by power and industrial operation. Flow regulated by Carry Falls Reservoir (usable capacity, 5,011,000,000 cu ft) about 46 miles upstream, since 1953; considerable natural storage in large lakes above Piercefield. Records of chemical analyses and water temperatures for the period October 1959 to September 1960, are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second, of Raquette River at Raymondville, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	662	1,418	2,492	1,947	1,810	2,471	6,216	2,933	1,181	2,191	1,065	749	2,093
1952	577	1,688	2,223	2,038	1,947	2,073	4,504	3,095	1,844	1,145	625	512	1,852
1953	886	843	1,832	1,564	1,779	2,324	3,452	4,270	1,386	935	1,151	1,186	1,802
1954	1,178	767	1,540	1,256	1,718	2,970	6,344	4,879	1,870	1,459	1,368	1,727	2,256
1955	2,254	2,057	2,062	2,771	2,030	3,095	5,717	2,488	1,934	1,068	1,064	998	2,293
1956	1,008	1,155	1,263	699	672	866	3,744	4,452	2,929	1,152	1,030	950	1,659
1957	1,280	740	1,442	1,289	1,634	1,908	1,556	1,992	1,905	1,579	1,131	1,030	1,457
1958	1,138	1,275	1,623	1,740	1,766	1,958	2,558	2,586	2,174	1,826	1,537	1,301	1,756
1959	1,581	1,627	1,619	1,487	1,868	2,183	4,028	3,355	1,837	1,508	1,299	1,268	1,951
1960	1,606	3,080	3,285	2,292	2,376	2,127	5,188	3,943	1,845	1,360	1,057	988	2,425

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	1,829	21.94
1951	1207	7,980	Apr. 15, 1951	126	2,093	1.85	25.12	2,086	25.03
1952	1237	5,600	Apr. 15, 1952	7.0	1,852	1.84	22.29	1,776	21.37
1953	1277	8,920	May 3, 1953	290	1,802	1.59	21.62	1,796	21.55
1954	1337	11,000	Apr. 17, 1954	72	2,256	1.99	27.07	2,498	29.97
1955	1387	7,780	May 1, 1955	92	2,293	2.03	27.52	2,045	24.55
1956	1437	8,560	Apr. 30, 1956	178	1,659	1.47	19.97	1,664	20.01
1957	1507	4,190	June 4, 1957	272	1,457	1.29	17.48	1,505	18.06
1958	1557	4,210	May 16, 1958	126	1,756	1.55	21.08	1,821	21.85
1959	1627	2,100	Apr. 29, 1959	620	1,951	1.73	23.42	2,216	26.60
1960	1707	8,720	Apr. 4, 1960	722	2,425	2.14	29.19	-	-

Note.--Monthly figures of discharge per square mile and runoff in inches, previously published in water-supply papers, may not represent natural flow because of storage above station. These figures are not published herein.

2682. Plum Brook at Grantville, N. Y.

Location--Lat 44°52'45", long 74°54'52", on right bank 175 ft upstream from highway bridge at Grantville, St. Lawrence County, 0.7 mile downstream from tributary, 1.1 miles upstream from mouth, and 2.3 miles southwest of Massena city limits.

Drainage area--37.6 sq mi.

Records available--September 1958 to September 1960 (no winter records).

Gage--Water-stage recorder. Datum of gage is 204.26 ft above mean sea level, datum of 1929.

Extremes--1958-60: Maximum discharge recorded, 1,180 cfs Apr. 4, 1960 (gage height, 5.99 ft); no flow Aug. 11 to Sept. 5, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	0.57	-
1959	4.20	13.9	-	-	-	-	169	16.6	7.93	4.20	47.3	45.1	-
1960	55.3	53.6	-	-	-	-	381	33.6	22.5	1.17	.032	.087	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	0.02	-
1959	0.13	0.41	-	-	-	-	5.00	0.51	0.24	0.13	1.45	1.34	-
1960	1.70	1.59	-	-	-	-	11.30	1.03	.67	.04	.001	.003	-

Yearly discharge, in cubic feet per second

Year	WSP	The season					Calendar year	
		Maximum recorded		Minimum day recorded	Mean	Per square mile	Runoff in inches	Mean
		Discharge	Date					
1958	1627	-	-	0.1	-	-	-	-
1959	1627	608	Apr. 6, 1959	.6	-	-	-	-
1960	1707	1,180	Apr. 4, 1960	0	-	-	-	-



Location.--Lat 44°56'30", long 74°47'50", on downstream side of highway bridge on South Raquette River Road, 0.1 mile upstream from mouth and 4.7 miles east of Grass River bridge at Massena, St. Lawrence County.

Records available.--October 1958 to September 1960 (no winter records).

Gage.--Wire-weight gage. Altitude of gage is 180 ft (from topographic map). Prior to Apr. 4, 1960, water-stage recorder, at site 0.4 mile upstream at different datum.

Extremes.--1958-60: Maximum discharge recorded, 543 cfs Apr. 6, 1959 (gage height, 7.26 ft, site and datum then in use); maximum gage height recorded, 7.91 ft Apr. 2, 1959, site and datum then in use (ice jam); no flow July 28 to Oct. 5, Oct. 8-15, 17-19, 1960.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	16.5	-	-	-	-	105	13.1	7.34	1.24	5.03	9.72	-
1960	24.0	37.3	-	-	-	-	-	23.6	8.93	.26	0	0	-

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	-	-
1959	-	0.43	-	-	-	-	2.77	0.36	0.19	0.03	0.14	0.26	-
1960	0.65	.98	-	-	-	-	-	.64	.24	.007	0	0	-

Year	WSP	The season						Calendar year	
		Maximum observed		Minimum day observed	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1627	-	-	-	-	-	-	-	-
1959	1627	543	Apr. 6, 1959	0.2	-	-	-	-	-
1960	1707	459	Apr. 14, 1960	0	-	-	-	-	-

Location.--Lat 44°33'13", long 74°18'34", on left bank 20 ft upstream from bridge on State Highway 10, 30 ft downstream from dam at outlet of Meacham Lake, 2.1 miles southwest of town of Meacham Lake, Franklin County.

Records available.--August 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,547.86 ft above mean sea level, datum of 1929.

Extremes--1958-60: Maximum discharge, 762 cfs Apr. 19, 1960 (gage height, 4.74 ft); minimum, 17 cfs July 27, 1960.

Remarks.--Seasonal distribution of flow slightly modified by storage in lakes and ponds above station.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	75.5	-
1959	83.7	75.0	46.0	56.3	59.8	57.8	264	119	86.6	46.7	42.9	39.2	81.2
1960	77.3	79.5	83.3	53.0	66.3	45.1	32	140	65.3	29.1	28.3	37.1	86.0

## STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

Monthly and yearly runoff, in inches, of East Branch St. Regis River near Meacham Lake, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	1.70	-
1959	1.95	1.69	1.07	1.31	1.26	1.35	5.96	2.78	1.96	1.09	1.00	.88	22.30
1960	1.80	1.80	1.94	1.24	1.45	1.05	7.51	3.26	1.48	.68	.66	.84	23.71

## Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1627	-	-	-	-	-	-	-	-
1959	1627	436	Apr. 20, 1959	27	81.2	1.64	22.30	84.2	23.13
1960	1707	762	Apr. 19, 1960	21	86.0	1.74	23.71	-	-

2687. St. Regis River at St. Regis Falls, N. Y.

Location.--Lat 44°40'22", long 74°32'56", on left bank 150 ft upstream from lower bridge on State Highway 72 in St. Regis Falls, Franklin County, and 6.4 miles downstream from East Branch St. Regis River.

Drainage area.--230 sq mi.

Records available.--August 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,219.93 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge, 3,330 cfs Apr. 18, 1960 (gage height, 5.73 ft); minimum, 40 cfs Sept. 8, 1960 (gage height, 0.34 ft); minimum daily, 71 cfs July 3, 1960.

Remarks.--Slight regulation by small reservoirs above station.

## Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	387	-
1959	484	438	228	224	254	315	1,471	522	431	212	183	161	409
1960	350	351	431	269	354	257	1,784	541	294	133	109	185	419

## Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	1.88	-
1959	2.43	2.12	1.14	1.12	1.15	1.58	7.13	2.62	2.09	1.06	0.92	.78	24.14
1960	1.76	1.70	2.16	1.35	1.66	1.29	8.65	2.71	1.42	.67	.55	.90	24.82

## Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1627	-	-	-	-	-	-	-	-
1959	1627	2,120	Apr. 19, 1959	106	409	1.78	24.14	408	24.07
1960	1707	3,330	Apr. 18, 1960	71	419	1.82	24.82	-	-

## 2688. West Branch St. Regis River near Parishville, N. Y.

Location.--Lat 44°35'52", long 74°44'19", on right bank 25 ft upstream from highway bridge, 4.1 miles downstream from Mud Pond Outlet, 4.2 miles southeast of Parishville, St. Lawrence County, and 4.8 miles upstream from Niagara Mohawk Power Corp. dam.

Drainage area.--172 sq mi.

Records available.--October 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 971.64 ft above mean sea level, datum of 1929.

Extremes.--1958-60: Maximum discharge, 2,990 cfs Apr. 16, 1960 (gage height, 5.18 ft); minimum, 53 cfs Sept. 3, 4, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	325	314	168	215	191	264	1,195	353	281	152	148	118	313
1960	239	258	324	182	256	175	1,429	392	254	94.0	69.9	105	313

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	2.18	2.03	1.26	1.44	1.16	1.90	7.75	2.36	1.82	1.02	0.99	0.76	24.67
1960	1.60	1.67	2.17	1.22	1.60	1.17	9.27	2.63	1.64	.63	.47	.68	24.75

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	2,030	Apr. 19, 1959	58	313	1.82	24.67	313	24.64
1960	1707	2,990	Apr. 16, 1960	55	313	1.82	24.75	-	-

## 2689. Trout Brook at Stockholm Center, N. Y.

Location.--Lat 44°46'16", long 74°48'47", on right bank on downstream side of highway bridge, 0.7 mile upstream from mouth and 1 mile northeast of Stockholm Center, St. Lawrence County.

Drainage area.--44.9 sq mi.

Records available.--September 1958 to September 1960 (no winter records).

Gage.--Staff and crest-stage gages. Altitude of gage is 310 ft (from topographic map).

Extremes.--1958-60: Maximum discharge observed, about 900 cfs Apr. 4, 1960 (gage height, 5.14 ft, ice jam); minimum observed, 4.9 cfs Sept. 7-9, 1960.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	17.1	-
1959	31.2	34.6	-	-	-	-	172	34.3	24.4	25.3	32.3	26.4	-
1960	-	-	-	-	-	-	272	44.7	45.6	12.6	8.36	7.20	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	0.42	-
1959	0.80	0.86	-	-	-	-	4.28	0.88	0.61	0.65	0.83	.66	-
1960	-	-	-	-	-	-	6.76	1.15	1.13	.32	.21	.18	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum observed		Minimum day observed	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1627	-	-	7.1	-	-	-	-	-
1959	1627	693	Apr. 6, 1959	7.7	-	-	-	-	-
1960	1707	a900	Apr. 4, 1960	4.9	-	-	-	-	-

a. About.

## 2690. St. Regis River at Brasher Center, N. Y.

Location.--Lat 44°51'50", long 74°46'45", on left bank 600 ft upstream from highway bridge at Brasher Center, St. Lawrence County, and  $6\frac{1}{2}$  miles downstream from West Branch (revised).

Drainage area.--616 sq mi.

Records available.--August 1910 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 217.23 ft above mean sea level, datum of 1929. Prior to June 24, 1916, chain gage at site 600 ft downstream at different datum. June 24, 1916, to Nov. 10, 1917, and Jan. 1, 1919, to Aug. 13, 1920, staff gage at present site and datum.

Average discharge.--50 years (1910-60), 1,052 cfs.

Extremes.--1910-60: Maximum discharge, 16,800 cfs Apr. 6, 1937 (gage height, 12.82 ft); maximum gage height recorded, about 15.3 ft Apr. 6, 1937 (ice jam); minimum discharge observed, about 34 cfs Aug. 8, 1917 (gage height, 5.25 ft); minimum daily, 37 cfs Aug. 8, 1917.

Remarks.--Slight diurnal fluctuation caused by powerplant operations above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	561	1,149	1,202	1,494	1,126	1,860	3,101	907	568	1,061	453	383	1,154
1952	363	1,028	682	1,004	823	987	2,549	1,297	757	450	219	283	867
1953	666	550	969	1,048	1,008	2,180	1,889	2,040	477	493	769	491	1,051
1954	478	435	934	651	1,574	1,927	4,099	1,779	1,075	654	737	1,400	1,305
1955	1,835	1,465	1,400	982	561	2,935	4,123	1,119	358	521	335	1,366	
1956	707	684	412	365	354	490	3,250	2,943	977	364	272	479	939
1957	388	423	680	542	578	1,291	1,546	1,377	743	461	263	333	719
1958	314	560	1,274	475	305	532	3,049	1,340	817	473	497	677	859
1959	938	939	530	565	694	853	3,610	1,066	921	493	419	366	946
1960	803	824	1,074	555	814	675	4,479	1,224	772	258	176	309	991

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.05	2.08	2.25	2.80	1.90	3.48	5.62	1.70	1.03	1.99	0.85	0.69	25.44
1952	.68	1.86	1.28	1.88	1.44	1.85	4.62	2.43	1.37	.84	.41	.51	19.17
1953	1.25	1.00	1.81	1.96	1.70	4.08	3.42	3.82	.92	1.44	.89		23.15
1954	.89	.79	1.75	1.22	2.66	3.61	7.42	3.33	1.95	1.22	1.38	2.54	28.76
1955	3.43	2.65	2.62	1.84	.95	5.49	7.47	2.09	1.33	.63	.97	.61	30.08
1956	1.32	1.24	.77	.68	.59	.92	5.89	5.51	1.77	.68	.51	.87	20.75
1957	.73	.77	1.27	1.01	.98	2.42	2.80	2.58	1.35	.86	.49	.60	15.86
1958	.59	1.01	2.38	.89	.52	.99	5.52	2.51	1.48	.88	.93	1.23	18.93
1959	1.75	1.70	.99	1.06	1.17	1.60	6.54	1.99	1.67	.92	.78	.66	20.83
1960	1.50	1.49	2.01	1.04	1.42	1.26	8.11	2.29	1.40	.48	.33	.56	21.89

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	994	21.91
1951	1207	9,150	Apr. 1, 1951	285	1,154	1.87	25.44	1,083	23.88
1952	1237	5,140	Apr. 6, 1952	142	867	1.41	19.17	878	19.41
1953	1277	5,720	Mar. 27, 1953	232	1,051	1.71	23.15	1,022	22.52
1954	1337	9,840	Apr. 9, 1954	259	1,305	2.12	28.76	1,544	34.03
1955	1387	13,900	Mar. 12, 1955	214	1,366	2.22	30.08	1,122	24.71
1956	1437	9,810	Apr. 30, 1956	217	939	1.52	20.75	913	20.19
1957	1507	3,510	May 16, 1957	138	719	1.17	15.86	775	17.07
1958	1557	5,720	Apr. 18, 1958	207	859	1.39	18.93	880	19.39
1959	1627	6,400	Apr. 6, 1959	184	946	1.54	20.83	971	21.39
1960	1707	9,330	Apr. 4, 1960	143	991	1.61	21.89	-	-

## 2691. Lawrence Brook near Moira, N. Y.

Location.--Lat 44°50'22", long 74°35'46", on left bank on downstream side of highway bridge, 2.4 miles northwest of Moira, Franklin County, and 5.4 miles upstream from mouth.

Drainage area.--28.0 sq mi.

Records available.--September 1958 to September 1960 (no winter records).

Gage.--Staff and crest-stage gages. Datum of gage is 303.56 ft above mean sea level, adjustment of 1912.

Extremes.--1958-60: Maximum discharge observed, 907 cfs Apr. 4, 1960 (gage height, 6.03 ft); maximum gage height observed, 6.99 ft Mar. 31, 1960 (ice jam); minimum discharge observed, 2.8 cfs Sept. 10, 1960 (gage height, 2.06 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	8.84	-
1959	22.4	16.2	-	-	-	-	80.3	16.9	15.6	7.80	8.44	6.82	-
1960	19.5	20.2	-	-	-	-	137	28.2	18.7	6.54	4.15	4.40	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	0.35	-
1959	0.92	0.65	-	-	-	-	3.20	0.70	0.62	0.32	0.35	.27	-
1960	.80	.80	-	-	-	-	5.45	1.16	.74	.27	.17	.18	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum observed		Minimum day observed	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1958	1627	-	-	4.6	-	-	-	-	-
1959	1627	364	Apr. 2, 1959	3.6	-	-	-	-	-
1960	1707	907	Apr. 4, 1960	2.9	-	-	-	-	-

## 2695. Deer River at Brasher Iron Works, N. Y.

Location.--Lat 44°53'32", long 74°41'28", on left bank 400 ft upstream from highway bridge, at Brasher Iron Works, St. Lawrence County, 2.6 miles southeast of Helena, 3.6 miles upstream from mouth, and 3.8 miles downstream from Lawrence Brook.

Drainage area.--189 sq mi.

Records available.--July 1912 to September 1916, August 1958 to September 1960. Monthly discharge only for some periods, published in WSP 1307. Published as "at Ironton" prior to 1913.

Gage.--Water-stage recorder. Datum of gage is 211.97 ft above mean sea level, datum of 1929. July 1912 to September 1916 staff gage at site 1,400 ft downstream at different datum.

Average discharge.--6 years (1912-16, 1958-60), 230 cfs.

Extremes.--1912-16, 1958-60: Maximum discharge, 9,700 cfs Jan. 17, 1913 (gage height, 9.3 ft, site and datum then in use), from rating curve extended above 3,000 cfs by logarithmic plotting; minimum observed, 17 cfs Aug. 19, 20, Sept. 14, 1913 (gage height, 0.80 ft, site and datum then in use).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	115	-
1959	189	194	116	139	132	266	689	175	178	76.9	66.2	78.2	191
1960	170	209	333	120	241	200	1,423	227	176	49.6	33.7	50.9	267

## STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

Monthly and yearly runoff, in inches, of Deer River at Brasher Iron Works, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1958	-	-	-	-	-	-	-	-	-	-	-	0.68	-
1959	1.15	1.15	0.71	0.85	0.72	1.63	4.07	1.07	1.05	0.47	0.40	.46	13.73
1960	1.04	1.23	2.03	.73	1.37	1.22	8.40	1.38	1.04	.30	.21	.30	19.25

## Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1627	2,000	Apr. 7, 1959	41	191	1.01	13.73	209	15.02
1960	1707	5,090	Apr. 4, 1960	26	267	1.41	19.25	-	-

2700. Salmon River at Chasm Falls, N. Y.

Location.--Lat 44°45'20", long 74°13'10", on right bank a quarter of a mile downstream from powerplant of Niagara Mohawk Power Corp. at Chasm Falls, Franklin County, and 3 miles downstream from Duane Stream.

Drainage area.--132 sq mi.

Records available.--July 1925 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 1,011.52 ft above mean sea level, datum of 1929.

Average discharge.--35 years (1925-60), 225 cfs.

Extremes.--1925-60: Maximum discharge, 2,890 cfs Apr. 25, 1926 (gage height, 5.0 ft); minimum, 12 cfs Sept. 2, 1960 (gage height, 0.47 ft); minimum daily, 28 cfs Sept. 4, 1934.

Remarks.--Seasonal regulation of flow by upstream reservoirs. Diurnal fluctuation at low and medium flow caused by powerplant. A small diversion from tributary stream above station is used as water supply for village of Malone.

## Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	131	259	258	233	198	279	677	222	182	235	134	146	244
1952	117	216	205	193	162	175	516	281	166	108	78.9	123	195
1953	130	134	195	187	190	434	410	343	125	142	118	102	210
1954	139	122	157	130	220	279	810	326	225	130	180	282	249
1955	391	257	255	233	173	325	853	224	181	126	156	134	276
1956	161	162	127	109	106	114	561	618	218	119	103	132	211
1957	123	120	144	139	142	228	284	276	160	152	103	124	167
1958	98.4	139	217	143	107	119	589	253	197	165	128	192	195
1959	242	242	158	167	143	175	658	222	214	119	128	112	215
1960	201	187	205	147	179	147	890	260	169	94.2	84.2	112	222

## Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	214	22.05
1951	1207	1,690	Mar. 31, 1951	68	244	1.85	25.07	237	24.30
1952	1237	995	Apr. 11, 1952	46	195	1.48	20.08	188	19.41
1953	1277	1,310	Mar. 27, 1953	63	210	1.59	21.56	206	21.20
1954	1337	2,100	Apr. 17, 1954	71	249	1.89	25.58	290	29.79
1955	1387	2,300	Apr. 16, 1955	96	276	2.09	28.35	237	24.42
1956	1437	2,440	Apr. 30, 1956	67	211	1.60	21.74	205	21.19
1957	1507	685	May 21, 1957	62	167	1.27	17.12	172	17.72
1958	1557	1,560	Apr. 22, 1958	71	195	1.48	20.11	211	21.71
1959	1627	981	Apr. 7, 1959	65	215	1.63	22.08	211	21.66
1960	1707	2,100	Apr. 16, 1960	45	222	1.68	22.88	-	-

Note.--Monthly figures of discharge per square mile and runoff in inches, previously published in water-supply papers, may not represent natural flow because of storage above gage. These figures are not published herein.

## 2702. Little Salmon River at Bombay, N. Y.

Location.--Lat 44°56'24", long 74°33'24", on right bank 50 ft downstream from highway bridge, half a mile east of village of Bombay, Franklin County, and 7.2 miles upstream from mouth.

Drainage area.--93.6 sq mi.

Records available.--August to November 1957, July 1958 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 173.91 ft above mean sea level, datum of 1929. August to November 1957, at site 100 ft upstream at datum 0.72 ft higher.

Extremes.--1957-60: Maximum discharge, about 1,800 cfs Apr. 4, 1960 (gage height, 12.40 ft, backwater from ice); minimum, 10 cfs Sept. 2, 1957 (gage height, 0.85 ft, site and datum then in use).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	-	-	-	18.0	30.6	-
1958	19.5	44.4	-	-	-	-	-	-	-	51.7	25.7	45.9	-
1959	86.1	75.2	43.3	55.2	56.7	138	331	67.9	78.1	29.6	31.7	36.1	85.5
1960	79.5	94.5	160	56.0	119	92.4	537	92.3	76.0	23.7	14.5	19.9	113

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1957	-	-	-	-	-	-	-	-	-	-	0.22	0.38	-
1958	0.24	0.53	-	-	-	-	-	-	-	0.64	.32	.55	-
1959	1.06	.90	0.53	0.68	0.63	1.70	3.95	0.84	0.93	.37	.39	.43	12.41
1960	.98	1.13	1.97	.69	1.38	1.14	6.41	1.14	.91	.29	.18	.24	16.46

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1957	1627	-	-	all	-	-	-	-	-
1958	1627	-	-	13	-	-	-	-	-
1959	1627	1,130	Apr. 6, 1959	13	85.5	0.913	12.41	96.4	14.00
1960	1707	61,800	Apr. 4, 1960	12	113	1.21	16.46	-	-

a Minimum day recorded.

b About.

## 2705. Chateaugay River near Chateaugay, N. Y.

Location.--Lat 44°54'35", long 74°05'10", on right bank 150 ft downstream from dam of International Hydroelectric Corp., 1 mile south of Chateaugay, Franklin County, and 5 miles upstream from Marble River.

Drainage area.--112 sq mi.

Records available.--September to December 1908, October 1926 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 847.04 ft above mean sea level, datum of 1929. September to December 1908, staff gage  $2\frac{1}{4}$  miles downstream at different datum.

Average discharge.--34 years (1926-60), 175 cfs.

Extremes.--1908, 1926-60: Maximum discharge, 2,060 cfs Apr. 8, 1928 (gage height, 7.3 ft), from rating curve extended above 1,300 cfs by logarithmic plotting; minimum, 6 cfs Nov. 20, 1928 (gage height, 0.23 ft); minimum daily, 26 cfs July 8, 1934.

Remarks.--Flow regulated by Upper and Lower Chateaugay Lakes. Considerable diurnal fluctuation caused by power operations prior to 1953.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	99.5	163	246	209	247	227	482	170	158	193	116	108	201
1952	98.3	126	141	194	200	183	358	210	142	85.5	81.2	74.9	157
1953	86.6	85.5	132	162	199	257	416	280	99.4	111	100	107	169
1954	124	112	107	102	163	266	622	318	181	114	115	232	204
1955	343	221	279	230	180	276	611	153	132	80.3	113	198	235
1956	95.6	67.1	64.6	62.7	124	134	363	490	178	81.0	73.8	84.8	152
1957	85.9	76.7	91.6	111	139	175	155	209	108	91.1	90.7	67.1	115
1958	79.4	80.9	169	192	130	151	514	218	150	95.7	97.5	95.9	162
1959	176	292	128	136	177	172	460	126	176	87.2	58.6	62.3	170
1960	104	165	182	138	151	187	774	196	99.1	39.7	45.5	64.8	176

Yearly discharge, in cubic feet per second, of Chateaugay River near Chateaugay, N. Y.

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	187	20.27
1951	1207	719	Apr. 15, 1951	95	201	1.79	24.33	189	22.88
1952	1237	545	Mar. 11, 1952	71	157	1.40	19.12	152	18.50
1953	1277	1,330	Jan. 8, 1953	71	169	1.51	20.53	173	20.93
1954	1337	1,180	Apr. 18, 1954	78	204	1.82	24.74	246	29.85
1955	1387	1,220	Apr. 15, 1955	72	235	2.10	28.43	183	22.14
1956	1437	1,050	May 1, 1956	54	152	1.36	18.42	154	18.68
1957	1507	407	May 22, 1957	54	115	1.03	13.91	121	14.69
1958	1557	1,390	Apr. 22, 1958	67	162	1.45	19.68	184	22.36
1959	1627	748	Apr. 20, 1959	54	170	1.52	20.61	156	18.95
1960	1707	1,450	Apr. 18, 1960	33	176	1.57	21.41	-	-

2707. Trout River at Trout River, N. Y.

Location.--Lat 44°59'23", long 74°17'56", on left bank at downstream side of county highway bridge, 0.2 mile east of State Highway 10 at Trout River, Franklin County, 0.5 mile upstream from international boundary, 1.5 miles downstream from unnamed tributary, and 3.3 miles downstream from Little Trout River.

Drainage area.--107 sq mi.

Records available.--October 1959 to September 1960 (no winter records).

Gage.--Water-stage recorder. Datum of gage is 219.97 ft above mean sea level, datum of 1929.

Extremes.--1959-60: Maximum discharge recorded, 4,110 cfs Apr. 4, 1960 (gage height, 6.63 ft), from rating curve extended above 2,100 cfs by logarithmic plotting; maximum gage height recorded, 7.36 ft Mar. 31, 1960 (ice jam); minimum discharge observed, 6.9 cfs Aug. 20, 1960 (gage height, 0.91 ft).

Remarks.--Diversion for irrigation of a few acres above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	66.6	93.4	-	-	-	-	898	119	64.2	21.8	15.0	24.6	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1960	0.72	0.97	-	-	-	-	9.36	1.28	0.67	0.24	0.16	0.26	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum recorded		Minimum day recorded	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1960	1707	4,110	Apr. 4, 1960	8.7	-	-	-	-	-



## 2708. English River near Mooers Forks, N. Y.

Location.--Lat 44°58'32", long 73°39'49", on right bank at downstream side of highway bridge, 1.6 miles upstream from unnamed tributary, 1.7 miles northwest of Mooers Forks, Clinton County, and 2.5 miles upstream from international boundary.

Drainage area.--40.8 sq mi.

Records available.--October 1959 to September 1960 (no winter records).

Gage.--Water-stage recorder. Datum of gage is 406.93 ft above mean sea level, datum of 1929.

Extremes.--1959-60: Maximum discharge recorded, 1,750 cfs Apr. 3, 1960 (gage height, 6.24 ft), from rating curve extended above 600 cfs by logarithmic plotting; minimum recorded, 0.6 cfs Aug. 13, 14, 18, 19, 1960.

Remarks.--Slight diurnal fluctuation at low flows.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	12.5	30.5	-	-	-	-	377	28.5	7.34	2.40	2.37	5.13	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	-	-	-	-	-	-	-	-	-	-	-	-
1960	0.35	0.83	-	-	-	-	10.32	0.81	0.20	0.07	0.07	0.09	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum recorded		Minimum day recorded	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1707	-	-	-	-	-	-	-	-
1960	1707	1,750	Apr. 3, 1960	1.0	-	-	-	-	-

## 2715. Great Chazy River at Perry Mills, N. Y.

Location.--Lat 45°00'00", long 73°30'05", on left bank 500 ft upstream from highway bridge at Perry Mills, Clinton County, and 7½ miles upstream from Corbeau Creek.

Drainage area.--247 sq mi.

Records available.--September 1928 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 164.93 ft above mean sea level, datum of 1929.

Average discharge.--32 years (1928-60), 268 cfs.

Extremes.--1928-60: Maximum discharge, 6,000 cfs Apr. 7, 1937 (gage height, 9.74 ft); maximum gage height, 11.5 ft Mar. 9, 1946, from floodmark (ice jam); minimum discharge, about 0.8 cfs Sept. 18, 1932 (gage height, 1.33 ft); minimum daily, 10 cfs Sept. 18, 1932.

Remarks.--Diurnal fluctuation at low and medium flow caused by sawmill immediately upstream. Slight regulation by Chazy Lake, from which Clinton Prison at Dannemore obtains its water supply.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	89.7	271	337	330	278	577	1,008	240	164	232	85.8	78.6	307
1952	87.9	161	168	219	219	287	930	258	199	78.7	98.8	106	235
1953	89.5	85.5	166	161	193	618	696	558	142	128	125	90.5	253
1954	106	64.8	147	107	400	681	1,196	524	383	111	126	368	358
1955	589	544	394	334	264	502	1,253	215	126	68.5	116	98.5	375
1956	85.0	74.6	48.1	51.7	46.5	70.5	1,037	543	217	64.7	51.3	68.5	196
1957	36.3	40.2	110	123	109	282	304	317	118	85.8	47.9	49.8	136
1958	43.4	61.6	235	152	170	256	1,613	317	206	97.7	79.6	155	281
1959	380	267	187	198	204	298	1,104	147	194	62.0	49.5	55.7	261
1960	133	147	317	240	287	283	1,653	261	125	54.8	55.3	63.9	299

## STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

Monthly and yearly runoff, in inches, of Great Chazy River at Perry Mills, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.42	1.22	1.57	1.54	1.17	2.70	4.55	1.12	0.74	1.08	0.40	0.36	16.87
1952	.41	.73	.78	1.02	.96	1.34	4.20	1.20	.90	.37	.46	.48	12.85
1953	.41	.29	.78	.75	.81	2.88	3.14	2.61	.64	.80	.58	.41	13.90
1954	.50	.29	.69	.50	1.69	3.18	5.40	2.91	1.73	.59	1.66	1.66	19.66
1955	2.75	2.46	1.84	1.56	1.11	2.34	5.66	1.00	.57	.32	.54	.44	20.59
1956	.40	.34	.22	.24	.20	.33	4.68	2.53	.98	.30	.24	.31	10.77
1957	.17	.18	.51	.57	.46	1.32	1.37	1.48	.53	.40	.22	.22	7.43
1958	.20	.28	1.10	.71	.72	1.20	7.29	1.48	.93	.46	.57	.70	15.44
1959	1.78	1.20	.87	.92	.86	1.39	4.99	.69	.88	.29	.23	.25	14.35
1960	.62	.66	1.48	1.12	1.26	1.32	7.47	1.22	.57	.26	.26	.29	16.53

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	235	-	12.88
1951	1207	4,750	Mar. 31, 1951	39	307	1.24	16.87	283	-	15.58
1952	1237	2,990	Apr. 6, 1952	41	233	.943	12.85	225	-	12.41
1953	1277	2,530	Mar. 31, 1953	36	253	1.02	13.90	253	-	13.90
1954	1337	4,580	Apr. 9, 1954	41	358	1.45	19.66	459	-	25.23
1955	1387	5,700	Apr. 6, 1955	44	375	1.52	20.59	264	-	14.50
1956	1437	3,280	Apr. 30, 1956	27	196	.794	10.77	194	-	10.67
1957	1507	1,920	May 21, 1957	23	136	.551	7.43	149	-	8.15
1958	1557	4,750	Apr. 19, 1958	26	281	1.14	15.44	322	-	17.71
1959	1627	4,780	Apr. 3, 1959	32	261	1.06	14.35	241	-	13.26
1960	1707	5,300	Apr. 4, 1960	29	299	1.21	16.53	-	-	-

2735. Saranac River at Plattsburgh, N. Y.

Location.--Lat 44°40'50", long 73°28'20", on right bank at Plattsburgh, Clinton County, 600 ft downstream from Imperial Paper & Color Corp. dam, 3 miles upstream from mouth, and 5½ miles downstream from Mead Brook.

Drainage area.--608 sq mi.

Records available.--March 1903 to September 1930, October 1943 to September 1960. Published as "near Plattsburgh," 1903-30.

Gage.--Water-stage recorder. Datum of gage is 155.74 ft above mean sea level, datum of 1929. Prior to Nov. 12, 1919, staff gage and Nov. 12, 1919, to Sept. 30, 1930, water-stage recorder, at site 1.5 miles upstream at different datum.

Average discharge.--44 years (1903-30, 1943-60), 832 cfs.

Extremes.--1903-30, 1943-60: Maximum discharge, 11,500 cfs Apr. 8, 1928, from computation of flow over dam and through waste gates and powerplant; minimum daily, 18 cfs June 19, 1949.

Remarks.--Considerable diurnal fluctuation caused by power and industrial operations. Regulation by storage in Lower Saranac Lake and elsewhere. Small amount of diversion from Saranac River and tributaries above station for municipal supply of Plattsburgh. Records of chemical analyses for the period October 1957 to September 1959 are published in reports of the Geological Survey.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	456	762	1,045	783	753	1,205	2,447	925	608	973	511	425	907
1952	378	759	749	736	753	814	1,948	1,023	758	420	311	271	740
1953	335	315	577	710	715	1,222	1,462	1,434	506	360	447	389	706
1954	357	340	486	476	738	1,266	3,276	1,500	954	789	563	859	965
1955	1,189	1,062	940	899	902	1,123	3,153	907	879	533	391	362	1,026
1956	483	572	527	549	528	467	1,837	2,377	1,042	437	300	352	789
1957	280	376	490	504	698	840	698	1,107	623	399	341	358	559
1958	322	330	684	613	648	662	2,103	1,077	765	426	486	459	713
1959	754	788	654	550	724	883	2,466	982	742	468	467	356	816
1960	502	701	941	713	807	901	3,229	1,322	683	472	497	342	923

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30					Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	784	-	17.48
1951	1207	5,640	Mar. 31, 1951	204	907	1.49	20.25	874	-	19.51
1952	1237	4,510	Apr. 6, 1952	112	740	1.22	16.58	687	-	15.39
1953	1277	3,560	Mar. 28, 1953	188	706	1.16	15.78	703	-	15.69
1954	1337	6,760	Apr. 17, 1954	193	965	1.59	21.53	1,133	-	25.29
1955	1387	6,190	Apr. 15, 1955	212	1,026	1.69	22.88	690	-	19.87
1956	1437	7,200	Apr. 30, 1956	121	789	1.30	17.68	753	-	16.86
1957	1507	2,780	May 21, 1957	69	559	.919	12.49	575	-	12.86
1958	1557	5,370	Apr. 22, 1958	106	713	1.17	15.91	783	-	17.47
1959	1627	4,540	Apr. 18, 1959	240	816	1.34	18.20	813	-	18.16
1960	1707	7,600	Apr. 15, 1960	60	923	1.52	20.67	-	-	-

Note.--Monthly figures of discharge per square mile and runoff in inches, previously published in water-supply papers, do not represent natural flow because of diversions and storage above station. These figures are not published herein.

## 2737. Salmon River at South Plattsburgh, N. Y.

Location.--Lat 44°38'24", long 73°29'43", on left bank at bridge on Salmon River Road, at South Plattsburgh, Clinton County, 0.4 mile west of State Highway 22 and 3.9 miles upstream from mouth.

Drainage area.--61.9 sq mi.

Records available.--Occasional low-flow measurements, water year 1954, 1957-58. May 1959 to September 1960 (no winter records).

Gage.--Water-stage recorder. Datum of gage is 220.53 ft above mean sea level, datum of 1929.

Extremes.--1959-60: Maximum discharge recorded, 1,010 cfs Apr. 3, 1960 (gage height, 4.54 ft); maximum gage height recorded, 7.31 ft Apr. 3, 1960 (ice jam); minimum discharge recorded, 5.8 cfs Aug. 2, 3, 1959 (gage height, 0.83 ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	-	-	-	-	-	-	35.6	29.2	11.5	10.6	9.98	-
1960	27.1	33.9	-	-	-	-	294	66.2	38.8	16.9	14.3	17.6	-

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1959	-	-	-	-	-	-	-	0.66	0.53	0.21	0.20	0.18	-
1960	0.50	0.61	-	-	-	-	5.30	1.23	.70	.32	.27	.32	-

Yearly discharge, in cubic feet per second

Year	WSP	The season						Calendar year	
		Maximum recorded		Minimum day recorded	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1959	1707	-	-	5.8	-	-	-	-	-
1960	1707	1,010	Apr. 3, 1960	9.2	-	-	-	-	-

## 2740. West Branch Ausable River near Lake Placid, N. Y.

Location.--Lat 44°18'40", long 73°55'00", on right bank 4 miles northeast of Lake Placid, Essex County, and 4 miles downstream from Lake Placid Outlet.

Drainage area.--116 sq mi.

Records available.--June 1916 to December 1917, July 1919 to September 1960. Prior to October 1956, published as "near Newman."

Gage.--Water-stage recorder. Datum of gage is 1,620.76 ft above mean sea level, datum of 1929. Prior to July 14, 1927, staff gage at same site and datum.

Average discharge.--41 years (1919-60), 219 cfs.

Extremes.--1916-17, 1919-60: Maximum discharge, 10,800 cfs Sept. 22, 1938 (gage height, 12.20 ft), from rating curve extended above 4,100 cfs by logarithmic plotting; practically no flow Sept. 13, 1920 (gage height, 1.60 ft), caused by closing gates in logging dam; minimum daily, 7.2 cfs July 29, 1920.

Remarks.--Diurnal fluctuation at low and medium flow caused by mills above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	80.2	324	275	139	128	285	664	348	131	280	115	123	241
1952	104	291	234	165	122	148	722	391	207	69.0	91.1	63.8	217
1953	88.6	107	204	174	156	563	535	436	68.2	55.1	142	81.7	218
1954	85.4	118	198	88.8	270	246	987	433	277	139	127	397	279
1955	255	250	192	129	109	250	874	295	226	74.5	126	87.7	239
1956	209	229	92.2	69.6	70.7	79.3	545	762	211	87.7	45.1	76.5	207
1957	70.8	103	124	150	113	142	344	324	199	130	67.6	74.3	154
1958	82.4	181	408	108	71.8	84.3	808	362	242	141	100	187	231
1959	191	203	69.1	133	72.0	69.9	736	382	275	87.7	82.1	58.2	196
1960	304	363	232	109	192	140	999	341	150	112	92.6	91.0	259

Monthly and yearly runoff, in inches, of West Branch Ausable River near Lake Placid, N. Y.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.80	3.11	2.74	1.38	1.15	2.83	6.38	3.46	1.26	2.78	1.14	1.18	28.21
1952	1.04	2.80	2.33	1.64	1.14	1.47	6.95	3.88	1.99	.69	.91	.61	25.45
1953	.88	1.03	2.03	1.73	1.40	5.60	5.14	4.33	.66	.55	1.41	.79	25.55
1954	.85	1.14	1.97	.88	2.43	2.45	9.49	4.31	2.67	1.38	1.26	3.82	32.65
1955	2.53	2.41	1.91	1.28	.97	2.48	8.40	2.93	2.18	.74	1.25	.84	27.92
1956	2.08	2.20	.92	.69	.66	.79	5.24	7.58	2.03	.87	.45	.74	24.25
1957	.70	.99	1.23	1.49	1.01	1.41	3.31	3.22	1.91	1.29	.67	.71	17.94
1958	.82	1.74	4.06	1.07	.64	.84	7.77	3.59	2.32	1.40	1.00	1.80	27.05
1959	1.90	1.96	.69	1.32	.65	.70	7.08	3.80	2.64	.87	.82	.56	22.99
1960	3.02	3.49	2.30	1.08	1.78	1.39	9.61	3.39	1.44	1.11	.92	.87	30.40

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	205	24.05	
1951	1207	4,070	Nov. 26, 1950	55	241	2.08	28.21	237	27.73	
1952	1237	2,250	Apr. 6, 1952	36	217	1.87	25.45	198	23.22	
1953	1277	4,340	Mar. 27, 1953	39	218	1.88	25.55	218	25.57	
1954	1337	4,300	Apr. 17, 1954	43	279	2.41	32.65	304	35.54	
1955	1387	3,350	Apr. 15, 1955	43	239	2.06	27.92	225	26.27	
1956	1437	3,800	Apr. 30, 1956	39	207	1.78	24.25	187	21.97	
1957	1507	4,240	Jan. 23, 1957	38	154	1.33	17.94	185	21.64	
1958	1557	5,700	Dec. 21, 1957	41	231	1.99	27.05	213	24.98	
1959	1627	1,570	Apr. 3, 1959	41	196	1.69	22.99	233	27.25	
1960	1707	3,220	Apr. 4, 1960	42	259	2.23	30.40	-	-	

2745. Black Brook at Black Brook, N. Y.

Location.--Lat 44°26'50", long 73°44'45", on right bank three-quarters of a mile south of hamlet of Black Brook, Clinton County, and 1½ miles upstream from mouth.Drainage area.--49.4 sq mi.Records available.--September 1924 to September 1960.Gage.--Water-stage recorder. Datum of gage is 888.48 ft above mean sea level, datum of 1929. Prior to Oct. 24, 1936, staff gage at same site and datum.Average discharge.--36 years (1924-60), 49.3 cfs.Extremes.--1924-60: Maximum discharge, 1,050 cfs Apr. 6, 1937 (gage height, 6.95 ft), from rating curve extended above 700 cfs by logarithmic plotting; minimum, 0.8 cfs July 2, Aug. 29, 1931.Remarks.--Appreciable regulation by Fern Lake and Taylor Pond.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	45.7	47.8	49.9	41.6	32.1	69.4	157	54.7	29.4	93.8	52.6	42.4	59.8
1952	28.0	38.8	27.0	34.6	29.5	39.5	164	55.2	49.6	30.0	31.6	49.2	47.9
1953	27.2	29.1	27.8	21.2	22.9	58.3	66.2	62.3	29.3	42.5	30.3	59.0	39.7
1954	49.8	17.8	20.0	17.2	47.8	55.3	176	81.3	38.4	28.9	51.5	42.4	52.0
1955	56.0	81.8	72.2	55.9	63.1	134	177	33.6	25.1	26.7	30.8	43.3	66.5
1956	29.7	22.4	21.9	32.2	57.3	54.2	129	90.8	37.0	12.3	33.9	37.0	46.3
1957	27.3	27.7	17.7	21.0	51.3	29.9	35.7	45.8	14.4	7.70	41.7	19.5	26.6
1958	9.96	12.2	35.3	21.2	14.7	57.8	157	49.2	28.9	15.0	25.8	41.1	39.0
1959	41.4	41.3	51.9	60.6	65.3	75.9	156	23.9	18.5	6.51	36.7	20.5	49.6
1960	23.3	28.3	56.5	65.0	37.7	26.9	178	50.8	49.8	26.8	15.9	33.8	49.2

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year		
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	46.0	12.64	
1951	1207	542	Mar. 31, 1951	10	59.8	1.21	16.44	55.6	15.29	
1952	1237	459	Apr. 6, 1952	7.2	47.9	.970	13.19	47.1	12.97	
1953	1277	241	Mar. 27, 1953	5.0	39.7	.804	10.92	40.1	11.01	
1954	1337	530	Apr. 8, 1954	10	52.0	1.05	14.30	62.2	17.11	
1955	1387	505	Apr. 7, 1955	6.6	66.5	1.35	18.26	55.1	15.13	
1956	1437	532	Apr. 30, 1956	5.7	46.3	.957	12.76	46.2	12.73	
1957	1507	175	May 21, 1957	3.9	26.6	.538	7.51	25.3	6.95	
1958	1557	478	Apr. 18, 1958	5.2	39.0	.789	10.72	45.5	12.49	
1959	1627	330	Apr. 3, 1959	2.6	49.6	1.00	13.64	47.4	13.03	
1960	1707	466	Apr. 15, 1960	5.5	49.2	.996	13.56	-	-	

2750. East Branch Ausable River at Au Sable Forks, N. Y.

Location.--Lat 44°26'20", long 73°40'55", on left bank 700 ft upstream from upper highway bridge in Au Sable Forks, Essex County, and half a mile upstream from confluence with West Branch.

Drainage area.--198 sq mi.

Records available.--September 1924 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 545.37 ft above mean sea level, datum of 1929. Prior to Sept. 21, 1938, staff gage at lower highway bridge in Au Sable Forks, 400 ft upstream from confluence with West Branch at datum 3.54 ft lower.

Average discharge.--36 years (1924-60), 310 cfs.

Extremes.--1924-60: Maximum discharge, 20,100 cfs Sept. 22, 1938 (gage height, 12.91 ft), from rating curve extended above 5,800 cfs by logarithmic plotting on basis of velocity-area studies; minimum observed, 20 cfs Aug. 11, 14, 28, 1934.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	77.2	368	400	189	194	474	1,112	554	230	353	110	116	348
1952	123	430	328	229	176	225	1,302	657	245	72.2	95.0	65.7	328
1953	74.6	140	318	237	187	840	799	707	75.5	54.5	147	97.0	308
1954	97.5	179	285	101	432	450	1,577	762	312	163	131	513	414
1955	512	522	291	166	126	376	1,396	435	304	73.1	172	91.7	355
1956	379	315	100	67.5	73.7	87.4	900	1,048	284	110	38.5	67.2	289
1957	71.6	94.5	120	140	96.0	182	458	403	299	153	54.0	56.2	177
1958	79.8	207	581	122	76.9	101	1,460	527	302	146	77.9	193	323
1959	214	220	74.8	158	74.5	64.9	1,185	503	299	70.7	66.5	80.2	250
1960	540	471	364	130	262	203	1,680	606	241	119	98.5	101	400

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.45	2.08	2.33	1.10	1.02	2.76	6.27	3.23	1.29	2.06	0.64	0.66	23.89
1952	.72	2.42	1.91	1.34	.96	1.31	7.34	3.82	1.38	.42	.55	.37	22.54
1953	.43	.79	1.95	1.38	.98	4.89	4.50	4.11	.43	.32	.86	.55	21.09
1954	.57	1.01	1.66	.59	2.27	2.62	8.88	4.44	1.76	.95	.76	2.89	28.40
1955	1.82	2.94	1.70	.97	.66	2.19	7.86	2.53	1.71	.43	1.00	.52	24.33
1956	2.21	1.77	.58	.39	.40	.51	5.07	6.10	1.60	.64	.22	.38	19.87
1957	.42	.53	.70	.82	.50	1.06	2.58	2.35	1.69	.89	.31	.32	12.17
1958	.46	1.17	3.38	.71	.40	.59	8.23	3.07	1.70	.85	.45	1.09	22.10
1959	1.24	1.24	.44	.92	.39	.38	6.68	2.93	1.68	.41	.39	.45	17.15
1960	3.14	2.65	2.12	.76	1.43	1.18	9.47	3.53	1.56	.69	.57	.57	27.47

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	273	18.74
1951	1207	7,770	Mar. 31, 1951	51	348	1.76	23.89	351	24.08
1952	1237	5,890	Apr. 6, 1952	35	328	1.66	22.54	299	20.56
1953	1277	7,460	Mar. 27, 1953	30	308	1.56	21.09	310	21.26
1954	1337	7,180	Apr. 17, 1954	47	414	2.09	28.40	461	31.62
1955	1387	5,240	Mar. 12, 1955	46	355	1.79	24.33	327	22.43
1956	1437	6,280	Apr. 5, 1956	33	289	1.46	19.87	247	16.96
1957	1507	3,280	Feb. 27, 1957	33	177	1.894	12.17	227	15.53
1958	1557	11,100	Dec. 21, 1957	34	323	1.63	22.10	292	20.01
1959	1627	4,420	Apr. 3, 1959	31	250	1.26	17.15	323	22.14
1960	1707	7,420	Oct. 24, 1959	38	400	2.02	27.47	-	-

## 2755. Ausable River near Au Sable Forks, N. Y.

Location.--Lat 44°27'05", long 73°38'35", on left bank  $1\frac{1}{2}$  miles downstream from confluence of East and West Branches at Au Sable Forks, Clinton County.

Drainage area.--448 sq mi.

Records available.--August 1910 to September 1960. Prior to September 1924, published as "at Au Sable Forks." Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 505.65 ft above mean sea level, datum of 1929. August 1910 to September 1924, chain gage at site  $1\frac{1}{2}$  miles upstream at different datum.

Average discharge.--50 years (1910-60), 685 cfs.

Extremes.--1910-60: Maximum discharge, 24,200 cfs Sept. 22, 1938 (gage height, 11.65 ft), from rating curve extended above 9,100 cfs on basis of slope-area measurement at gage height 11.39 ft; maximum gage height, about 14.0 ft Mar. 27, 1934 (ice jam); practically no flow July 21, 1912, result of unusual regulation.

Remarks.--Regulation since 1905, principally by Taylor Pond and Fern Lake. Diurnal fluctuation at low and medium flow caused by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	245	823	815	434	414	927	2,273	1,084	467	863	342	336	752
1952	313	850	656	492	385	478	2,505	1,247	574	205	245	210	678
1953	228	313	623	486	407	1,676	1,643	1,424	209	183	385	266	656
1954	264	368	566	240	845	890	3,274	1,468	721	384	342	1,106	867
1955	734	993	660	416	347	896	2,887	871	637	203	364	257	771
1956	661	630	247	198	231	249	1,790	2,199	625	249	140	219	620
1957	206	250	301	352	279	439	957	940	570	340	200	178	418
1958	207	442	1,105	301	188	284	2,900	1,104	653	344	244	468	687
1959	530	555	226	436	265	284	2,409	983	657	197	222	196	579
1960	933	949	742	354	542	404	3,436	1,159	515	286	244	252	814

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	602	18.24
1951	1207	12,700	Mar. 31, 1951	174	752	1.68	22.79	747	22.62
1952	1237	8,350	Apr. 6, 1952	121	678	1.51	20.60	624	18.96
1953	1277	12,200	Mar. 27, 1953	113	656	1.46	19.87	659	19.96
1954	1337	12,100	Apr. 17, 1954	170	867	1.94	26.27	967	29.27
1955	1387	8,890	Apr. 15, 1955	152	771	1.72	23.37	700	21.22
1956	1437	10,700	Apr. 30, 1956	107	620	1.38	18.85	555	16.86
1957	1507	8,300	Jan. 23, 1957	108	418	.933	12.66	502	15.21
1958	1557	15,000	Dec. 21, 1957	118	687	1.53	20.81	649	19.66
1959	1627	5,670	Apr. 3, 1959	120	579	1.29	17.53	689	20.87
1960	1707	8,870	Oct. 24, 1959	124	814	1.82	24.74	-	-

Note.--Monthly figures of discharge per square mile and runoff in inches, previously published in water-supply papers, do not represent natural flow because of storage above station. These figures are not published herein.

## 2765. Bouquet River at Willsboro, N. Y.

Location.--Lat 44°21'30", long 73°23'50", on right bank at Willsboro, Essex County, half a mile upstream from bridge on State Highway 22, 2½ miles downstream from North Branch Bouquet River, and 3 miles upstream from mouth.

Drainage area.--275 sq mi.

Records available.--August and September 1904 (gage heights and discharge measurements only), August to November 1908, July 1923 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 150.88 ft above mean sea level, datum of 1929. Prior to November 1908, staff gages at site three-quarters of a mile downstream at various datums. July 23 to Aug. 28, 1923, staff gage at site 600 ft downstream at present datum.

Average discharge.--37 years (1923-60), 303 cfs.

Extremes.--1923-60: Maximum discharge, 11,800 cfs Oct. 1, 1924 (gage height, 10.85 ft), from rating curve extended above 4,600 cfs by logarithmic plotting; minimum, 8.8 cfs Sept. 20, 1957 (gage height, 1.84 ft).

Remarks.--Diurnal fluctuation at low flow caused by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	68.0	195	375	210	194	545	1,251	382	182	255	108	112	323
1952	134	531	307	255	240	372	1,582	572	303	96.6	84.7	72.0	377
1953	80.0	93.1	274	248	202	868	766	710	114	63.7	101	73.1	301
1954	81.9	130	186	110	356	615	1,455	764	281	136	102	350	379
1955	239	537	409	196	154	497	1,460	336	300	95.4	207	110	378
1956	284	364	151	99.1	90.3	104	1,109	767	329	135	65.5	78.2	297
1957	74.9	80.5	92.2	145	134	221	307	302	216	111	29.5	30.4	145
1958	40.8	111	514	196	129	253	1,600	452	240	114	75.8	85.9	317
1959	160	178	102	178	99.4	127	1,334	282	185	70.4	57.8	77.0	238
1960	339	441	510	349	432	253	1,508	531	248	95.6	71.5	91.7	404

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.29	0.79	1.57	0.88	0.73	2.29	5.07	1.60	0.74	1.07	0.45	0.46	15.94
1952	.56	2.16	1.29	1.07	.94	1.56	6.42	2.40	1.23	.41	.36	.29	18.69
1953	.34	.38	1.15	1.04	.76	3.64	3.11	2.98	.46	.27	.43	.30	14.86
1954	.34	.53	.78	.46	1.35	2.58	5.90	3.20	1.14	.57	.43	1.42	18.70
1955	1.00	2.18	1.71	.82	.58	2.08	5.92	1.41	1.22	.40	.87	.45	18.64
1956	1.19	1.48	.63	.42	.35	.43	4.50	3.22	1.34	.57	.27	.32	14.72
1957	.31	1.33	.39	.61	.51	.93	1.25	1.26	.88	.47	.12	.12	7.18
1958	.17	.45	2.16	.82	.49	1.06	6.49	1.90	.97	.48	.32	.35	15.66
1959	.75	.72	.43	.75	.38	.53	5.41	1.18	.75	.30	.24	.31	11.75
1960	1.42	1.79	2.14	1.46	1.70	1.06	6.12	2.22	1.01	.40	.30	.37	19.99

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	243	11.98
1951	1207	5,740	Mar. 31, 1951	36	323	1.17	15.94	351	17.30	
1952	1237	6,100	Apr. 6, 1952	52	377	1.37	18.69	334	16.55	
1953	1277	6,010	Mar. 25, 1953	47	301	1.09	14.86	296	14.64	
1954	1337	4,900	Apr. 17, 1954	43	379	1.38	18.70	445	21.94	
1955	1387	3,650	Apr. 15, 1955	64	378	1.37	18.64	345	17.05	
1956	1437	4,430	Apr. 5, 1956	55	297	1.08	14.72	251	12.45	
1957	1507	1,200	May 21, 1957	12	145	.527	7.18	181	8.35	
1958	1557	7,460	Dec. 21, 1957	25	317	1.15	15.66	299	14.78	
1959	1627	4,930	Apr. 3, 1959	29	238	.865	11.75	308	15.20	
1960	1707	4,990	Apr. 5, 1960	34	404	1.47	19.99	-	-	

## 2790. Lake George Outlet at Ticonderoga, N. Y.

Location.--Lat 43°50'35", long 73°26'00", at Ticonderoga, Essex County. River channel gage on right bank 250 ft downstream from "c" Mill dam of International Paper Co., 250 ft upstream from Trout Brook, and half a mile downstream from upper dam ("A" Mill dam) of International Paper Co. Turbine gate-opening gage in powerhouse at "c" Mill dam.

Drainage area.--234 sq mi.

Records available.--August 1904 to December 1905, October 1942 to September 1960.

Gage.--Water-stage recorder and concrete control on river channel. Datum of gage is 190.41 ft above mean sea level, datum of 1929. Turbine gate-opening recorder in powerhouse. Prior to Dec. 31, 1905, staff gages at site 2,000 ft upstream at different datum.

Average discharge.--18 years (1942-60), 316 cfs.

Extremes.--1942-60: Maximum daily discharge, 1,290 cfs June 5, 6, 1947; minimum daily, 6.1 cfs July 6, 1952.

Remarks.--Discharge in tailrace determined from rating for turbine gates developed from discharge measurements. Records represent total discharge from Lake George and include flow in river channel and in tailrace. Diurnal fluctuation at low and medium flow caused by three powerplants. Appreciable regulation by Lake George.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	159	167	262	283	569	315	1,163	431	224	291	235	245	359
1952	219	228	411	679	630	429	934	646	607	173	177	135	438
1953	116	59.5	116	305	715	463	1,009	983	190	73.2	70.1	121	349
1954	169	80.9	75.3	145	438	452	647	892	399	175	164	117	312
1955	189	230	225	283	358	438	801	262	270	197	169	150	297
1956	209	312	265	261	254	341	567	462	374	215	158	144	297
1957	167	153	144	156	207	185	158	177	203	135	122	83.4	157
1958	78.7	64.1	104	505	740	557	529	608	349	129	77.8	87.7	316
1959	80.9	149	193	223	398	540	628	257	243	157	90.7	101	254
1960	170	309	809	571	431	471	788	325	269	243	164	113	389

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Maximum day		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	286	16.58
1951	1207	1,250	Apr. 15, 1951	29	359	1.53	20.84	382	22.16
1952	1237	1,160	Apr. 16, 17, 1952	6.1	438	1.87	25.45	390	22.68
1953	1277	1,150	May 4, 1953	15	349	1.49	20.23	352	20.40
1954	1337	988	May 11, 1954	8.9	312	1.53	18.10	339	19.65
1955	1387	952	Apr. 18, 1955	27	297	1.27	17.20	308	17.89
1956	1437	941	May 2, 3, 1956	34	297	1.27	17.26	270	15.69
1957	1507	237	May 28, 1957	32	157	.671	9.12	139	8.07
1958	1557	1,060	Apr. 24, 1958	34	316	1.35	18.55	351	19.20
1959	1627	901	Apr. 13, 14, 1959	46	254	1.09	14.71	327	18.95
1960	1707	1,010	Apr. 26, 1960	63	389	1.66	22.61	-	-



2800. Poultney River below Fair Haven, Vt.

Location.--Lat 43°37'40", long 73°18'50", on right bank a third of a mile downstream from Carver Falls, 1.9 miles upstream from Hubbardton River, and 3½ miles northwest of Fair Haven, Rutland County.

Drainage area.--187 sq mi.

Records available.--October 1928 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 105 ft, revised (from topographic map).

Average discharge.--32 years (1928-60), 246 cfs.

Extremes.--1928-60: Maximum discharge, 14,800 cfs July 20, 1945 (gage height, 24.36 ft, from high-water mark in gage well), from rating curve extended above 2,400 cfs on basis of computations of peak flow over dam at gage heights 16.10, 21.40, and 24.36 ft; minimum daily, 2.9 cfs Oct. 13, 1935.

Remarks.--Flow regulated by powerplant above station and by Lake Bomoseen.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	61.5	187	318	186	587	530	824	152	60.0	144	67.9	75.3	263
1952	130	368	478	505	356	462	815	262	410	75.8	37.6	36.2	327
1953	79.2	59.7	178	489	493	540	556	536	59.3	17.5	28.8	100	260
1954	37.3	41.1	243	82.5	517	627	553	497	436	109	54.1	198	281
1955	94.4	178	322	222	258	683	675	117	69.3	25.6	34.9	47.7	227
1956	98.1	154	65.5	84.8	73.7	148	1,148	302	214	71.0	18.1	71.9	203
1957	100	164	220	289	219	280	252	128	77.1	68.2	25.5	45.0	155
1958	108	167	458	319	264	439	813	277	161	29.0	24.4	46.5	282
1959	89.2	128	105	163	154	357	815	147	67.2	31.5	17.7	42.6	176
1960	157	692	539	373	309	301	1,066	217	72.6	41.7	33.7	96.4	323

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.38	1.12	1.96	1.14	3.27	3.27	4.92	0.94	0.56	0.89	0.42	0.45	19.12
1952	.80	2.19	2.95	3.11	2.06	2.85	4.86	1.62	2.45	.47	.23	.22	23.81
1953	.49	.36	1.09	3.02	2.74	3.33	3.32	3.31	.35	.11	.18	.60	18.90
1954	.23	.25	1.50	.51	2.88	3.87	3.30	3.06	2.60	.67	.33	1.18	20.38
1955	.58	1.06	1.99	1.37	1.43	4.21	4.03	.72	.41	.16	.22	.28	16.46
1956	.60	.92	.40	.52	.43	.91	6.85	1.86	1.28	.44	.11	.43	14.75
1957	.62	.98	1.36	1.78	1.22	1.73	1.50	.79	.46	.42	.16	.27	11.29
1958	.67	1.00	3.07	1.97	1.47	2.71	4.85	1.71	.96	.18	.15	.28	19.02
1959	.55	.76	.65	1.01	.86	2.20	4.86	.91	.40	.19	.11	.26	12.76
1960	.97	4.13	3.32	2.30	1.78	1.86	6.36	1.34	.43	.26	.21	.58	23.54

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	240	-	17.41
1951	1207	2,240	Nov. 26, 1950	17	263	1.41	19.12	298	21.60	
1952	1237	4,390	June 2, 1952	23	327	1.75	23.81	272	19.81	
1953	1277	4,950	Jan. 25, 1953	10	260	1.39	18.90	261	18.94	
1954	1337	2,000	Feb. 22, 1954	17	281	1.50	20.38	304	22.03	
1955	1387	3,080	Mar. 12, 1955	10	227	1.21	16.46	203	14.75	
1956	1437	3,440	Apr. 7, 1956	9.0	203	1.09	14.75	217	15.79	
1957	1507	*3,000	Jan. 23, 1957	6.0	155	.829	11.29	180	13.07	
1958	1557	4,700	Dec. 21, 1957	7.7	262	1.40	19.02	224	16.24	
1959	1627	5,060	Apr. 3, 1959	6.2	176	.941	12.76	265	19.22	
1960	1707	8,360	Nov. 28, 1959	7.7	323	1.73	23.54	-	-	

\* Not previously published.

## 2815. East Creek at Rutland, Vt.

Location.--Lat 43°37'40", long 72°59'20", on left bank on grounds of Rutland Country Club, at Rutland, Rutland County, 280 ft downstream from Grove Street Bridge and 2 miles upstream from mouth.

Drainage area.--51.1 sq mi.

Records available.--August 1940 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 570 ft (from topographic map).

Average discharge.--20 years (1940-60), 100 cfs (adjusted for diversion and storage).

Extremes.--1940-60: Maximum discharge, 36,500 cfs June 3, 1947 (gage height, 20.3 ft, from high-water mark in gage house), mean of two slope-area measurements, caused by failure of East Pittsford Dam 5.8 miles upstream; minimum daily, 3.1 cfs Nov. 8, 1947.

Remarks.--Discharge adjusted for diversion from Mendon Brook for municipal supply of Rutland and for change in contents in Chittenden Reservoir (usable capacity, 819,800,000 cu ft).

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	66.5	101	105	85.9	125	112	232	86.7	48.1	93.5	71.0	57.7	98.4
1952	81.6	128	129	143	131	126	211	100	154	59.4	72.9	71.2	117
1953	72.3	60.4	74.3	93.0	87.1	171	174	195	66.7	65.3	46.9	46.1	96.2
1954	44.8	51.1	83.6	45.9	111	125	211	162	167	57.5	78.3	115	104
1955	92.9	134	127	100	104	143	239	80.2	62.7	70.0	83.1	49.3	107
1956	63.8	84.6	59.3	79.6	74.9	66.7	215	143	108	78.4	73.5	71.6	93.0
1957	71.5	75.2	97.6	101	89.4	73.8	71.3	44.1	47.3	57.7	67.2	77.4	72.7
1958	64.3	67.9	118	92.0	83.0	102	286	105	64.8	72.6	66.8	47.0	97.4
1959	74.7	78.1	67.1	67.1	69.4	87.0	190	62.7	62.7	48.2	42.5	45.3	74.4
1960	88.2	153	148	119	135	132	295	125	49.9	33.1	48.2	67.4	116

Monthly and yearly discharge, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.03	3.00	2.87	1.78	2.51	2.90	7.66	2.23	1.08	2.44	1.33	1.26	30.09
1952	1.85	2.95	3.03	2.88	1.85	2.17	7.25	3.01	3.22	.88	.56	.54	29.99
1953	.60	.94	1.73	2.79	2.46	5.97	5.05	4.49	.99	.45	.64	.43	26.54
1954	.51	1.00	2.47	1.11	3.23	3.27	6.60	4.05	3.82	1.07	1.25	2.29	30.67
1955	1.20	3.38	2.79	1.54	1.30	3.74	7.78	2.30	1.14	.77	1.72	.57	28.23
1956	1.79	1.99	.97	1.54	.84	.75	7.44	5.24	2.31	1.48	.50	1.52	28.37
1957	1.17	1.59	2.43	2.16	1.30	2.07	2.62	1.59	1.40	1.67	.86	.94	19.80
1958	.89	1.78	3.49	1.68	1.13	1.28	9.78	3.68	1.37	.96	.64	.89	27.55
1959	1.53	1.48	1.10	1.74	.93	1.76	6.66	2.21	1.69	.67	.48	.68	20.93
1960	2.43	4.71	3.05	2.06	1.66	2.31	10.09	2.78	1.23	.85	.53	1.26	32.96

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed			Adjusted				Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	97.3	99.9	26.55
1951	1207	2,190	Nov. 26, 1950	13	98.4	113	2.21	30.09	104	116	30.82
1952	1237	1,800	June 1, 1952	16	117	112	2.19	29.99	106	96.2	25.63
1953	1277	1,650	Mar. 27, 1953	14	96.2	99.9	1.95	26.54	93.9	103	27.25
1954	1337	699	Feb. 22, 1954	14	104	115	2.25	30.67	119	128	34.06
1955	1587	1,250	Aug. 13, 1955	12	107	106	2.07	28.23	94.7	96.4	25.61
1956	1437	1,230	Apr. 29, 1956	17	93.0	99.0	1.94	26.37	96.1	101	26.81
1957	1507	894	Jan. 23, 1957	14	72.7	74.6	1.46	19.80	73.3	76.2	20.77
1958	1557	1,110	Apr. 21, 1958	17	97.4	104	2.04	27.55	94.8	96.0	25.50
1959	1627	1,280	Apr. 2, 1959	15	74.4	78.7	1.54	20.93	88.6	102	27.01
1960	1707	1,510	Nov. 28, 1959	7.8	116	124	2.43	32.96	-	-	-

## 2820. Otter Creek at Center Rutland, Vt.

Location.--Lat 43°36'15", long 73°00'50", on right bank at downstream side of bridge on U.S. Highway 4 at Center Rutland, Rutland County, 200 ft downstream from dam, 1.2 miles downstream from East Creek, and 1½ miles west of Rutland.

Drainage area.--307 sq mi.

Records available.--May 1928 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 475.80 ft above mean sea level, datum of 1929. Prior to July 22, 1929, chain gage at same site and datum.

Average discharge.--32 years (1928-60), 554 cfs.

Extremes.--1928-60: Maximum discharge, 13,700 cfs Sept. 22, 1938 (gage height, 12.45 ft), from rating curve extended above 7,400 cfs on basis of computation of peak flow over dam; minimum daily, 45 cfs Sept. 21, 1947.

Remarks.--Flow regulated by powerplants and Chittenden Reservoir on East Creek (usable capacity, 819,800,000 cu ft).

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	166	585	669	365	741	698	2,051	522	229	374	283	241	573
1952	429	760	702	770	559	642	1,957	704	1,014	209	145	165	668
1953	188	234	480	789	742	1,495	1,392	1,515	229	130	131	125	604
1954	151	218	516	281	777	960	1,480	1,388	1,196	309	254	551	653
1955	290	906	776	402	484	988	1,842	461	325	192	494	165	609
1956	575	697	244	382	252	283	1,937	1,347	510	330	148	315	584
1957	242	374	578	474	340	455	693	473	290	290	184	203	383
1958	174	401	873	429	300	424	2,504	907	377	232	168	156	578
1959	261	354	289	665	360	554	1,708	495	313	138	118	122	447
1960	419	1,025	903	607	550	462	2,672	677	523	228	175	360	713

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.62	2.12	2.51	1.37	†2.51	2.62	7.45	1.96	0.83	1.40	1.06	0.88	25.33
1952	1.61	2.76	2.64	2.89	1.96	2.41	7.11	2.64	3.69	.78	.54	.60	29.63
1953	.71	.85	1.80	2.96	2.52	5.62	5.06	4.94	.83	.49	.49	.45	26.72
1954	.57	.79	1.94	1.06	2.63	3.60	5.38	4.47	4.35	1.16	.95	2.00	28.90
1955	1.09	3.29	2.92	1.51	1.64	3.71	6.69	1.73	1.18	.72	1.85	.60	26.93
1956	2.16	2.53	.92	1.43	.89	1.06	7.04	5.06	1.85	1.24	.55	1.14	25.87
1957	.91	1.36	2.17	1.78	1.15	1.71	2.52	1.77	1.05	1.09	.69	.74	16.94
1958	.65	1.46	3.28	1.61	1.02	1.59	9.10	3.41	1.37	.87	.63	.57	25.56
1959	.98	1.29	1.09	2.05	1.22	2.08	6.21	1.86	1.14	.52	.44	.44	19.77
1960	1.58	3.72	3.39	2.28	1.93	1.74	9.71	2.54	1.90	.86	.66	1.31	31.62

† Corrected.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	528	23.34
1951	1207	5,530	Nov. 27, 1950	87	573	1.87	25.33	613	27.09
1952	1237	7,680	June 2, 1952	59	668	2.18	29.63	586	25.98
1953	1277	7,730	Mar. 27, 1953	55	604	1.97	26.72	603	26.66
1954	1337	2,790	June 24, 1954	59	653	2.13	28.90	744	32.90
1955	1387	4,390	Apr. 16, 1955	96	609	1.98	26.93	571	25.24
1956	1437	7,530	Apr. 30, 1956	98	584	1.90	25.87	557	24.70
1957	1507	3,370	Jan. 23, 1957	97	383	1.25	16.94	405	17.89
1958	1557	7,280	Apr. 22, 1958	79	578	1.88	25.56	532	23.53
1959	1627	5,030	Apr. 3, 1959	61	447	1.46	19.77	568	25.10
1960	1707	7,690	Apr. 5, 1960	80	713	2.32	31.62	-	-

## 2825. Otter Creek at Middlebury, Vt.

Location.--Lat 44°00'45", long 73°10'05", on right bank 150 ft upstream from highway bridge in Middlebury, Addison County, and 3½ miles downstream from Middlebury River.

Drainage area.--628 sq mi.

Records available.--April 1903 to April 1907, October 1910 to January 1920, October 1928 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 335.75 ft above mean sea level, datum of 1929. Apr. 1, 1903, to Apr. 30, 1907, and Oct. 5, 1910, to Jan. 31, 1920, chain gage at site 1,800 ft upstream at datum 10 ft lower, and Oct. 1, 1928, to Oct. 17, 1933, at present datum.

Average discharge.--44 years (1903-6, 1910-19, 1928-60), 982 cfs.

Extremes.--1903-7, 1910-20, 1928-60: Maximum discharge, 11,000 cfs Mar. 20, 21, 1936 (gage height, 10.3 ft); minimum daily, 100 cfs Dec. 28, 1914.  
Maximum discharge known, 13,600 cfs Nov. 4, 1927 (gage height, 13.3 ft, present datum, at chain-gage site 1,800 ft upstream), from rating curve extended above 9,000 cfs by logarithmic plotting.

Remarks.--Some regulation by Chittenden Reservoir (usable capacity, 819,800,000 cu ft) on East Creek.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	295	692	1,557	727	1,342	1,249	3,402	1,124	406	776	528	484	1,044
1952	678	1,415	1,277	1,456	1,084	1,270	3,336	1,315	1,703	408	253	253	1,199
1953	290	359	706	1,007	1,588	1,715	2,766	2,457	400	246	263	233	998
1954	252	352	822	461	1,338	2,041	2,397	2,097	1,758	619	436	966	1,124
1955	502	1,290	1,361	803	881	2,146	3,065	1,004	621	344	451	282	1,078
1956	746	1,067	416	588	416	523	3,029	2,627	1,071	628	250	517	988
1957	434	610	1,001	891	683	1,052	1,162	787	574	568	340	329	703
1958	273	590	1,461	945	682	1,065	3,587	1,986	753	373	350	309	1,031
1959	474	589	487	783	679	1,135	3,308	821	527	255	226	298	795
1960	851	1,489	2,283	1,014	1,095	683	4,500	1,614	952	432	334	552	1,302

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.54	1.23	2.86	1.33	2.23	2.29	6.04	2.06	0.72	1.42	0.97	0.86	22.55
1952	1.24	2.51	2.34	2.67	1.86	2.33	5.93	2.41	3.03	.75	.46	.45	25.98
1953	.53	.64	1.30	1.85	2.63	3.15	4.91	4.51	.71	.45	.48	.41	21.57
1954	.46	.63	1.51	1.85	2.22	3.75	4.26	3.85	3.12	1.14	.80	1.72	24.31
1955	.92	2.29	2.50	1.47	1.46	3.94	5.45	1.84	1.10	.63	1.19	.50	23.29
1956	1.37	1.90	.76	1.08	.71	.96	5.38	4.82	1.90	1.15	.46	.92	21.41
1957	.80	1.08	1.84	1.64	1.13	1.93	2.06	1.44	1.02	1.04	.62	.58	15.18
1958	.50	1.05	2.68	1.73	1.13	1.96	6.37	3.65	1.34	.68	.64	.55	22.28
1959	.87	1.05	.89	1.44	1.13	2.08	5.88	1.51	.94	.47	.41	.53	17.20
1960	1.56	2.61	4.19	1.86	1.88	1.25	7.99	2.78	1.69	.79	.61	.98	28.19

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	934	20.20	
1951	1207	4,550	Apr. 16, 1951	165	1,044	1.66	22.55	1,112	24.01		
1952	1237	4,830	Apr. 11, 1952	160	1,199	1.91	25.98	1,032	22.36		
1953	1277	4,950	Apr. 1, 1953	168	998	1.59	21.57	1,004	21.70		
1954	1337	5,750	Feb. 27, 1954	162	1,124	1.79	24.31	1,268	27.42		
1955	1387	4,150	Apr. 21, 1955	201	1,078	1.72	23.29	1,000	21.61		
1956	1437	4,830	May 5, 1956	198	988	1.57	21.41	974	21.10		
1957	1507	2,220	Mar. 16, 1957	188	703	1.12	15.18	727	15.69		
1958	1557	6,880	Apr. 25, 1958	170	1,031	1.64	22.28	965	20.86		
1959	1627	4,990	Apr. 9, 1959	162	795	1.27	17.20	1,052	22.75		
1960	1707	8,200	Apr. 7, 8, 1960	190	1,302	2.07	28.19	-	-		

## 2835. East Barre Detention Reservoir at East Barre, Vt.

Location.--Lat 44°09'20", long 72°26'40", at reservoir on Jail Branch at East Barre, Washington County, 4½ miles upstream from mouth of Jail Branch.

Drainage area.--38.8 sq mi.

Records available.--February 1936 to September 1960. February 1936 to September 1938 month-end contents, published in WSP 1307.

Gage.--Staff gage. Datum of gage is 1,127.9 ft above mean sea level (levels by Corps of Engineers).

Extremes.--1936-60: Maximum gage height, 36.0 ft Mar. 22, 1936 (contents, 474.7 mcf); minimum not determined, occurred in summer of 1960 after lowering of bottom of outlet opening.

Remarks.--Reservoir is formed by earthfill dam completed by Corps of Engineers in 1935 for flood control. Usable capacity of reservoir, 506,000,000 cu ft between bottom of outlet opening and 37.1 ft (crest of spillway). Dam has no gates; below gage height 37.1 ft, outflow from reservoir is dependent on capacity of outlet opening near base of dam. Outlet opening enlarged and spillway modified during period November 1957 to November 1959. Size of outlet opening since enlargement, height, 7 ft, and average width, 3 2/3 ft.

Usable contents, in millions of cubic feet, on last day of month

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1951	0.30	4.68	1.34	1.34	2.12	98.6	12.65	1.78	2.12	0.45	0.35	0.50
1952	.74	.93	2.65	1.86	1.86	2.48	3.48	2.04	.87	.20	.20	.25
1953	.68	.45	1.34	2.65	1.86	144.8	2.95	1.11	.35	.10	.05	.20
1954	.99	.99	.68	.68	3.79	2.30	14.6	1.34	1.26	.56	9.70	1.11
1955	2.04	4.17	2.21	.99	2.12	2.84	47.9	6.62	.25	.10	.20	.20
1956	1.95	.56	.40	.74	1.11	.93	42.8	3.26	.45	.25	.74	.50
1957	.56	.80	.99	1.11	2.65	2.65	3.37	1.48	1.11	.56	.20	.20
1958	.99	1.05	3.06	1.86	1.26	2.74	249.8	3.37	.74	.50	.25	.40
1959	1.41	.80	.68	1.11	1.71	1.18	1.86	.45	.99	1.41	1.56	2.39
1960	2.39	9.46	.68	.68	.68	61.83	1.26	.62	.30	.50	0	0

## 2840. Jail Branch at East Barre, Vt.

Location.--Lat 44°09'40", long 72°27'00", on right bank 75 ft downstream from highway bridge, at East Barre, Washington County, 0.6 mile downstream from East Barre Detention Reservoir, and 3.9 miles upstream from mouth.

Drainage area.--40.4 sq mi.

Records available.--August 1920 to September 1923, October 1933 to September 1960. October 1933 monthly discharge only, published in WSP 1307. Prior to October 1922, published as Jail Brook at East Barre.

Gage.--Water-stage recorder. Datum of gage is 1,071.59 ft above mean sea level (levels by Corps of Engineers). Aug. 14, 1920, to Sept. 30, 1923, staff gage at site a quarter of a mile upstream at different datum. Nov. 1, 1933, to Jan. 25, 1935, staff gage at present site and datum.

Average discharge.--30 years (1920-23, 1933-60), 55.4 cfs (adjusted for storage).

Extremes.--1920-23, 1933-60: Maximum discharge, 1,820 cfs Oct. 1, 1920 (gage height, 9.50 ft, from graph based on gage readings, site and datum then in use), from rating curve extended above 900 cfs; minimum, 0.1 cfs Aug. 18, 1950, Aug. 3, 4, 31, Sept. 1, 3, 1953.

Remarks.--Discharge affected by East Barre Detention Reservoir (see above). At times, diurnal fluctuation at low flow caused by mill above station. Diversion from reservoir on Orange Brook, a tributary above station, for city of Barre. Discharge adjusted for change in contents in East Barre Detention Reservoir.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	7.02	50.3	69.2	20.7	46.3	54.2	328	65.4	15.7	34.6	19.2	7.56	59.6
1952	11.0	61.3	34.1	31.0	31.0	35.6	314	96.0	158	10.3	2.82	7.23	65.3
1953	14.0	16.3	70.5	58.2	56.4	120	165	150	11.4	2.69	5.03	12.2	56.9
1954	7.24	17.6	63.1	12.6	48.6	96.5	258	148	45.9	12.4	11.8	57.0	64.7
1955	32.5	90.8	61.8	22.3	26.8	60.3	283	79.5	27.9	2.29	6.50	1.48	57.7
1956	7.95	22.6	8.08	15.5	10.1	11.9	166	147	35.7	15.1	2.83	13.3	37.9
1957	13.1	19.3	41.5	24.9	25.1	43.6	90.0	47.0	17.0	10.5	3.82	3.15	28.2
1958	4.26	24.7	88.0	32.2	19.8	32.7	252	226	52.9	11.9	6.86	10.4	63.6
1959	27.9	29.3	15.0	34.2	18.0	28.1	255	38.9	17.8	2.99	7.22	6.84	39.9
1960	65.5	108	85.9	41.7	41.5	31.7	225	66.5	22.9	9.86	4.34	13.2	59.5

Monthly and yearly runoff, in inches (adjusted), of Jail Branch at East Barre, Vt.

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.20	1.44	1.94	0.59	1.20	2.57	8.16	1.75	0.44	0.97	0.55	0.21	20.02
1952	.32	1.70	.99	.88	.83	.97	8.67	2.72	4.35	.29	.08	.20	22.00
1953	.40	.45	2.02	1.67	1.45	4.95	3.05	4.25	.31	.07	.14	.34	19.10
1954	.21	.49	1.80	.36	1.29	2.74	7.26	4.08	1.27	.35	.43	1.48	21.76
1955	.94	2.53	1.74	.62	.70	1.73	8.30	1.83	.70	.06	.19	.04	19.38
1956	.25	.61	.23	.44	.27	.34	5.03	3.77	.96	.43	.09	.36	12.78
1957	.38	.54	1.18	.71	.66	1.24	2.49	1.32	.47	.29	.11	.09	9.48
1958	.13	.68	2.53	.90	.50	.95	9.59	3.82	1.43	.34	.19	.29	21.35
1959	.81	.80	.43	.98	.47	.80	7.06	1.10	.50	.09	.21	.20	13.45
1960	1.87	3.07	2.36	1.19	1.11	1.56	5.57	1.89	.63	.28	.12	.37	20.02

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed	Adjusted	
		Momentary maximum		Minimum	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date	day							
1950	-	-	-	-	-	-	-	-	43.8	43.8	14.71
1951	1207	394	Apr. 12, 1951	2.9	59.6	59.6	1.48	20.02	57.8	57.9	19.45
1952	1237	529	June 1, 1952	1.5	65.3	65.2	1.61	22.00	64.9	64.9	21.86
1953	1277	400	Mar. 30, 1953	1.1	56.9	56.9	1.41	19.10	55.8	55.8	18.73
1954	1337	340	Apr. 7, 1954	3.1	64.7	64.7	1.60	21.76	72.6	72.8	24.47
1955	1387	363	Apr. 16, 1955	.2	57.7	57.7	1.43	19.38	45.5	45.4	15.26
1956	1437	277	Apr. 17, 1956	1.6	37.9	37.9	.938	12.78	40.9	40.9	13.79
1957	1507	450	Jan. 23, 1957	1.0	28.2	28.2	.698	9.48	31.9	31.9	10.72
1958	1557	479	Apr. 23, 1958	2.0	63.6	63.6	1.57	21.35	59.6	59.7	20.05
1959	1627	590	Apr. 3, 1959	1.8	39.9	40.0	.990	13.45	55.6	55.6	18.71
1960	1707	432	Mar. 31, 1960	.8	59.5	59.4	1.47	20.02	-	-	-

## 2850. Wrightsville Detention Reservoir at Wrightsville, Vt.

Location.--Lat 44°18'35", long 72°34'30", at reservoir on North Branch Winooski River at Wrightsville, Washington County, a third of a mile downstream from Long Meadow Brook and 4½ miles upstream from mouth.

Drainage area.--66.5 sq mi.

Records available.--November 1935 to September 1960. November 1935 to September 1938 month-end contents published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 612.75 ft above mean sea level (levels by Corps of Engineers). Prior to July 28, 1960, staff gage at site 0.5 mile upstream at same datum.

Extremes.--1935-60: Maximum gage height, 63.7 ft Mar. 22, 1936 (contents, 675.0 mcf), from graph based on gage readings; minimum observed, 0.2 ft Aug. 17, 1949, and Aug. 17-19, 1950 (contents, 0.45 mcf).

Remarks.--Reservoir is formed by earthfill dam completed by Corps of Engineers in 1935 for flood control. Usable capacity of reservoir, 873,500,000 cu ft between gage heights 0.0 ft (bottom of outlet opening) and 72.25 ft (crest of spillway). Dam has no gates; below gage height 72.25 ft, outflow from reservoir is dependent on capacity of outlet opening, 5¼ ft square, near base of dam.

Contents, in millions of cubic feet, on last day of month

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1951	5.05	40.2	5.35	6.70	10.6	107.5	197.6	7.85	8.15	5.35	2.25	5.35
1952	5.05	8.45	9.65	10.6	8.75	16.0	66.8	11.6	4.25	1.60	2.50	1.35
1953	3.00	4.55	6.70	9.65	7.55	366.7	81.0	4.25	4.00	1.60	1.10	2.00
1954	2.50	5.60	4.25	4.25	12.6	10.6	246.1	7.25	5.90	7.25	9.95	7.85
1955	9.35	16.0	14.9	4.25	9.35	11.9	196.6	4.80	2.75	1.10	3.75	3.00
1956	61.2	7.00	3.25	4.80	4.55	4.80	238.0	83.1	3.50	2.75	5.60	3.75
1957	4.25	8.15	7.25	9.05	67.4	15.2	14.2	7.55	9.65	5.05	3.25	2.75
1958	11.2	11.9	26.2	9.35	7.85	23.4	248.4	11.2	5.35	14.9	4.00	7.25
1959	34.2	8.45	6.15	10.3	6.15	14.2	26.6	5.90	8.75	5.05	7.85	4.55
1960	19.2	168.7	6.45	5.35	6.45	52.7	29.9	5.35	4.80	7.85	3.25	2.25

2855. North Branch Winooski River at Wrightsville, Vt.

Location.--Lat 44°18'00", long 72°34'45", on right bank at Wrightsville, Washington County, three-quarters of a mile downstream from Wrightsville Detention Reservoir and  $3\frac{1}{2}$  miles upstream from mouth.

Drainage area.--69.2 sq mi.

Records available.--October 1933 to September 1960.

Gage.--Water-stage recorder and concrete control. Datum of gage is 550.53 ft above mean sea level (levels by Corps of Engineers). Prior to Nov. 21, 1934, staff gage at same site and datum.

Average discharge.--27 years (1933-60), 132 cfs (adjusted for storage).

Extremes.--1933-60: Maximum discharge, 2,170 cfs Apr. 12, 1934 (gage height, 6.53 ft), from rating curve extended above 920 cfs; minimum daily, 0.2 cfs Aug. 13, 1941.  
Maximum discharge known, 17,200 cfs Nov. 3, 1927, by computation of peak flow over dam three-quarters of a mile above gage.

Remarks.--Discharge affected by Wrightsville Detention Reservoir (see preceding page).  
Diurnal fluctuation at low flow caused by small mill above station. Discharge adjusted for change in contents in Wrightsville Detention Reservoir.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	59.6	149	219	66.9	119	123	615	187	46.1	108	42.6	39.0	147
1952	56.5	218	137	111	118	107	602	246	234	23.8	11.3	23.4	156
1953	30.8	57.0	146	122	108	299	473	282	18.9	7.91	12.7	5.66	130
1954	9.70	25.9	98.8	29.8	92.7	137	573	358	75.1	19.1	31.5	155	133
1955	160	160	115	63.6	51.8	149	642	163	45.3	8.21	78.3	12.9	137
1956	64.8	182	31.0	84.1	34.9	35.7	384	428	123	44.9	11.4	69.6	124
1957	70.1	92.0	87.9	96.2	63.4	157	321	150	63.4	77.8	10.6	12.8	100
1958	23.5	128	290	70.5	42.7	77.3	569	289	126	93.4	38.1	65.0	151
1959	194	109	48.0	120	59.0	96.0	630	87.4	46.8	14.2	15.9	18.1	120
1960	189	247	206	90.7	85.8	55.5	633	143	49.1	15.6	11.9	27.7	146

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.01	2.62	3.44	1.12	1.81	2.65	10.48	1.94	0.75	1.78	0.69	0.65	28.94
1952	.94	3.54	2.29	1.86	1.82	1.82	10.02	3.76	3.73	.38	.19	.37	30.72
1953	.52	.93	2.45	2.06	1.61	7.21	5.84	4.22	.30	.12	.21	.10	25.57
1954	.16	.44	1.64	.50	1.45	2.27	10.70	4.47	1.20	.33	.54	2.48	26.18
1955	2.67	2.62	1.91	.99	.81	2.49	11.50	1.51	.72	.13	1.32	.20	26.87
1956	1.44	2.60	.49	1.41	.54	.60	7.64	6.16	1.49	.74	.21	1.11	24.43
1957	1.17	1.51	1.46	1.61	1.32	2.29	5.18	2.45	1.03	1.27	.17	.20	19.66
1958	.44	2.07	4.92	1.07	.63	1.38	10.57	5.34	2.00	1.62	.57	1.07	†29.68
1959	3.40	1.59	.79	2.03	.86	1.65	10.24	1.33	.77	.21	.28	.27	23.42
1960	3.24	4.91	2.43	1.50	1.34	1.21	10.07	2.23	.79	.28	.17	.44	28.61

† Corrected.

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year		
		Observed				Adjusted			Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	123	123	24.16
1951	1207	703	Apr. 15, 1951	14	147	148	2.14	28.94	146	146	28.64
1952	1237	700	Apr. 20, 1952	5.5	156	156	2.25	30.72	142	142	27.85
1953	1277	785	Mar. 30, 1953	2.4	130	130	1.88	25.57	122	122	23.91
1954	1337	850	Apr. 23, 24, 1954	3.3	133	133	1.92	26.18	158	159	31.14
1955	1387	825	Apr. 20, 1955	1.7	137	137	1.98	26.87	124	123	24.20
1956	1437	641	May 4, 1956	7.8	124	124	1.79	24.43	122	122	24.04
1957	1507	580	Apr. 22, 1957	4.3	100	100	1.45	19.66	116	117	22.95
1958	1557	870	Apr. 23, 1958	6.5	151	151	2.18	†29.68	144	143	28.03
1959	1627	780	Apr. 9, 1959	3.2	120	119	1.72	23.42	144	144	28.22
1960	1707	785	Apr. 18, 19, 1960	3.0	146	146	2.11	28.61	-	-	-

† Corrected.

## 2860. Winooski River at Montpelier, Vt.

Location.--Lat 44°15'25", long 72°35'35", on right bank 0.4 mile upstream from Dog River and 1 mile downstream from depot at Montpelier, Washington County.

Drainage area.--397 sq mi.

Records available.--May 1909 to June 1914 (fragmentary), July 1914 to September 1923, August 1928 to September 1960.

Gage.--Water-stage recorder. Datum of gage is 499.99 ft above mean sea level, datum of 1929. Prior to June 16, 1914, chain gage at site 0.9 mile upstream at different datum. June 16 to July 3, 1914, staff gage at present site and datum.

Average discharge.--41 years (1914-23, 1928-60), 585 cfs (adjusted for storage since October 1935).

Extremes.--1909-23, 1928-60: Maximum discharge, 17,200 cfs Apr. 7, 1912 (gage height, 17.31 ft, from floodmarks, present datum), from rating curve extended above 6,900 cfs by logarithmic plotting; minimum daily, 17 cfs Sept. 3, 1933.  
Maximum discharge known, 57,000 cfs Nov. 3, 1927 (gage height, 27.1 ft), from rating curve extended above 6,900 cfs by logarithmic plotting.

Remarks.--Flow regulated by several small powerplants above station, by Peacham Pond and Mollys Falls Reservoir (combined usable capacity, 492,000,000 cu ft), which regulate runoff from 24 sq mi, and by East Barre (see p. 357) and Wrightsville Detention Reservoirs (see p. 358). Discharge adjusted for change in contents in Peacham Pond, Mollys Falls Reservoir, and East Barre and Wrightsville Detention Reservoirs.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	179	446	755	369	594	802	2,663	707	251	415	220	151	627
1952	207	726	551	553	538	591	2,725	998	1,224	199	87.1	164	709
1953	220	214	567	669	679	1,598	1,625	1,312	205	91.8	112	113	618
1954	107	152	374	176	523	893	2,261	1,316	470	199	186	605	603
1955	575	730	861	394	357	764	2,731	685	353	104	263	120	643
1956	216	540	200	323	232	228	1,900	1,642	538	271	104	284	538
1957	318	337	401	419	387	654	998	548	298	263	104	87.8	401
1958	120	350	914	440	348	498	2,813	1,278	628	336	219	215	679
1959	481	396	255	370	302	464	2,348	401	216	89.5	93.4	137	461
1960	707	974	871	493	558	434	2,376	680	331	168	99.1	141	650

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.49	1.29	2.15	0.99	1.56	2.51	7.72	1.82	0.68	1.23	0.61	0.41	21.46
1952	.55	2.04	1.62	1.54	1.41	1.67	7.97	2.84	3.43	.49	.26	.40	24.22
1953	.59	.50	1.77	1.92	1.68	5.36	4.16	3.74	.51	.25	.28	.31	21.07
1954	.25	.45	1.13	.46	1.37	2.52	6.87	3.59	1.30	.56	.55	1.66	20.71
1955	1.66	2.06	1.89	1.01	.89	2.19	8.20	1.75	.98	.26	.77	.26	21.92
1956	.68	1.47	.49	.94	.54	.59	5.80	4.65	1.51	.82	.32	.78	18.59
1957	.78	.92	1.17	1.16	1.05	1.81	2.92	1.67	.86	.75	.25	.23	13.57
1958	.29	1.00	2.74	1.21	.81	1.39	8.75	5.20	1.75	.99	.55	.61	23.27
1959	1.42	1.05	.66	1.05	.72	1.23	6.96	1.16	.61	.24	.25	.31	15.66
1960	2.07	2.96	2.29	1.35	1.44	1.33	6.88	1.99	.74	.40	.28	.43	22.16

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year			
		Observed				Adjusted			Observed		Adjusted	
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches	Runoff in inches
		Discharge	Date									
1950	-	-	-	-	-	-	-	-	510	509	17.42	
1951	1207	5,920	Dec. 5, 1950	87	627	628	1.58	21.46	655	636	21.74	
1952	1237	10,900	June 1, 1952	48	709	707	1.78	24.22	670	867	22.87	
1953	1277	5,650	Mar. 27, 1953	38	618	616	1.55	21.07	586	586	20.04	
1954	1337	3,970	Apr. 8, 1954	48	603	606	1.53	20.71	715	716	24.49	
1955	1387	5,130	Apr. 6, 1955	57	643	641	1.61	21.92	558	555	18.95	
1956	1437	4,570	Apr. 17, 1956	68	538	542	1.37	18.59	547	549	18.82	
1957	1507	3,530	Jan. 23, 1957	36	401	397	1.00	13.57	429	431	14.73	
1958	1557	6,390	Apr. 22, 1958	47	679	681	1.72	23.27	658	654	22.37	
1959	1627	5,480	Apr. 3, 1959	38	461	458	1.15	15.66	580	581	19.85	
1960	1707	6,800	Nov. 28, 1959	46	650	647	1.63	22.16	-	-	-	



2870. Dog River at Northfield Falls, Vt.

Location.--Lat 44°10'55", long 72°38'30", on right bank 1 mile downstream from Northfield Falls, Washington County, and 1½ miles downstream from Cox Branch.

Drainage area.--76.1 sq mi.

Records available.--October 1934 to September 1960. Monthly discharge only for October 1934, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is 603.00 ft above mean sea level (levels by Corps of Engineers).

Average discharge.--26 years (1934-60), 121 cfs.

Extremes.--1934-60: Maximum discharge, 9,750 cfs Sept. 21, 1938 (gage height, 11.53 ft), from rating curve extended above 1,500 cfs on basis of computation of flow over dam at gage height 8.49 ft and slope-area measurements at gage heights 8.96 and 11.53 ft; minimum, 4.3 cfs Aug. 31, Sept. 7, 1942.

Remarks.--Some regulation at low flow by powerplant above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	25.8	82.4	187	75.5	134	180	608	107	35.3	56.5	35.0	23.9	129
1952	34.0	153	131	117	121	129	693	190	252	27.9	13.7	23.2	156
1953	21.1	29.5	125	125	135	453	320	300	34.0	14.8	17.7	11.5	133
1954	12.9	19.0	60.9	39.5	127	182	559	230	73.0	34.7	32.4	107	122
1955	72.2	149	147	79.1	61.4	156	630	98.1	49.7	13.9	15.3	11.6	123
1956	34.4	86.6	31.6	54.7	36.7	43.5	459	265	109	43.0	14.2	40.8	101
1957	44.0	50.7	98.1	107	91.1	122	187	90.6	44.4	29.7	12.3	10.6	72.2
1958	12.8	59.7	246	90.5	59.4	81.8	705	198	96.5	31.4	18.8	22.5	135
1959	56.1	69.5	47.2	77.8	65.6	103	546	76.7	30.1	11.8	19.0	21.2	95.0
1960	168	242	173	94.3	98.3	89.0	572	143	59.4	26.6	15.9	24.4	142

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.39	1.21	2.83	1.14	1.84	2.72	8.92	1.62	0.52	0.66	0.53	0.35	22.93
1952	.52	2.24	1.99	1.77	1.72	1.96	10.16	2.87	3.69	.42	.21	.34	27.89
1953	.32	.43	1.90	1.90	1.85	6.87	4.70	4.55	.50	.22	.27	.17	23.68
1954	.20	.28	.92	.60	1.74	2.75	8.20	3.49	1.07	.53	.49	1.57	21.84
1955	1.09	2.18	2.22	1.20	.84	2.37	9.23	1.49	.73	.21	.23	.17	21.96
1956	.52	1.27	.48	.83	.52	.66	6.74	4.02	1.59	.65	.22	.60	18.10
1957	.67	.74	1.49	1.62	1.25	1.84	2.45	1.37	.65	.45	.19	.16	12.88
1958	.19	.88	3.73	1.37	.81	1.24	10.33	3.00	1.44	.48	.29	.33	24.09
1959	.85	1.02	.71	1.18	.87	1.57	8.00	1.16	.44	.18	.29	.31	16.58
1960	2.55	3.55	2.63	1.43	1.39	1.35	8.38	2.16	.87	.40	.24	.36	25.31

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	1174	-	-	-	-	-	-	112	20.05
1951	1207	3,770	Dec. 4, 1950	7.6	129	1.70	22.93	130	23.25
1952	1237	7,140	June 1, 1952	10	158	2.05	27.89	144	25.79
1953	1277	3,590	Mar. 24, 1953	7.0	133	1.75	23.68	126	22.43
1954	1337	2,190	Apr. 8, 1954	6.7	122	1.60	21.84	145	25.93
1955	1387	1,920	Apr. 10, 1955	5.4	123	1.62	21.96	105	18.74
1956	1437	1,630	Apr. 17, 1956	11	101	1.33	18.10	105	18.73
1957	1507	2,030	Jan. 23, 1957	6.4	72.2	.949	12.88	82.9	14.78
1958	1557	5,190	Dec. 21, 1957	8.5	135	1.77	24.09	123	21.87
1959	1627	1,900	Apr. 3, 1959	6.4	93.0	1.22	16.58	127	22.73
1960	1707	4,950	Nov. 28, 1959	7.9	142	1.87	25.31	-	-

## 2880. Mad River near Moretown, Vt.

Location.--Lat 44°16'40" long 72°44'35", on left bank at downstream side of highway bridge, 2.4 miles downstream from Moretown, Washington County, and 3.8 miles upstream from mouth.

Drainage area.--139 sq mi.

Records available.--July to November 1910, October 1928 to September 1960. Monthly discharge only for October 1928, published in WSP 1307.

Gage.--Water-stage recorder. Concrete control since Oct. 13, 1933. Altitude of gage is 545 ft (from topographic map). July 6 to Nov. 4, 1910, staff gage at same site at different datum. Nov. 20, 1928, to Sept. 27, 1930, chain gage at same site and present datum.

Average discharge.--32 years (1928-60), 250 cfs.

Extremes.--1910, 1928-60: Maximum discharge, 18,400 cfs Sept. 22, 1938 (gage height, 16.34 ft, from floodmarks), from rating curve extended above 2,700 cfs on basis of computations of flow over dam at gage heights 9.98, 11.51, 16.34, and 19.4 ft; minimum, 1.4 cfs Oct. 1, 1930.

Maximum discharge known, 23,000 cfs Nov. 3, 1927 (gage height, 19.4 ft, from floodmarks), by computation of peak flow over dam.

Remarks.--Regulation at low flow by mill in Moretown.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	92.1	252	399	143	246	340	1,026	286	95.5	203	119	84.9	273
1952	112	385	273	219	224	223	1,256	486	409	70.2	41.0	77.7	313
1953	60.6	112	241	229	247	770	710	570	60.5	23.0	75.6	23.4	261
1954	39.0	65.5	222	91.3	249	340	1,101	493	188	78.4	96.1	264	268
1955	191	343	272	146	129	361	1,195	263	168	38.5	105	45.4	271
1956	181	283	90.9	117	70.1	76.9	765	664	228	125	33.4	128	230
1957	124	150	241	266	164	226	358	227	131	138	49.5	36.6	176
1958	40.7	157	466	139	98.8	129	1,295	421	233	102	58.7	124	271
1959	198	170	106	183	138	259	957	191	118	43.1	39.1	42.9	201
1960	395	546	338	190	187	177	1,133	263	100	52.3	34.7	95.5	291

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.76	2.02	3.31	1.19	1.84	2.82	8.24	2.37	0.77	1.68	0.99	0.68	26.67
1952	.93	3.09	2.27	1.81	1.74	1.85	10.08	4.03	3.28	.58	.34	.62	30.62
1953	.50	.90	2.00	1.90	1.85	6.38	5.70	4.73	.49	1.19	.63	.19	25.46
1954	.32	.53	1.84	.76	1.87	2.82	8.84	4.09	1.51	.65	.80	2.12	26.15
1955	1.59	2.75	2.25	1.21	.96	2.99	9.59	2.18	1.35	.32	.87	.36	26.42
1956	1.50	2.27	.75	.97	.54	.64	6.14	5.50	1.83	1.04	.28	1.03	22.49
1957	1.03	1.20	2.00	2.20	1.23	1.88	2.87	1.89	1.05	1.15	.41	.29	17.20
1958	.34	1.26	3.86	1.15	.66	1.07	10.39	3.49	1.87	.85	.49	1.00	26.43
1959	1.64	1.36	.88	1.52	1.03	1.98	7.68	1.58	.95	.36	.32	.34	19.64
1960	3.27	4.40	2.80	1.58	1.45	1.47	9.09	2.18	.81	.43	.29	.77	28.54

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	219	21.39
1951	1207	6,270	Dec. 4, 1950	28	273	1.96	26.67	275	26.87
1952	1237	7,310	June 1, 1952	20	313	2.25	30.62	283	27.73
1953	1277	5,500	Mar. 24, 1953	9.3	261	1.88	25.46	253	24.75
1954	1337	4,960	Apr. 8, 1954	9.3	268	1.93	26.15	308	30.05
1955	1387	4,420	Apr. 15, 1955	18	271	1.95	26.42	249	24.35
1956	1437	4,400	May 27, 1956	18	230	1.65	22.49	227	22.20
1957	1507	5,540	Jan. 23, 1957	14	176	1.27	17.20	189	18.43
1958	1557	7,150	Dec. 21, 1957	19	271	1.95	26.43	255	24.85
1959	1627	6,160	Apr. 3, 1959	19	201	1.45	19.64	269	26.23
1960	1707	7,760	Nov. 28, 1959	16	291	2.09	28.54	-	-

## 2885. Waterbury Reservoir near Waterbury, Vt.

Location.--Lat 44°22'55", long 72°46'15", at dam on Waterbury River, 2 2/3 miles upstream from mouth and 3½ miles north of Waterbury, Washington County.

Drainage area.--109 sq mi.

Records available.--September 1937 to September 1960. Month-end contents only for September 1937 to August 1938, published in WSP 1307.

Gage.--Water-stage recorder. Datum of gage is at mean sea level (levels by Corps of Engineers). Prior to Dec. 10, 1938, staff gage at same site and datum.

Extremes.--1937-60: Maximum elevation, 613.45 ft May 4, 1940; minimum observed, 501.3 ft Oct. 16, 1938.

Remarks.--Reservoir is formed by earthfill dam completed by Corps of Engineers during summer of 1937 for flood control and storage of water for power. Total usable capacity for flood control, 2,812,300,000 cu ft between elevations 500.0 ft (bottom of lowest outlet) and 617.5 ft (crest of spillway) above mean sea level. Usable capacity for storage of water for power, 1,582,700,000 cu ft between elevations 500.0 and 592.0 ft (sill of taintor gate) above mean sea level. Figures given herein represent usable contents.

Contents, in millions of cubic feet, on last day of month

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1951	1,163.5	1,554.2	1,532.1	1,367.0	1,185.3	839.1	1,554.2	1,563.6	1,491.5	1,493.6	1,350.8	1,083.5
1952	1,016.2	1,493.6	1,522.8	1,473.1	932.9	706.6	1,462.8	1,652.5	1,629.1	1,602.6	1,613.1	1,602.6
1953	1,804.5	1,621.7	1,624.0	1,642.4	1,633.4	1,776.8	1,716.7	1,620.5	1,505.0	1,266.5	1,074.2	840.5
1954	878.0	910.7	1,195.5	1,076.0	882.7	358.2	1,613.1	1,549.9	1,498.9	1,368.8	1,455.4	1,490.8
1955	1,386.0	1,507.7	1,454.0	1,062.4	767.1	466.2	1,622.9	1,562.0	1,474.2	1,311.3	1,391.6	1,097.7
1956	1,268.5	1,352.9	950.5	873.2	446.5	250.3	1,224.9	1,616.2	1,483.6	1,411.5	1,125.0	1,091.4
1957	929.1	912.8	1,021.0	907.6	616.9	368.4	1,186.6	1,477.0	1,522.8	1,239.7	997.6	958.7
1958	885.3	1,182.5	1,518.6	1,170.7	583.9	511.1	1,642.8	1,551.9	1,496.4	1,565.9	1,278.1	1,475.9
1959	1,573.0	1,261.1	857.8	863.0	576.3	320.6	1,393.4	1,540.7	1,525.2	1,265.9	1,267.8	1,157.8
1960	1,490.8	1,702.6	1,331.1	1,105.0	772.7	427.7	1,567.1	1,564.8	1,525.2	1,538.0	1,227.5	1,131.4

## 2890. Waterbury River near Waterbury, Vt.

Location.--Lat 44°22'10", long 72°46'10", on right bank 1 mile downstream from Waterbury Reservoir, 1 2/3 miles upstream from mouth, and 2 1/2 miles north of Waterbury, Washington County.

Drainage area.--111 sq mi.

Records available.--July to October 1910 (gage heights only), October 1935 to September 1960. Monthly discharge only for October, November 1935, published in WSP 1307.

Gage.--Water-stage recorder. Concrete control since Dec. 8, 1937. Datum of gage is 428.00 ft above mean sea level (levels by Corps of Engineers). July 7 to Oct. 31, 1910, staff gage at site 2 miles upstream at different datum.

Average discharge.--25 years (1935-60), 231 cfs (adjusted for storage).

Extremes.--1935-60: Maximum discharge, 6,520 cfs Mar. 18, 1936 (gage height, 19.38 ft); minimum daily, 0.6 cfs several times during summers of 1938-39, 1941, and 1944.

Remarks.--Flow completely regulated by Waterbury Reservoir (see preceding page). Discharge adjusted for change in contents in Waterbury Reservoir.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	148	79.8	303	199	260	398	609	257	124	165	135	173	237
1952	124	119	218	197	370	251	619	374	398	97.0	71.7	86.3	242
1953	68.2	148	240	207	212	525	673	480	116	120	137	119	254
1954	29.7	43.7	31.7	86.4	249	440	513	473	205	96.2	81.6	251	207
1955	338	230	253	264	262	432	598	289	197	103	220	170	280
1956	116	212	224	163	239	147	292	566	234	132	161	169	221
1957	172	151	148	215	272	281	141	145	168	362	132	79.1	189
1958	100	107	300	254	324	163	570	445	203	129	198	152	245
1959	281	304	240	115	198	244	489	159	208	150	80.7	80.3	212
1960	139	339	369	226	293	300	522	275	163	68.2	152	128	247

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.43	2.32	3.07	1.42	1.74	2.79	8.90	2.71	0.96	1.72	0.85	0.70	28.61
1952	1.03	3.04	2.37	1.86	1.50	1.73	9.15	4.62	3.90	.90	.79	.83	31.72
1953	.72	1.55	2.50	2.22	1.96	6.01	6.53	4.61	.72	.32	.68	.29	28.11
1954	.45	.57	1.43	.43	1.59	2.54	10.02	4.66	1.86	.57	1.11	2.66	27.89
1955	3.11	2.78	2.42	1.31	1.31	3.24	10.50	2.77	1.64	.43	2.59	.57	32.67
1956	1.86	2.46	.77	1.39	.66	.77	6.71	7.40	1.84	1.10	.56	1.57	27.09
1957	1.16	1.45	1.95	1.80	1.42	1.96	4.59	2.63	1.87	2.67	.44	.64	22.58
1958	.76	2.23	4.42	1.29	.76	1.41	10.12	4.26	1.82	1.61	.94	2.30	31.92
1959	3.29	1.85	.93	1.22	.75	1.55	1.07	2.22	2.03	.55	.85	.38	24.69
1960	2.73	4.23	2.39	1.47	1.56	1.78	9.67	2.85	1.48	.76	.37	.92	30.21

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year				
		Observed			Adjusted			Observed		Adjusted		
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches	
		Discharge	Date									
1950	-	-	-	-	-	-	-	-	191	191	23.37	
1951	1207	1,420	Apr. 26, 1951	4.1	237	234	2.11	28.61	231	231	28.23	
1952	1237	1,500	June 1, 1952	2.2	242	259	2.33	31.72	242	245	30.02	
1953	1277	1,840	Mar. 25, 1953	5.3	254	230	2.07	28.11	224	211	25.79	
1954	1337	1,920	Apr. 23, 1954	9.9	207	228	2.05	27.89	268	276	33.75	
1955	1387	847	Apr. 26, 1955	4.9	280	267	2.41	32.67	257	241	29.45	
1956	1437	1,330	May 28, 1956	4.2	221	221	1.99	27.09	214	217	26.56	
1957	1507	570	July 22, 1957	4.7	189	185	1.67	22.58	192	208	25.43	
1958	1557	2,340	Apr. 24, 1958	4.5	245	261	2.35	31.92	271	250	30.58	
1959	1627	670	Oct. 29, 1958	4.9	212	202	1.82	24.69	214	229	27.97	
1960	1707	1,640	Nov. 30, 1959	4.9	247	246	2.22	30.21	-	-	-	

## 2905. Winooski River near Essex Junction, Vt.

Location.--Lat 44°28'40", long 73°08'20", on right bank half a mile downstream from Muddy Brook and 2 miles southwest of Essex Junction, Chittenden County.

Drainage area.--1,044 sq mi.

Records available.--October 1928 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 185 ft (from topographic map).

Average discharge.--32 years (1928-60), 1,669 cfs (adjusted for storage since October 1938).

Extremes.--1928-60: Maximum discharge, 45,300 cfs Mar. 19, 1936 (gage height, 23.54 ft), from rating curve extended above 27,000 cfs on basis of computations of flow over dam at gage heights 18.72, 23.54, and 50.4 ft and slope-area measurement at gage height 50.4 ft; minimum daily, 65 cfs Sept. 20, 1959.

Maximum discharge known, 113,000 cfs Nov. 4, 1927 (gage height, 50.4 ft, from floodmarks), from rating curve extended above 27,000 cfs by method explained above.

Remarks.--Flow regulated by powerplants above station, by Peacham Pond and Mollys Falls Reservoir (combined usable capacity, 492,000,000 cu ft), by Waterbury Reservoir (see p. 363), and by East Barre (see p. 357) and Wrightsville Detention Reservoirs (see p. 358). Discharge adjusted for change in contents in Peacham Pond, Mollys Falls Reservoir, East Barre and Wrightsville Detention Reservoirs, and Waterbury Reservoir.

Monthly and yearly mean discharge, in cubic feet per second (observed)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	591	1,502	2,424	1,151	1,818	2,532	6,580	1,816	691	1,201	671	568	1,773
1952	641	2,059	1,705	1,573	1,714	1,790	7,325	2,793	3,233	563	299	484	2,003
1953	478	666	1,603	1,746	1,805	4,614	4,987	3,759	593	331	473	321	1,783
1954	267	389	985	572	1,774	2,655	6,517	3,627	1,306	550	538	1,741	1,735
1955	1,684	2,096	2,047	1,259	1,150	2,708	7,641	1,850	1,159	382	1,145	504	1,966
1956	853	1,907	775	1,027	805	761	5,410	4,623	1,611	758	384	805	1,658
1957	823	922	1,239	1,368	1,244	1,973	2,356	1,486	928	1,190	433	336	1,192
1958	369	936	2,870	1,211	1,038	1,345	8,224	3,248	1,716	871	690	771	1,938
1959	1,504	1,347	888	1,173	1,000	1,615	6,897	1,200	914	378	318	318	1,456
1960	1,738	3,205	2,620	1,556	1,638	1,438	7,081	1,903	903	435	384	523	1,943

Monthly and yearly runoff, in inches (adjusted)

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.63	1.56	2.65	1.17	1.74	2.72	7.42	1.92	0.70	1.34	0.67	0.49	23.01
1952	.66	2.40	1.90	1.69	1.53	1.67	8.26	3.14	3.44	.58	.34	.49	26.30
1953	.51	.68	1.82	1.93	1.76	5.43	5.15	4.08	.56	.26	.45	.25	22.86
1954	.29	.44	1.22	.56	1.89	2.69	7.68	3.89	1.37	.55	.63	1.86	22.87
1955	1.81	2.29	2.23	1.19	1.01	2.85	8.84	1.92	1.20	.34	1.30	.39	25.37
1956	1.03	2.06	.66	1.10	.62	.73	6.36	5.22	1.67	.80	.31	.84	21.40
1957	.79	.97	1.42	1.44	1.14	2.04	2.90	1.79	1.02	1.19	.36	.34	15.40
1958	.36	1.13	3.34	1.17	.75	1.43	9.57	3.35	1.81	.99	.61	.91	25.42
1959	1.71	1.29	.78	1.29	.85	1.63	7.95	1.38	.97	.50	.34	.26	18.75
1960	2.06	3.60	2.65	1.59	1.53	1.47	8.12	2.11	.88	.45	.29	.53	25.28

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30										Calendar year		
		Observed					Adjusted					Observed		Adjusted
		Momentary maximum		Minimum day	Mean	Mean	Per square mile	Runoff in inches	Mean	Mean	Runoff in inches	Mean	Mean	Runoff in inches
		Discharge	Date											
1950	-	-	-	-	-	-	-	-	-	-	-	1,458	1,457	18.94
1951	1207	18,300	Dec. 5, 1950	100	1,773	1,770	1.70	23.01	1,778	1,779	23.13	1,778	1,779	23.13
1952	1237	24,900	June 2, 1952	81	2,003	2,017	1.93	26.30	1,866	1,867	24.35	1,866	1,867	24.35
1953	1277	19,600	Mar. 25, 1953	89	1,783	1,757	1.68	22.86	1,689	1,676	21.80	1,676	1,676	21.80
1954	1337	14,600	Apr. 9, 1954	90	1,735	1,758	1.68	22.87	2,066	2,095	27.25	2,066	2,095	27.25
1955	1387	15,100	Apr. 15, 1955	120	1,966	1,951	1.87	25.37	1,772	1,752	22.79	1,772	1,752	22.79
1956	1437	15,900	May 28, 1956	182	1,638	1,641	1.57	21.40	1,594	1,597	20.83	1,594	1,597	20.83
1957	1507	11,400	Jan. 23, 1957	103	1,192	1,184	1.13	15.40	1,293	1,311	17.05	1,293	1,311	17.05
1958	1557	22,100	Apr. 22, 1958	125	1,938	1,955	1.87	25.42	1,899	1,875	24.37	1,899	1,875	24.37
1959	1627	19,000	Apr. 3, 1959	65	1,456	1,443	1.38	18.75	1,776	1,792	25.28	1,776	1,792	25.28
1960	1707	24,100	Nov. 28, 1959	86	1,943	1,939	1.86	25.28	-	-	-	-	-	-

## 2920. Lamoille River at Johnson, Vt.

Location--Lat 44°37'20", long 72°40'50", on right bank at falls, 0.7 mile upstream from bridge in Johnson, Lamoille County, and 0.8 mile upstream from Gihon River.

Drainage area--310 sq mi.

Records available--July to December 1910, June 1911 to December 1913 (monthly discharge only, January to March 1912, February 1913), September 1928 to September 1960.

Gage--Water-stage recorder. Altitude of gage is 495 ft (from topographic map). Prior to Dec. 31, 1913, chain gage at bridge 0.7 mile downstream at different datum.

Average discharge--34 years (1911-13, 1928-60), 525 cfs.

Extremes--1910-13, 1928-60: Maximum discharge, 13,000 cfs Mar. 18, 1936 (gage height, 16.48 ft), from rating curve extended above 8,500 cfs on basis of computation of peak flow over dam; minimum, 11 cfs Sept. 2, 1935; minimum daily, 16 cfs Oct. 26, 1947.

Remarks--Flow regulated by powerplant above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	259	495	688	319	387	618	2,244	510	279	372	264	249	556
1952	265	610	478	380	334	443	2,054	640	1,118	246	249	257	586
1953	261	277	549	472	456	1,375	1,156	777	228	173	187	159	507
1954	114	140	292	117	365	617	2,180	1,005	416	215	235	628	525
1955	602	583	560	355	345	651	2,435	445	346	176	550	219	605
1956	285	526	213	379	237	216	1,673	1,314	398	230	202	285	496
1957	255	301	338	353	309	541	1,041	569	324	483	209	231	413
1958	221	506	970	356	280	362	2,337	740	466	420	255	302	601
1959	668	409	277	323	238	389	2,055	543	263	157	169	140	451
1960	443	973	604	369	438	290	2,160	486	318	212	194	268	560

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	0.96	1.78	2.56	1.19	1.30	2.30	8.08	1.90	1.00	1.38	0.98	0.90	24.33
1952	.98	2.20	1.78	1.41	1.16	1.65	7.39	2.38	4.02	.91	.93	.93	25.74
1953	.97	1.00	2.04	1.76	1.53	5.11	4.16	2.89	.82	.64	.70	.57	22.19
1954	.42	.50	1.09	.43	1.23	2.29	7.85	3.74	1.50	.80	.67	2.26	22.98
1955	2.24	2.10	2.08	1.32	1.16	2.42	8.76	1.65	1.25	.66	2.05	.79	26.48
1956	1.06	1.89	.79	1.41	.83	.80	6.02	4.89	1.43	.85	.75	1.02	21.74
1957	.95	1.08	1.26	1.31	1.04	2.01	3.75	2.12	1.17	1.80	.78	.83	18.10
1958	.82	1.82	3.61	1.32	.94	1.34	8.41	2.75	1.68	1.56	.95	1.09	26.29
1959	2.49	1.47	1.03	1.20	.80	1.45	7.40	1.27	.95	.58	.63	.50	19.77
1960	1.65	3.50	2.24	1.37	1.52	1.08	7.77	1.81	1.14	.79	.72	.96	24.55

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	455	19.90
1951	1207	7,940	Mar. 31, 1951	128	556	1.79	24.33	548	23.99
1952	1237	9,060	June 2, 1952	150	586	1.89	25.74	565	24.79
1953	1277	6,900	Mar. 25, 1953	123	507	1.64	22.19	461	20.19
1954	1337	6,850	Apr. 23, 1954	68	525	1.69	22.98	525	27.39
1955	1387	6,030	Apr. 16, 1955	123	605	1.95	26.48	544	23.80
1956	1437	6,300	May 27, 1956	144	496	1.60	21.74	485	21.29
1957	1507	4,820	Jan. 23, 1957	140	413	1.33	18.10	481	21.06
1958	1557	8,440	Dec. 21, 1957	173	601	1.94	26.29	572	25.03
1959	1627	4,800	Apr. 3, 1959	80	451	1.45	19.77	506	22.17
1960	1707	8,800	Nov. 28, 1959	80	560	1.81	24.55	-	-

## 2925. Lamoille River at East Georgia, Vt.

Location.--Lat 44°40'45", long 73°04'20", on right bank at East Georgia, Franklin County, 0.5 mile upstream from railroad bridge and 1 mile downstream from Beaver Meadow Brook.

Drainage area.--686 sq mi.

Records available.--August 1929 to September 1960. Prior to October 1937, published as "near Milton."

Gage.--Water-stage recorder. Altitude of gage is 285 ft (from topographic map). Prior to December 1937, at site  $3\frac{1}{2}$  miles downstream at different datum.

Average discharge.--31 years (1929-60), 1,214 cfs, adjusted to present drainage area.

Extremes.--1929-60: Maximum discharge, 23,200 cfs Mar. 19, 1936 (gage height, 12.52 ft, site and datum then in use), by computation of peak flow over dam; maximum gage height, 18.81 ft Apr. 3, 1959 (ice jam); minimum daily discharge, 91 cfs July 30, 1933.

Remarks.--Low flow regulated by powerplants above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	722	1,356	1,750	723	879	1,317	4,897	1,144	613	784	450	462	1,255
1952	518	1,620	1,135	950	822	1,082	4,433	1,642	2,432	551	581	557	1,353
1953	605	823	1,386	1,098	1,072	2,801	2,659	1,787	455	331	333	242	1,134
1954	237	306	691	271	940	1,437	4,904	2,209	1,412	458	527	1,457	1,231
1955	1,681	1,417	1,310	817	792	1,494	5,388	1,029	853	319	1,259	421	1,397
1956	654	1,444	470	862	532	520	3,764	3,161	928	452	337	545	1,137
1957	499	603	746	800	700	1,202	2,229	1,346	792	1,190	368	445	911
1958	460	1,154	2,215	833	659	941	5,453	1,807	1,018	913	702	925	1,422
1959	1,635	1,071	673	779	581	910	4,491	829	872	366	372	239	1,066
1960	986	2,522	1,526	899	1,044	629	4,812	1,136	815	410	343	524	1,296

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.21	2.21	2.94	1.22	1.33	2.21	7.96	1.92	1.00	1.32	0.76	0.75	24.83
1952	.87	2.63	1.91	1.60	1.29	1.82	7.21	2.76	3.96	.93	.98	.91	26.87
1953	1.02	1.34	2.33	1.84	1.63	4.71	4.32	3.00	.74	.56	.56	.39	22.44
1954	.40	.50	1.16	.46	1.43	2.42	7.98	3.71	2.30	.77	.89	2.37	24.39
1955	2.83	2.30	2.20	1.37	1.20	2.51	8.76	1.73	1.39	.54	2.12	.68	27.63
1956	1.10	2.35	.79	1.45	.84	.87	6.12	5.31	1.51	.76	.57	.89	22.56
1957	.84	.98	1.25	1.34	1.06	2.02	3.62	2.26	1.29	2.00	.62	.72	18.00
1958	.77	1.88	3.72	1.40	1.00	1.58	8.87	3.04	1.66	1.53	1.18	1.51	28.14
1959	2.75	1.74	1.13	1.31	.88	1.53	7.30	1.39	1.42	.62	.63	.39	21.09
1960	1.66	4.10	2.56	1.51	1.64	1.06	7.83	1.91	1.32	.69	.58	.85	25.71

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	1,065	21.07
1951	1207	10,900	Apr. 1, 1951	276	1,255	1.83	24.83	1,207	23.88		
1952	1237	12,900	June 2, 1952	251	1,353	1.97	26.87	1,317	26.15		
1953	1277	11,500	Mar. 25, 1953	184	1,134	1.85	22.44	1,001	19.81		
1954	1337	12,500	Apr. 23, 1954	125	1,231	1.79	24.39	1,498	29.66		
1955	1387	13,000	Apr. 16, 1955	238	1,397	2.04	27.63	1,240	24.54		
1956	1437	11,000	Apr. 30, 1956	234	1,137	1.66	22.56	1,078	21.39		
1957	1507	8,500	Jan. 23, 1957	246	911	1.33	18.00	1,077	21.30		
1958	1557	15,100	Apr. 22, 1958	270	1,422	2.07	28.14	1,384	27.39		
1959	1627	10,000	Apr. 3, 1959	134	1,066	1.55	21.09	1,202	23.79		
1960	1707	14,500	Nov. 29, 1959	220	1,296	1.89	25.71	-	-		

2930. Missisquoi River near North Troy, Vt.

Location.--Lat 44°58'20", long 72°23'15", on right bank 200 ft upstream from Big Falls, 1½ miles downstream from Jay Branch, and 2½ miles upstream from North Troy, Troy County.

Drainage area.--131 sq mi.

Records available.--August 1931 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 580 ft (from topographic map).

Average discharge.--29 years (1931-60), 269 cfs.

Extremes.--1931-60: Maximum discharge, 7,980 cfs May 3, 1940 (gage height, 12.87 ft), from rating curve extended above 3,600 cfs by logarithmic plotting, verified by computation of flow over dam at gage height 11.70 ft; minimum, 9.4 cfs Aug. 28, 1949; minimum daily, 11 cfs Aug. 28, 1949, Aug. 30, 1953.

Remarks.--Some regulation caused by small powerplant above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	168	286	342	185	191	337	1,060	232	83.9	132	58.1	57.1	260
1952	85.6	335	244	196	147	214	1,076	385	460	65.7	77.3	88.7	276
1953	119	170	296	225	197	685	694	371	79.4	85.4	56.0	31.5	251
1954	56.7	99.5	206	70.0	226	305	1,309	505	339	91.8	124	388	308
1955	478	284	235	133	121	289	1,325	228	163	36.4	142	36.5	289
1956	101	217	60.9	115	72.3	81.4	839	716	157	78.0	46.8	107	215
1957	114	151	208	260	182	284	638	320	154	242	46.6	100	225
1958	105	320	560	134	91.5	135	1,345	368	194	356	172	228	334
1959	430	203	100	141	101	209	1,195	215	202	81.2	79.4	55.2	249
1960	311	630	268	166	194	160	1,421	298	166	81.5	54.2	159	324

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.48	2.43	3.01	1.61	1.52	2.96	9.02	2.04	0.71	1.16	0.51	0.49	26.94
1952	.75	2.66	2.15	1.73	1.21	1.88	9.17	3.21	3.92	.56	.68	.76	28.88
1953	1.05	1.45	2.61	1.98	1.56	6.03	5.91	3.27	.68	.75	.49	.27	26.05
1954	.50	.85	1.82	.62	1.80	2.68	11.15	4.44	2.89	.81	1.09	3.30	31.95
1955	4.21	2.42	2.07	1.17	.96	2.55	11.29	2.00	1.39	.32	1.25	.31	29.94
1956	.89	1.65	.54	1.01	.60	.72	7.14	6.30	1.34	.69	.41	.91	22.40
1957	1.00	1.29	1.83	2.29	1.45	2.50	5.43	2.62	1.31	2.13	.41	.86	23.32
1958	.91	2.73	4.93	1.18	.73	1.19	11.46	3.24	1.65	3.13	1.51	1.92	34.56
1959	3.78	1.73	.88	1.24	.80	1.84	10.16	1.89	1.72	.71	.70	.30	25.75
1960	2.74	5.37	2.36	1.46	1.60	1.41	12.10	2.62	1.42	.72	.48	1.35	33.63

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year			
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff 10 inches	Mean	Runoff in inches		
		Discharge	Date								
1950	-	-	-	-	-	-	-	-	-	243	25.22
1951	1207	4,050	Dec. 5, 1950	31	260	1.98	26.94	249	25.76		
1952	1237	5,060	June 2, 1952	20	278	2.12	28.88	272	28.23		
1953	1277	3,170	Mar. 25, 1953	11	251	1.92	26.05	233	24.11		
1954	1337	4,580	Apr. 8, 1954	15	308	2.35	31.95	362	37.48		
1955	1387	3,880	Apr. 15, 1955	13	289	2.21	29.94	237	24.52		
1956	1437	3,340	Apr. 30, 1956	14	215	1.64	22.40	224	23.24		
1957	1507	4,740	Jan. 23, 1957	28	225	1.72	23.32	268	27.77		
1958	1557	5,110	Dec. 21, 1957	38	334	2.55	34.58	313	32.40		
1959	1627	3,730	Apr. 3, 1959	26	249	1.90	25.75	288	29.83		
1960	1707	5,180	Nov. 28, 1959	26	324	2.47	33.63	-	-		



## 2935. Missisquoi River near Richford, Vt.

Location.--Lat 44°57'30", long 72°41'55", on left bank 1 2/3 miles upstream from Trout River, 3 miles south of Richford, Franklin County, and 3 1/2 miles downstream from North Branch.

Drainage area.--479 sq mi.

Records available.--July 1911 to September 1923, October 1928 to September 1960. Monthly discharge only for some periods, published in WSP 1307.

Gage.--Water-stage recorder. Altitude of gage is 410 ft (from topographic map). Prior to Aug. 1, 1915, chain gage at site a quarter of a mile downstream at datum 4.35 ft lower. Aug. 1, 1915, to Sept. 30, 1923, water-stage recorder at present site and datum. Oct. 1, 1928, to Sept. 30, 1929, chain gage at former site at datum 4.6 ft lower.

Average discharge.--44 years (1911-23, 1928-60), 911 cfs.

Extremes.--1911-23, 1928-60: Maximum discharge, 17,200 cfs May 4, 1940 (gage height, 15.15 ft), from rating curve extended above 9,300 cfs on basis of computation of peak flow over dam at gage height 14.70 ft, slope-area measurement at gage height 12.90 ft, and study of discharge per foot of width at measuring section; maximum gage height, 18.92 ft Mar. 15, 1946 (ice jam); minimum discharge observed, 8 cfs July 14, 1911. Maximum discharge known, 45,000 cfs during flood of November 1927 (gage height, 23.1 ft, from floodmarks), from rating curve extended above 9,300 cfs by method explained above.

Remarks.--Diurnal fluctuation at low flow prior to 1934.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	520	1,083	1,260	670	709	1,152	3,563	656	293	456	161	213	892
1952	277	1,138	808	775	549	790	3,530	1,044	1,535	204	181	200	914
1953	319	518	1,013	814	718	2,264	2,098	1,215	283	329	191	92.7	823
1954	158	241	662	273	840	1,143	3,871	1,456	1,439	300	392	1,365	1,003
1955	1,993	1,055	842	487	416	1,041	4,298	742	483	102	304	103	988
1956	243	744	270	430	265	296	2,846	2,167	553	270	130	259	704
1957	322	422	767	735	555	1,164	1,934	961	480	904	230	426	744
1958	427	1,028	1,998	513	354	579	4,396	980	586	1,237	808	791	1,140
1959	1,396	719	274	415	364	730	4,177	613	661	206	190	91.2	817
1960	790	2,167	1,097	660	770	568	4,195	1,021	385	191	142	446	1,029

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.25	2.52	3.03	1.61	1.54	2.77	8.30	1.58	0.68	1.10	0.39	0.50	25.27
1952	.67	2.65	1.94	1.86	1.24	1.90	8.22	2.51	3.58	.49	.44	.47	25.97
1953	.77	1.21	2.44	1.96	1.56	5.45	4.89	2.92	.66	.79	.46	.22	23.33
1954	.33	.56	1.59	.66	1.83	2.75	9.02	3.50	3.35	.72	.94	3.18	28.43
1955	4.80	2.46	2.03	1.17	.90	2.51	10.01	1.79	1.13	.25	.73	.24	28.02
1956	.58	1.73	.65	1.03	.60	.71	6.63	5.21	1.29	.65	.31	.60	19.99
1957	.77	.96	1.89	1.77	1.21	2.80	4.50	2.31	1.12	2.18	.55	.99	21.07
1958	1.03	2.39	4.81	1.23	.77	1.39	10.24	2.31	1.37	2.98	1.95	1.84	32.31
1959	3.36	1.88	.68	1.00	.79	1.78	9.73	1.46	1.54	.50	.46	.21	23.17
1960	1.90	5.05	2.64	1.59	1.73	1.37	9.77	2.46	.90	.46	.34	1.04	29.25

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30							Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches	
		Discharge	Date							
1950	-	-	-	-	-	-	-	-	-	-
1951	1207	8,980	Mar. 31, 1951	111	692	1.66	25.27	829	23.49	
1952	1237	8,160	June 2, 1952	76	914	1.91	25.97	906	25.13	
1953	1277	7,540	Mar. 26, 1953	90	823	1.72	23.33	755	21.39	
1954	1337	9,370	Apr. 8, 1954	74	1,003	2.09	28.43	1,243	35.24	
1955	1387	10,700	Oct. 13, 1954	58	988	2.06	28.02	765	21.69	
1956	1437	10,200	Apr. 30, 1956	78	704	1.47	19.99	728	20.67	
1957	1507	8,060	Jan. 23, 1957	82	744	1.55	21.07	906	25.66	
1958	1557	10,600	Apr. 18, 1958	126	1,140	2.38	32.31	1,051	29.78	
1959	1627	11,500	Apr. 4, 1959	58	817	1.71	23.17	954	27.06	
1960	1707	10,200	Apr. 5, 1960	66	1,029	2.15	29.25	-	-	

## STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

2960. Black River at Coventry, Vt.

Location.--Lat 44°52'08", long 72°16'14", on right bank 15 ft downstream from highway bridge, 800 ft upstream from Stony Brook, and 0.35 mile northwest of Coventry, Orleans County.

Drainage area.--122 sq mi.

Records available.--October 1951 to September 1960.

Gage.--Water-stage recorder. Altitude of gage is 725 ft (from topographic map).

Average discharge.--9 years (1951-60), 197 cfs.

Extremes.--1951-60: Maximum discharge, 3,010 cfs Nov. 28 or 29, 1959 (gage height, 7.20 ft, from floodmark); minimum daily, 11 cfs Aug. 29 to Sept. 1, 1953.

Remarks.--Flow regulated by mill above station.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	52.9	205	170	158	132	155	797	179	318	63.3	49.4	80.2	195
1953	89.5	97.0	204	172	163	509	434	268	57.1	41.9	34.2	19.9	174
1954	28.4	55.0	129	43.3	142	244	976	415	185	72.3	87.8	275	220
1955	297	203	208	120	122	255	974	152	126	35.0	184	44.8	226
1956	60.5	168	64.4	102	65.7	63.1	711	497	144	65.3	35.4	81.8	171
1957	73.1	91.7	123	131	101	236	437	229	108	116	44.3	54.3	145
1958	59.9	211	433	122	87.1	118	975	284	147	195	92.2	118	237
1959	245	166	86.0	107	83.9	147	882	122	89.1	47.4	51.8	37.3	171
1960	190	421	270	138	157	109	1,020	222	140	50.7	38.3	65.1	234

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	-	-	-	-	-	-	-	-	-	-	-	-	-
1952	0.50	1.87	1.61	1.50	1.17	1.46	7.29	1.69	2.91	0.61	0.47	0.73	21.80
1953	.85	.89	1.92	1.62	1.39	4.81	3.97	2.54	.52	.40	.32	.18	19.41
1954	.27	.50	1.22	.41	1.22	2.30	8.93	3.92	1.69	.68	.85	2.52	24.49
1955	2.81	1.85	1.97	1.13	1.04	2.41	8.91	1.44	1.15	.33	1.74	.41	25.19
1956	.57	1.54	.61	.96	.58	.60	6.50	4.70	1.31	.62	.33	.75	19.07
1957	.69	.84	1.17	1.23	.86	2.23	3.99	2.16	.99	1.10	.42	.50	16.18
1958	.57	1.93	4.09	1.15	.74	1.11	8.92	2.69	1.34	1.85	.87	1.08	26.34
1959	2.31	1.51	.81	1.01	.72	1.39	8.07	1.15	.81	.45	.49	.34	19.06
1960	1.80	3.85	2.55	1.31	1.39	1.03	9.33	2.09	1.28	.48	.36	.60	26.07

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	-	-
1951	-	-	-	-	-	-	-	-	-
1952	1237	2,010	June 1, 1952	16	195	1.60	21.80	192	21.48
1953	1277	1,860	May 26, 27, 1953	11	174	1.43	19.41	160	17.74
1954	1337	2,220	Apr. 8, 1954	14	220	1.80	24.49	262	29.13
1955	1387	2,530	Apr. 16, 1955	14	226	1.85	25.19	191	21.28
1956	1437	1,750	Apr. 30, 1956	16	171	1.40	19.07	171	19.05
1957	1507	1,530	Jan. 23, 1957	23	145	1.19	16.18	180	20.07
1958	1557	2,620	Apr. 19, 1958	16	237	1.94	26.34	219	24.38
1959	1627	1,930	Apr. 6, 1959	16	171	1.40	19.06	203	22.63
1960	1707	3,010	Nov. 28 or 29	22	234	1.92	26.07	-	-

## 2965. Clyde River at Newport, Vt.

Location.--Lat 44°56'20", long 72°11'25", on right bank in Newport, Orleans County, just downstream from small tributary entering from north, 1 mile upstream from mouth.

Drainage area.--142 sq mi.

Records available.--May 1909 to September 1919, May 1920 to August 1922, October 1922 to September 1924, November 1928 to May 1936, September 1938 to September 1960. Prior to November 1928, published as "at West Derby."

Gage.--Water-stage recorder; and, since Mar. 6, 1957, records of power generation. Datum of gage is 682.36 ft above mean sea level, datum of 1929. May 25, 1909, to Sept. 20, 1915, staff or chain gage. Sept. 21, 1915, to Sept. 30, 1924, Nov. 16, 1928, to May 4, 1936, water-stage recorder, at site 0.65 mile upstream at different datum.

Average discharge.--41 years (1909-19, 1920-21, 1922-24, 1929-35, 1938-60), 250 cfs.

Extremes.--1909-24, 1928-36, 1938-60: Maximum discharge, 3,900 cfs Mar. 20, 1936 (gage height, 5.76 ft, site and datum then in use), from rating curve extended above 2,800 cfs on basis of computation of peak flow over dam; minimum daily, 2.6 cfs June 18, 1956.

Remarks.--Flow regulated by powerplant and reservoirs above station. Diversion around station, through canal and penstock of powerplant below station; discharge computed from relation of kilowatt-hour output and discharge measurements. Since Mar. 6, 1957, discharge computed by adding river flow and flow diverted through powerplant.

Cooperation.--Records of power generation furnished by Citizens Utilities Co.

Monthly and yearly mean discharge, in cubic feet per second

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	126	196	355	167	239	237	894	391	182	123	98.0	107	260
1952	77.3	216	192	180	190	165	817	417	475	116	49.9	103	249
1953	142	117	197	193	277	480	618	385	113	72.7	96.7	77.8	230
1954	95.1	92.1	212	116	156	325	1,024	711	386	130	134	405	315
1955	337	235	218	197	191	307	940	356	212	102	130	60.4	274
1956	88.1	185	97.4	110	108	102	461	733	248	145	43.1	116	203
1957	157	164	164	160	123	259	405	349	141	167	136	90.7	195
1958	106	240	398	267	203	154	335	447	213	278	200	141	298
1959	212	235	165	170	178	173	876	358	259	174	106	98.5	249
1960	264	470	477	219	221	167	939	476	230	157	76.8	83.4	314

Monthly and yearly runoff, in inches

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	The year
1951	1.02	1.54	2.88	1.52	1.75	1.92	7.02	3.17	1.43	1.00	0.71	0.84	24.80
1952	.63	1.70	1.56	1.46	1.44	1.34	6.42	3.39	3.73	.95	.41	.81	23.84
1953	1.15	.92	1.60	1.57	2.03	3.90	4.86	3.13	.89	.59	.79	.61	22.04
1954	1.77	.72	1.72	.94	1.15	2.64	8.05	5.77	3.03	1.06	1.08	3.18	30.11
1955	2.74	1.65	1.77	1.60	1.40	2.49	7.39	2.89	1.67	.83	1.05	.47	26.15
1956	.72	1.45	.79	.89	.82	.83	3.62	5.95	1.95	1.18	.35	.91	19.46
1957	1.28	1.28	1.33	1.30	.90	2.10	3.18	2.83	1.11	1.52	1.11	.71	18.65
1958	.86	1.89	3.22	2.17	1.49	1.25	7.35	3.63	1.67	2.26	1.63	1.11	28.53
1959	1.72	1.85	1.34	1.38	1.29	1.40	6.88	2.91	2.03	1.41	.86	.77	23.84
1960	2.14	3.70	3.87	1.78	1.68	1.35	7.38	3.87	1.81	1.27	.62	.66	30.13

Yearly discharge, in cubic feet per second

Year	WSP	Water year ending Sept. 30						Calendar year	
		Momentary maximum		Minimum day	Mean	Per square mile	Runoff in inches	Mean	Runoff in inches
		Discharge	Date						
1950	-	-	-	-	-	-	-	242	23.11
1951	1207	1,290	Apr. 15, 1951	32	260	1.83	24.80	243	23.25
1952	1237	1,340	Apr. 23, 1952	12	249	1.75	23.84	246	23.62
1953	1277	1,520	Mar. 28, 1953	21	230	1.62	22.04	226	21.58
1954	1337	2,620	Apr. 24, 1954	22	315	2.22	30.11	348	33.26
1955	1387	2,140	Apr. 17, 1955	16	274	1.93	26.15	238	22.75
1956	1437	1,080	May 5, 1956	2.6	203	1.43	19.46	213	20.39
1957	1507	1,000	Apr. 24, 1957	10	195	1.37	18.65	217	20.73
1958	1557	2,800	Apr. 24, 1958	16	298	2.10	28.53	287	27.47
1959	1627	1,810	Apr. 7, 1959	20	249	1.75	23.84	300	28.64
1960	1707	1,900	Apr. 18, 1960	23	314	2.21	30.13	-	-



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