

STREAMFLOW STATISTICS OF SELECTED STREAMS IN THE LOWER RED RIVER OF THE NORTH BASIN, NORTH DAKOTA, MINNESOTA, AND MANITOBA

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CONTENTS

Abstract	1
Introduction	1
History of the stream-gaging program in North Dakota	2
Explanation of station summaries	2
Station description	6
Statistics of monthly and annual mean discharges	7
Monthly and annual flow duration	8
Probability of occurrence of high or low discharges	8
Data considerations	9
Period of record	9
References	10
Streamflow statistics	11
05064900 Beaver Creek near Finley, ND	12
05065500 Goose River near Portland, ND	19
05066500 Goose River at Hillsboro, ND	28
05067500 Marsh River near Shelly, MN	37
05068000 Sand Hill River at Beltrami, MN	46
05068500 Sand Hill Ditch at Beltrami, MN	53
05069000 Sand Hill River at Climax, MN	60
05074500 Red Lake River near Red Lake, MN	69
05075000 Red Lake River at High Landing near Goodridge, MN	78
05076000 Thief River near Thief River Falls, MN	87
05076500 Red Lake River at Thief River Falls, MN	97
05077500 Clearwater River near Leonard, MN	104
05077700 Ruffy Brook near Gonvick, MN	111
05078000 Clearwater River at Plummer, MN	118
05078230 Lost River at Oklee, MN	127
05078500 Clearwater River at Red Lake Falls, MN	134
05079000 Red Lake River at Crookston, MN	143
05082500 Red River of the North at Grand Forks, ND	154
05083000 Turtle River at Manvel, ND	166
05083500 Red River of the North at Oslo, MN	173
05083600 Middle Branch Forest River near Whitman, ND	180
05084000 Forest River near Fordville, ND	187
05085000 Forest River at Minto, ND	196
05087500 Middle River at Argyle, MN	205
05088000 South Branch Park River near Park River, ND	214
05089000 South Branch Park River below Homme Dam, ND	221
05089100 Middle Branch Park River near Union, ND	230
05089500 Cart Creek at Mountain, ND	237
05090000 Park River at Grafton, ND	244
05092000 Red River of the North at Drayton, ND	257
05092200 Pembina County Drain 20 near Glasston, ND	266
05093000 South Branch Two Rivers at Pelan, MN	273
05094000 South Branch Two Rivers at Lake Bronson, MN	280
05095500 Two Rivers below Hallock, MN	289
05096000 North Branch Two Rivers near Lancaster, MN	296
05096500 State Ditch 85 near Lancaster, MN	303
05098700 Hidden Island Coulee near Hansboro, ND	310
05098800 Cypress Creek near Sarles, ND	317
05099100 Snowflake Creek near Snowflake, MB	324
05099150 Mowbray Creek near Mowbray, MB	331

05099300	Pembina River near Windygates, MB.....	338
05099400	Little South Pembina River near Walhalla, ND.....	345
05099600	Pembina River at Walhalla, ND.....	356
05100000	Pembina River at Neche, ND.....	365
05100500	Herzog Creek near Concrete, ND.....	375
05101000	Tongue River at Akra, ND.....	382
05101500	Tongue River at Cavalier, ND.....	391
05102500	Red River Of The North at Emerson, MB.....	398

FIGURES

1. Map showing location of streamflow-gaging stations in the lower Red River of the North Basin for which streamflow statistics are published in this report.....4
2. Graph showing number of streamflow-gaging stations in North Dakota, 1901-94.....5

TABLES

1. List of streamflow-gaging stations in the lower Red River of the North Basin for which streamflow statistics are published in this report.....3

DEFINITION OF TERMS

Climatic year is the 12-month period April 1 through March 31. The climatic year is designated by the calendar year in which it begins.

Cubic foot per second (ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Discharge is the volume of water in the "natural" channel of a stream that passes a given point within a given period of time. Discharge often is used interchangeably with the term "streamflow".

Drainage area (of a stream at a streamflow-gaging station) is the area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the stream upstream from the station.

Drainage basin is a part of the surface of the Earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height is the water-surface elevation referred to some arbitrary gage datum. Gage height often is used interchangeably with the more general term "stage", although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Ground water is the water in the ground that is in the zone of saturation, from which wells, springs, and ground-water runoff are supplied.

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an eight-digit number.

Instantaneous discharge is the discharge at a particular instant of time.

Mean is the arithmetic average of a list of values.

Mean discharge is the arithmetic mean of individual discharges during a specific period.

Partial-record station is a particular site where limited streamflow data are collected systematically over a period of years.

Period of record is the time during which a stream-gaging station is in operation and for which the records are published.

Probability of occurrence is the likelihood that an event will occur. Probabilities are generally expressed as a decimal number between 0 and 1. If the probability is 0, the event will not occur; if the probability is 1, the event will occur absolutely. Probability also can be expressed as a percent, where 0 percent corresponds to 0 probability and 100 percent corresponds to a probability of 1.

Recurrence interval is the average time interval between occurrences of a hydrologic event of a given or greater magnitude, usually expressed in years.

Regulation is the artificial manipulation of the flow of a stream.

Stage see "gage height"

Standard deviation is a measure of the variability of the values in a list of values.

Stream-gaging station is a gaging station where a record of discharge of a stream is obtained.

Streamflow see "discharge"

Surface water is the water on the surface of the earth.

Water year is the 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months.

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By Tara Williams-Sether *and* Gregg J. Wiche

ABSTRACT

Statistical summaries of streamflow data through water year 1994 for selected active and discontinued U.S. Geological Survey gaging stations for the Red River of the North Basin downstream of Halstad, Minnesota, to and including Emerson, Manitoba, are presented in this report. The summaries for each streamflow-gaging station include (1) station description, (2) graph of the annual mean discharge for the period of record, (3) statistics of monthly and annual mean discharges, (4) graph of the annual flow duration, (5) monthly and annual flow duration, (6) probability of occurrence of annual high discharges, (7) probability of occurrence of annual low discharges, (8) probability of occurrence of seasonal low discharges, (9) annual peak discharge and corresponding gage height for the period of record, and (10) monthly and annual mean discharges for the period of record.

INTRODUCTION

A part of the mission of the United States Geological Survey is the collection of systematic data to determine the quantity, quality, and use of surface and ground water. A total of 7,292 streamflow-gaging stations (as of 1994) were operated by the U. S. Geological Survey in the United States, Puerto Rico, and the Trust Territories of the Pacific Islands (Wahl and others, 1995). Of the 7,292 streamflow-gaging stations, 60 were operated in the Red River of the North Basin upstream of Emerson, Manitoba, excluding the Devils Lake Basin.

At streamflow-gaging stations, the water level in the river is monitored continually. A relation between water level and discharge is developed by making periodic discharge measurements throughout the range in water level. This relation is referred to as a station rating. A continuous record of streamflow is computed for each gaging station by using the water level record and the station rating.

Knowledge of the magnitude and time distribution of streamflow is essential for all aspects of water management and environmental planning. Federal, State, and local agencies responsible for the development and management of North Dakota's surface-water resources use this knowledge for making safe, economical, and environmentally sound water-resource planning decisions.

Streamflow statistics published in annual state water reports by the U. S. Geological Survey include records of daily mean discharge, annual high and low discharge, and annual mean discharge. Other statistics can be retrieved from U.S. Geological Survey computer files. Water resource managers may go to various sources to obtain the necessary statistics. These sources may only include active gaging stations listed in the most recent annual report and, thus, overlook information available for many discontinued gaging stations.

The purpose of this report is to provide a comprehensive publication summarizing streamflow statistics through water year 1994 for selected active and discontinued gaging stations for the Red River of the North Basin downstream of Halstad, Minnesota, to and including Emerson, Manitoba. Active and discontinued gaging stations listed in this report have a least 10 years of record. These stations are listed in table 1 and their locations are shown in figure 1.

HISTORY OF THE STREAM-GAGING PROGRAM IN NORTH DAKOTA

Much of the history of the stream-gaging program in North Dakota outlined in this report was written by Crosby (1970). However, the number of streamflow-gaging stations given in figure 2 may differ from the number given by Crosby (1970) because the type of gaging stations included may differ. The collection of systematic streamflow data began in 1882 when a gaging station was established on the Red River of the North at Grand Forks. This gaging station was a stage station; however, infrequent discharge measurements were made for navigational purposes. Stage data were obtained on the Missouri River at Bismarck in 1881-82 and in 1886-89 by the Missouri River Commission. As result of the National Reclamation Act of 1902 and the disastrous flood in 1897 in the Red River of the North Basin, the U.S. Geological Survey, in cooperation with the state of North Dakota, established and operated streamflow-gaging stations from 1901-09 (fig. 2). Additional interest was created as problems with Canada concerning the division of waters along the international boundary resulted in the formation of the International Joint Commission in 1912. Eight streamflow-gaging stations were in operation in 1925 when State cooperation was discontinued (fig. 2). Only five federally operated gaging stations were continued. State cooperation resumed in 1931, but funds were limited from 1934-38. However, the Rivers and Harbors Act of 1927 and the Flood Control Acts of 1928 and 1936 resulted in the U.S. Army Corps of Engineers supporting a large expansion of the stream-gaging program. Forty-one gaging stations were in operation when the North Dakota-South Dakota U.S. Geological Survey Office was created on October 16, 1944. Plans for the coordinated development of the waters of the Missouri River Basin, with respect to flood control, navigation, power, and irrigation, were formulated in 1943-44 by the U.S. Army Corps of Engineers, the Bureau of Reclamation, and the States in the Basin. These plans resulted in a rapid increase in the stream-gaging program, and, by 1947, 64 gaging stations were in operation in North Dakota. The number of gaging stations grew steadily from the late 1940's until the late 1960's, and, by 1969, 109 gaging stations were in operation.

During 1969-76, the number of gaging stations in operation remained relatively stable. During the 1970's, the U.S. Geological Survey established 25 additional gaging stations to monitor the quantity and quality of streamflow in drainage basins underlain by strippable lignite deposits (Haffield, 1981). By 1979, about 145 gaging stations were in operation in North Dakota. During 1981-83, the number of gaging stations in operation declined rapidly, and, during 1984-87, the number declined slowly to about 110. Since 1987, the number of gaging stations in operation has been relatively stable at about 105 to 110.

EXPLANATION OF STATION SUMMARIES

Station summaries are presented so that each station description and tables of streamflow statistics and probabilities of occurrence are presented in the same order and format for each gaging station, including the same relative placement of the pages. Because the information and statistics in the tables were created by "data retrievals" or statistical program results, significant figures were not rounded to U.S. Geological Survey standards. The order of presentation is as follows:

1. station description,
2. graph of the annual mean discharge for the period of record,
3. table of statistics of monthly and annual mean discharges,

Table 1. List of streamflow-gaging stations in the lower Red River of the North Basin for which streamflow statistics are published in this report

[ND, North Dakota; MN, Minnesota; MB, Manitoba]

Station number	Station name
05064900	Beaver Creek near Finley, ND
05065500	Goose River near Portland, ND
05066500	Goose River at Hillsboro, ND
05067500	Marsh River near Shelly, MN
05068000	Sand Hill River at Beltrami, MN
05068500	Sand Hill Ditch at Beltrami, MN
05069000	Sand Hill River at Climax, MN
05074500	Red Lake River near Red Lake, MN
05075000	Red Lake River at Highlanding near Goodridge, MN
05076000	Thief River near Thief River Falls, MN
05076500	Thief River at Thief River Falls, MN
05077500	Clearwater River near Leonard, MN
05077700	Ruffy Brook near Gonvick, MN
05078000	Clearwater River at Plummer, MN
05078230	Lost River at Oklee, MN
05078500	Clearwater River at Red Lake Falls, MN
05079000	Red Lake River at Crookston, MN
05082500	Red River of the North at Grand Forks, ND
05083000	Turtle River at Manvel, ND
05083500	Red River of the North at Oslo, MN
05083600	Middle Branch Forest River near Whitman, ND
05084000	Forest River near Fordville, ND
05085000	Forest River at Minto, ND
05087500	Middle River at Argyle, MN
05088000	South Branch Park River near Park River, ND
05089000	South Branch Park River below Homme Dam, ND
05089100	Middle Branch Park River near Union, ND
05089500	Cart Creek at Mountain, ND
05090000	Park River at Grafton, ND
05092000	Red River of the North at Drayton, ND
05092200	Pembina County Drain 20 near Glasston, ND
05093000	South Branch Two Rivers at Pelon, MN
05094000	South Branch Two Rivers at Lake Bronson, MN
05095500	Two Rivers below Hallock, MN
05096000	North Branch Two Rivers near Lancaster, MN
05096500	State Ditch 85 near Lancaster, MN
05098700	Hidden Island Coulee near Hansboro, ND
05098800	Cypress Creek near Sarles, ND
05099100	Snowflake Creek near Snowflake, MB
05099150	Mowbray Creek near Mowbray, MB
05099300	Pembina River near Windygates, MB
05099400	Little South Pembina River near Walhalla, ND
05099600	Pembina River at Walhalla, ND
05100000	Pembina River at Neche, ND
05100500	Herzog Creek near Concrete, ND
05101000	Tongue River at Akra, ND
05101500	Tongue River at Cavalier, ND
05102500	Red River of the North at Emerson, MB

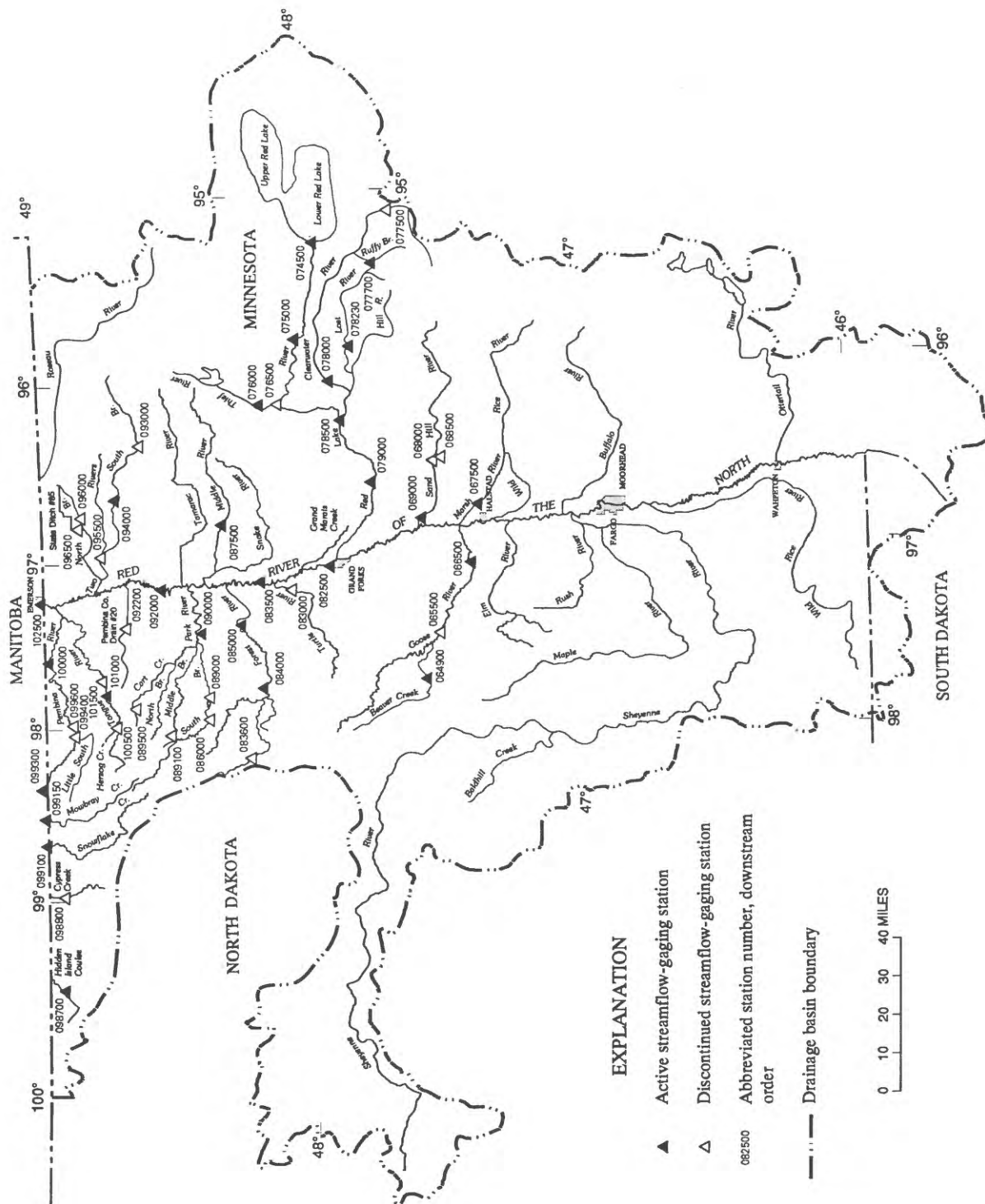


Figure 1. Location of streamflow-gaging stations in the lower Red River of the North Basin for which streamflow statistics are published in this report.

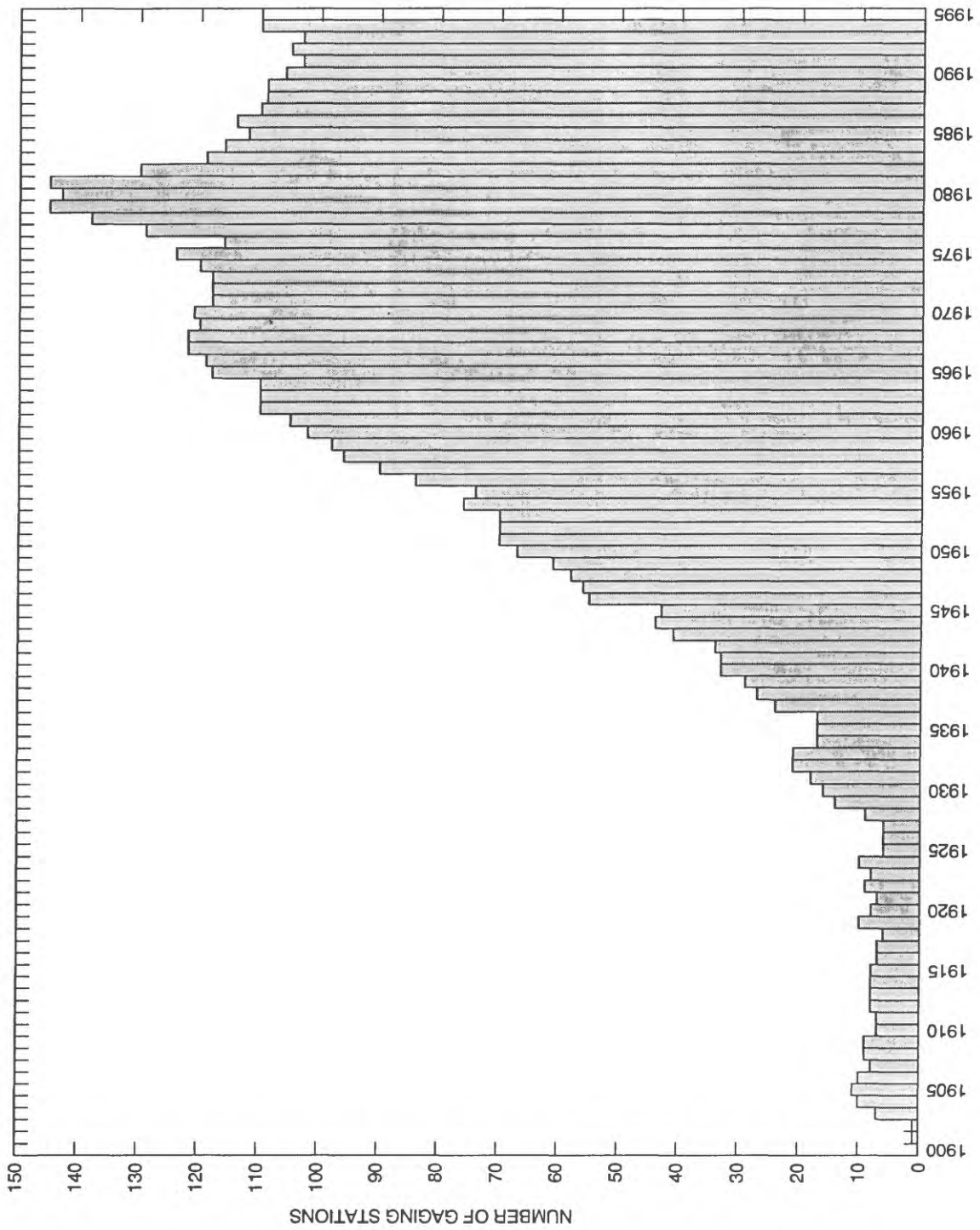


Figure 2. Number of streamflow-gaging stations in North Dakota, 1901-94.

4. graph of the annual flow duration,
5. table of monthly and annual flow duration,
6. table of probability of occurrence of annual high discharges,
7. table of probability of occurrence of annual low discharges,
8. table of probability of occurrence of seasonal low discharges,
9. table of annual peak discharge and corresponding gage height for the period of record, and
10. table of monthly and annual mean discharges for the period of record.

Where both pre-regulation and post-regulation statistics are presented for a gaging station, the station description, graph of annual mean discharges, table of annual peak discharges and corresponding gage heights, and table of monthly and annual mean discharges are presented with the pre- and post-regulation data. The respective tables for the pre- and post-regulation data are presented in the same relative page format as non-regulated streams.

Station Description

The location, drainage area, period of record, and other information about each streamflow-gaging station are included in the station description. This information is compiled from records maintained by the U.S. Geological Survey and generally is presented in the same format as published in the annual state water report. The following comments clarify information presented under the various headings of the station description.

LOCATION.--Information on gaging station location is obtained from the most accurate maps available and is furnished with respect to cultural and physical features in the vicinity of the gaging station and the community or landmark included in the gaging station name. In the case of discontinued gaging stations, the location is furnished using features in the vicinity at the time the gaging station was in operation. In many instances, the identifying features have been altered since the gaging station was discontinued.

DRAINAGE AREA.--Drainage area is measured using U.S. Geological Survey 7.5-minute topographic quadrangle maps. However, 7.5-minute topographic maps for drainage area computations were not available when some gaging stations were installed; therefore, the accuracy of drainage areas also varies. Drainage areas of discontinued gaging stations are those determined while the gaging station was in operation.

PERIOD OF RECORD.--The period of record is the period for which there are published records for the gaging station or for an equivalent gaging station. An equivalent gaging station is a gaging station that was in operation in a different location prior to the subject gaging station, and whose location is such that records from it can reasonably be considered equivalent with records from the subject gaging station. This situation arises when a gaging station is relocated upstream or downstream and given a new gaging station number and name, but the changes in drainage area and other basin characteristics are not significantly different. Period of record to current year indicates that the station was in operation as of September 30, 1994.

GAGE.--The type of gage or recorder that is or was used to collect data, the datum of the gage referred to sea level, and a condensed history of the types, locations, and datums of previous gages are given under this heading.

EXTREMES FOR PERIOD OF RECORD.--Extremes may include maximum and minimum discharges and maximum and minimum gage heights. Unless otherwise qualified, the maximum discharge is the instantaneous maximum discharge corresponding to the highest gage height that occurred. If the maximum gage height did not occur on the same day as the maximum discharge, it is listed separately. Similarly, the minimum discharge is the instantaneous minimum discharge corresponding to the lowest gage height that occurred, unless qualified and listed otherwise.

EXTREMES OUTSIDE PERIOD OF RECORD.--Included is any information available concerning major floods or unusually low flows that occurred outside the stated period of record. The information may not have been obtained by the U.S. Geological Survey.

Statistics of Monthly and Annual Mean Discharges

Statistics of monthly and annual mean discharges presented for each gaging station include (1) the maximum, minimum, and mean monthly discharges and (2) the maximum, minimum, and mean annual discharges. The water years (October 1 through September 30) in which the maximum and minimum discharges occurred are listed with the respective values, and the standard deviation and coefficient of variation of the monthly and annual mean discharges are listed with the respective values. Also, the percentage of the annual discharge that is comprised by each monthly mean discharge is listed in the table.

Each of the statistics is explained in the following paragraphs. As an aid to the readers' understanding of how the monthly mean and annual mean discharges are determined, data for the gaging station Red Lake River at Crookston, MN (05079000, p. 143-153) are used as an example. The monthly mean value is the average of the daily values for the month. The annual mean value is the average of the daily values for the year. Months or years for which all daily values are not available are not included in the compilation of statistics.

The maximum monthly mean discharge is the maximum value of all the monthly mean values. The maximum mean value for October is 2,840 cubic feet per second (ft^3/s), which occurred during water year 1972. Similarly, the minimum monthly mean discharge is the minimum value of all the monthly mean values. The minimum mean value for October is 8.02 ft^3/s , which occurred during water year 1937. The maximum and minimum monthly mean values can be found in the statistics of monthly and annual mean discharges table or by searching the monthly and annual mean discharges table.

The mean monthly discharge is the mean of all the monthly mean discharges for a given month, and the standard deviation is a measure of the variability of the values. The mean monthly discharge for October is 805 ft^3/s , and the standard deviation is 689 ft^3/s . The monthly mean discharge for October (mean of the mean monthly values) is the same as the mean of all October daily values for the period of record used. However, the standard deviation is smaller than the standard deviation obtained using all daily values. The standard deviation is smaller because the monthly values have less variability than the daily values.

The coefficient of variation is the ratio of the standard deviation to the mean. The coefficient of variation is dimensionless. Because monthly mean discharges are generally much greater in spring than in winter, the standard deviations also are generally much greater in spring than in winter. However, dividing the standard deviation by the mean monthly discharge tends to equalize the measures for all months so a more meaningful comparison among months can be made.

The percentage of the annual discharge is the percent of the annual discharge that occurred during each month. It is calculated by dividing the mean discharge for the month by the total of the 12 monthly mean discharges and multiplying by 100. Because of rounding of the monthly percentage, the sum of the 12 percentages may not equal 100 percent.

The maximum, minimum, and mean annual discharges are selected or computed from the annual mean discharges for the period of record. The water years of occurrence of the maximum and minimum values are listed with the respective values, and the standard deviation of the mean of the annual mean values is listed with the mean value. The minimum annual mean discharge of 132 ft³/s occurred in 1935, and the maximum annual mean discharge of 3,130 ft³/s occurred in 1950. The mean annual discharge for the period of record is 1,110 ft³/s.

Monthly and Annual Flow Duration

The monthly and annual flow duration table is a magnitude and frequency analysis of daily discharge values. It is computed by tabulating the number of daily discharge values that fall within preselected class limits, computing the percentage of values within each class, and interpolating discharge values for the percentages shown in the table. Monthly values are calculated from daily values in all complete months in the record, and annual figures are calculated for all complete water years. For example, if the 90-percent flow duration value for October is 101 ft³/s, then 90 percent of all October daily discharge values for the period of record were equal to or greater than 101 ft³/s.

Probability of Occurrence of High or Low Discharges

The probabilities of occurrence of annual high discharges, annual low discharges, and seasonal low discharges are presented in three tables for each gaging station. Probability of occurrence is an estimate of the likelihood that a particular discharge in a stream will be equaled or exceeded in 1 year or, in the case of low flows, the likelihood that the discharge will not be equaled or exceeded during the year. The probability of occurrence of a high flow is called the exceedance probability, and the probability of occurrence of low flow is called the nonexceedance probability. For example, if the maximum instantaneous discharge for the 0.20 exceedance probability is listed as 13,100 ft³/s, then a 20 percent chance exists that a discharge equal to or greater than 13,100 ft³/s will occur once during the year.

Recurrence interval is another way of expressing annual probability and it is the reciprocal of probability of occurrence. The recurrence interval for an exceedance probability of 0.20 is 5 years (1 divided by 0.20). For a long discharge record the annual maximum discharge can be expected to equal or exceed 13,100 ft³/s on average once every 5 years.

The table of probability of occurrence of annual high discharges for each gaging station lists the maximum instantaneous discharge and the maximum mean discharge for 3, 7, 15, and 30 consecutive-day periods for selected exceedance probabilities and recurrence intervals. Values for the maximum instantaneous discharge are computed from the streamflow record according to the guidelines established by the Hydrology Subcommittee of the Interagency Advisory Committee on Water Data (1982). According to the guidelines, adjustments are made for length of record and regional skew.

Values for the maximum mean discharges for 3, 7, 15, and 30 consecutive-day periods are computed from the annual high mean values of the corresponding periods. The computations are based on the log-Pearson Type III distribution using values obtained for the water year.

The table of probability of occurrence of annual low discharges for each gaging station lists the minimum mean discharge for 1, 3, 7, 14, 30, 60, 90, 120, and 183 consecutive-day periods for selected nonexceedance probabilities and recurrence intervals. Values for the minimum mean discharges are computed from the annual low discharge values of the corresponding periods using the log-Pearson Type III distribution. If the log-Pearson Type III distribution curve fails to fit the data at the lower end, a graphical interpretation is made. Probabilities of annual low discharges are computed using values obtained for the climatic year (April 1 through March 31).

The table of probability of occurrence of seasonal low discharges for each gaging station lists the minimum mean discharge for 1, 7, 14, and 30 consecutive-day periods for selected probabilities and recurrence intervals. These values are computed from the seasonal low mean values of the corresponding periods using the log-Pearson Type III distribution.

The annual low discharge and the seasonal low discharges that occur in any given year are sensitive to natural-channel processes, such as evapotranspiration and human-induced hydrologic modifications, such as the operation of many small water-storage reservoirs; the effects of surface-water withdrawal for agricultural, municipal, and industrial use; and the effects of return flow to the river. Thus, the statistics in tables are given for recurrence intervals that generally are within twice the period of record.

DATA CONSIDERATIONS

Period of Record

The reliability of statistical data is related to the length of record for a stream. The Hydrology Subcommittee of the Interagency Advisory committee on Water Data (1982) recommends that at least 10 years of record be used for computing flood frequency estimates. Therefore, the length of record criterion for inclusion of a gaging station in this report is at least 10 years. Even with this criterion, the lengths and continuity of record for the gaging stations vary substantially. Subsequently, extreme high or low flows may be included in the streamflow record of one gaging station and not in another, resulting in inconsistencies in the streamflow statistics when comparing gaging station data. Also, longer record lengths for many of the gaging stations in this report may result in different streamflow statistics when comparing data in this report with data in previous publications.

Differences in statistical data for pre- and post-regulation periods may not be caused solely by regulation. Differences also can be attributed to the length of record and climatic variability as expressed by hydrologic variability. By comparing a statistic that easily can be affected by regulation, such as the 7-day low flow, and a statistic that generally is unaffected by regulation, such as the mean annual discharge, a determination can be made about the effect of regulation. As an example, the annual 7-day low flow with a 10-year recurrence interval for the Red River of the North at Fargo (Wiche and Williams-Sether, 1997) is 0 ft³/s for the pre-regulation period (1901-41) and 17.9 ft³/s for the post-regulation period (1942-94). The effect of regulation on the mean annual discharge of the Red River of the North can be assumed to be negligible; however, the mean annual discharge is 403 ft³/s for the pre-regulation period and 741 ft³/s for the post-regulation period. Although annual 7-day low flow for a 10-year recurrence interval is much greater for the regulation period, the mean annual discharge for the regulated period also is much greater, indicating that regulation may happen to correspond to a relatively wet period in the Red River of the North Basin and may not be the sole factor for differences in statistical data for pre- and post-regulation periods.

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STREAMFLOW STATISTICS

05064900 BEAVER CREEK NEAR FINLEY, ND

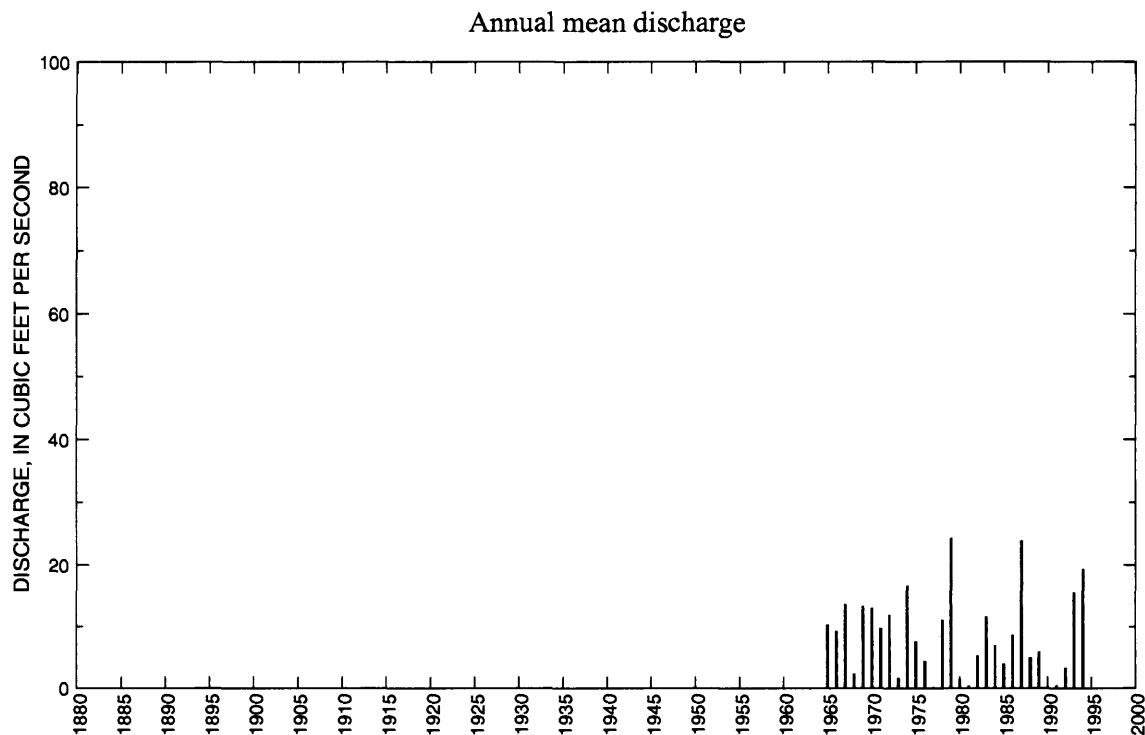
LOCATION.--Lat 47°35'40", long 97°42'18", in NE¹/₄ sec.31, T.148 N., R.55 W., Steele County, Hydrologic Unit 09020109, on right bank 500 ft upstream from bridge on county highway, and 7 mi northeast of Finley.

DRAINAGE AREA.--160 mi², approximately.

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder and concrete broad-crested weir. Datum of gage is 1,170.08 ft above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,900 ft³/s, Apr. 19, 1979, gage height, 8.35 ft; maximum gage height, 9.70 ft, Mar. 14, 1966; no flow at times.



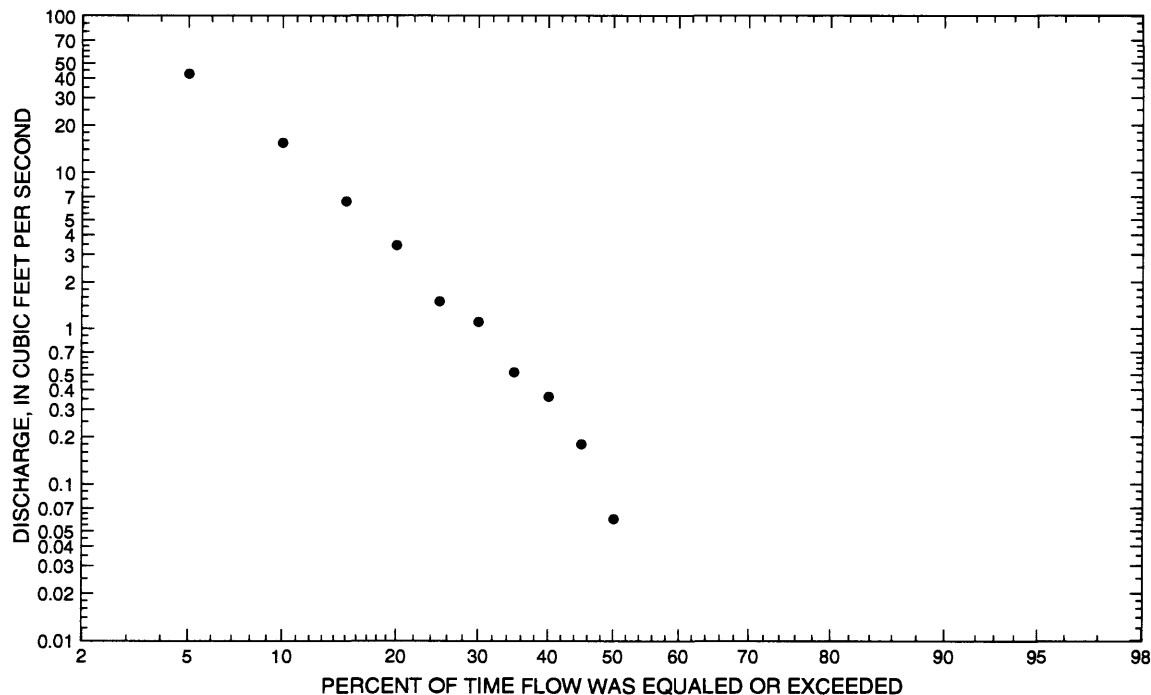
05064900 BEAVER CREEK NEAR FINLEY, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	9.30	1983	0	m	1.14	2.15	1.89	1.09
November	5.04	1994	0	m	0.520	1.02	1.95	0.50
December	2.52	1994	0	m	0.140	0.46	3.21	0.14
January	0.796	1994	0	m	0.030	0.15	5.20	0.03
February	2.61	1984	0	m	0.240	0.56	2.31	0.23
March	64.6	1966	0	m	23.2	21.4	0.92	22.16
April	244	1979	0.192	1981	50.4	59.2	1.17	48.18
May	47.0	1979	0.042	1977	8.95	12.2	1.36	8.55
June	29.4	1994	0.001	1988	5.00	7.01	1.40	4.78
July	104	1993	0	m	8.67	21.6	2.49	8.28
August	43.4	1994	0	m	3.96	9.97	2.52	3.78
September	21.2	1993	0	m	2.41	5.49	2.28	2.30
Annual	24.3	1979	0.121	1977	8.73	6.78	0.78	100

Annual flow duration



05064900 BEAVER CREEK NEAR FINLEY, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.09	0	0	0	0	0	0	0	0	0
90	0	0	0	0.36	0.10	0	0	0	0	0	0	0	0
85	0	0	0	0.52	0.25	0	0	0	0	0	0	0	0
80	0	0	0	1.10	0.46	0.10	0	0	0	0	0	0	0
75	0	0	0	1.50	0.61	0.19	0	0	0	0	0	0	0
70	0	0	0	2.20	0.82	0.25	0	0	0	0	0	0	0
65	0	0	0	3.77	1.10	0.45	0	0	0	0	0	0	0
60	0	0	0	6.51	1.50	0.60	0.09	0	0	0	0	0	0
55	0	0	0.05	8.21	2.00	0.81	0.18	0	0	0	0	0	0
50	0	0	0.34	11.4	2.00	1.10	0.34	0	0	0	0.08	0	0.06
45	0	0	1.20	16.0	2.70	1.10	0.47	0	0.02	0.07	0.12	0	0.18
40	0	0	3.70	21.0	3.85	1.50	0.90	0.03	0.14	0.18	0.19	0	0.36
35	0	0	6.33	27.5	4.42	1.90	1.20	0.10	0.24	0.29	0.23	0	0.52
30	0	0	10.0	35.5	5.34	2.60	1.70	0.19	0.41	0.47	0.28	0	1.10
25	0	0	17.7	45.3	7.18	3.53	3.12	0.33	0.71	0.76	0.43	0	1.50
20	0	0	35.0	57.1	10.1	4.27	4.27	0.60	1.20	1.20	0.53	0.09	3.45
15	0	0	55.7	84.1	16.5	6.92	6.57	1.90	2.70	2.50	0.81	0.19	6.59
10	0	0.40	83.4	129	26.7	13.4	11.4	10.1	6.40	3.20	1.50	0.33	15.5
5	0.05	0.90	125	226	44.4	25.0	34.9	23.5	15.0	5.54	1.90	0.48	42.7

05064900 BEAVER CREEK NEAR FINLEY, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	3.6	1.33	0.770	0.534	0.357
0.95	1.05	16.0	7.72	5.11	3.62	2.42
0.90	1.11	32.9	17.5	12.2	8.63	5.75
0.80	1.25	73.4	42.2	30.6	21.7	14.3
0.50	2	281	167	124	85.7	55.7
0.20	5	843	457	328	216	137
0.10	10	1,370	676	469	301	188
0.04	25	2,150	941	625	389	240
0.02	50	2,790	1,120	719	439	269
0.01	100	3,440	1,270	795	478	291
0.005	200	4,110	1,400	856	508	307
0.002	500	5,000	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	0	0	0
0.10	10	ng	ng	ng	ng	ng	ng	0	0	0
0.20	5	ng	ng	ng	ng	ng	ng	0	0	0
0.50	2	ng	ng	ng	ng	ng	ng	0	0.009	0.043

05064900 BEAVER CREEK NEAR FINLEY, ND--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	0	0	0	0
0.10	10	ng	ng	ng	ng	0	0	0	0
0.20	5	ng	ng	ng	ng	0	0	0	0.085
0.50	2	ng	ng	ng	ng	0	0	0	1.02
		June-July-August				September-October-November			
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0

05064900 BEAVER CREEK NEAR FINLEY, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1965	April 11	6.88	1,250	1980	March 31	3.72	100
1966	March 20	7.33	400	1981	July 17	2.89	10.0
1967	April 20	5.52	652	1982	March 30	5.74	700
1968	June 7	3.55	47.0	1983	June 21	4.53	259
1969	April 9	6.55	1,320	1984	March 25	--	150
1970	June 16	6.49	1,270	1985	March 11	4.49	253
1971	April 5	4.77	392	1986	May 12	4.60	282
1972	May 26	5.65	736	1987	July 22	6.04	688
1973	March 14	4.35	170	1988	March 24	4.07	130
1974	April 11	--	550	1989	April 5	4.55	230
1975	June 22	5.07	472	1990	June 30	2.67	9.70
1976	March 24	5.26	290	1991	May 23	2.65	7.80
1977	March 31	3.00	29.0	1992	March 5	--	95.0
1978	March 28	7.28	950	1993	July 23	6.42	700
1979	April 19	8.35	1,900	1994	April 24	--	170
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 19	8.35	1,900	1986	May 12	4.60	282
1969	April 9	6.55	1,320	1983	June 21	4.53	259
1970	June 16	6.49	1,270	1985	March 11	4.49	253
1965	April 11	6.88	1,250	1989	April 5	4.55	230
1978	March 28	7.28	950	1973	March 14	4.35	170
1972	May 26	5.65	736	1994	March 24	--	170
1982	March 30	5.74	700	1984	March 25	--	150
1993	July 23	6.42	700	1988	March 24	4.07	130
1987	July 22	6.04	688	1980	March 31	3.72	100
1967	April 20	5.52	652	1992	March 5	--	95.0
1974	April 11	--	550	1968	June 7	3.55	47.0
1975	June 22	5.07	472	1977	March 31	3.00	29.0
1966	March 20	7.33	400	1981	July 17	2.89	10.0
1971	April 5	4.77	392	1990	June 30	2.67	9.70
1976	March 24	5.26	290	1991	May 23	2.65	7.80

05064900 BEAVER CREEK NEAR FINLEY, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1965	1.15	0.140	0	0	0	0	108.6	6.01	6.21	2.24	0.381	1.86	10.4
1966	1.33	0.119	0.061	0	0	64.6	14.4	9.07	3.63	11.8	5.09	0.269	9.32
1967	0.139	0.019	0	0	0	62.7	65.8	30.5	3.38	0.434	0.025	0	13.7
1968	0	0	0	0	0	10.7	2.86	0.891	8.24	3.45	0.440	1.31	2.33
1969	0.089	0.124	0.046	0	0	0	145.8	3.54	3.76	1.76	0	7.87	13.4
1970	1.28	0.454	0.270	0	0	0.387	126.1	13.2	15.8	0.120	0.005	0.687	13.1
1971	0.018	0.391	0.008	0	0	35.5	68.1	2.30	4.13	5.97	0.115	0.721	9.76
1972	4.30	1.45	0.090	0	0	43.5	68.1	24.6	1.73	0	0.001	0	12.0
1973	0	0	0	0	0.111	13.6	1.43	0.754	3.68	0.172	0	0	1.67
1974	4.48	0.687	0.088	0	0	0	131.5	39.4	16.5	5.18	3.22	0.127	16.7
1975	0.010	0.473	0.007	0	0	3.90	57.5	17.1	11.1	1.87	0	0	7.62
1976	0	0	0	0	0.172	37.3	13.6	1.21	0.056	0.053	0	0	4.40
1977	0	0	0	0	0	0.812	0.537	0.042	0.003	0.037	0	0.014	0.121
1978	0.185	0.209	0.315	0	0	44.0	86.0	3.28	0.309	0	0	0.691	11.2
1979	0.008	0	0	0	0	0	244.1	47.0	2.49	0.681	0.276	0.002	24.3
1980	0	0	0	0	0	7.56	8.66	0.307	0.001	0	0	0	1.38
1981	0	0	0	0	1.05	0.812	0.192	0.118	0.293	1.02	0.224	0.057	0.310
1982	1.08	0.458	0.005	0	0	28.4	28.8	2.49	1.09	0.053	0.118	0.001	5.23
1983	9.30	1.41	0.214	0.031	0.573	55.5	26.0	2.93	8.31	6.41	18.3	10.6	11.7
1984	3.76	1.87	0.361	0	2.61	34.6	33.9	4.52	1.39	0.013	0	0	6.91
1985	0	0	0	0	0.714	34.1	3.55	4.46	1.47	0.064	0.329	2.07	3.94
1986	1.26	0.614	0.149	0.011	0	47.4	25.8	16.3	0.285	8.95	0.320	1.88	8.67
1987	0.297	1.79	0.151	0	0	36.2	137.1	15.8	19.8	54.3	18.2	2.74	23.9
1988	0.321	0.264	0.017	0	0.083	32.0	19.9	0.371	0.001	5.78	0.458	0	4.95
1989	0	0	0	0	0	1.27	65.8	3.92	0.466	0	0	0	5.89
1990	0	0	0	0	0	0.247	0.863	0.137	1.65	0.402	0	0	0.273
1991	0	0	0	0	0	0.039	0.521	1.88	0.368	1.97	0.155	0	0.417
1992	0	0.060	0	0	1.24	29.3	1.52	1.92	2.06	2.65	0.066	0.190	3.29
1993	0	0.024	0	0	0	24.0	4.12	0.874	2.43	103.6	27.7	21.2	15.6
1994	5.09	5.04	2.52	0.796	0.723	47.6	22.1	13.5	29.4	41.0	43.4	20.1	19.4

05065500 GOOSE RIVER NEAR PORTLAND, ND

LOCATION.--Lat 47°32'20", long 97°27'20", in SE¹/₄NE¹/₄ sec.19, T.147 N., R.53 W., Traill County, Hydrologic Unit 09020101, on left bank 75 ft upstream from bridge on State Highway 18, 1.2 mi upstream from unnamed tributary, 4 mi downstream from Beaver Creek, and 5 mi northwest of Portland.

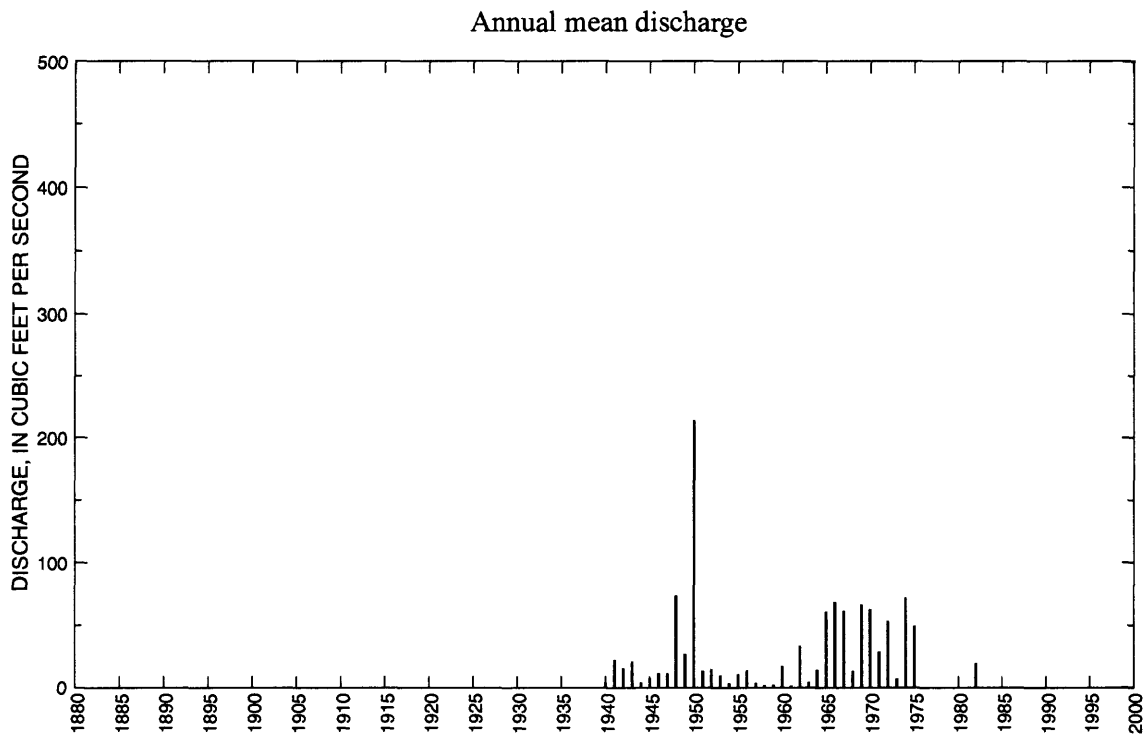
DRAINAGE AREA.--517 mi² of which about 110 mi² is probably noncontributing.

PERIOD OF RECORD.--October 1939 to September 1975, October 1980 to 1986. Seasonal records only since 1983.

GAGE.--Water-stage recorder. Datum of gage is 967.48 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1956, nonrecording gage at site 2 mi upstream at datum 11.28 ft higher.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,530 ft³/s, May 9, 1950, gage height, 20.12 ft, on basis of contracted opening measurement, present site and datum; no flow at times most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 20-21, 1979, reached a stage of 20.96 ft, present datum, from floodmark; discharge not determined.

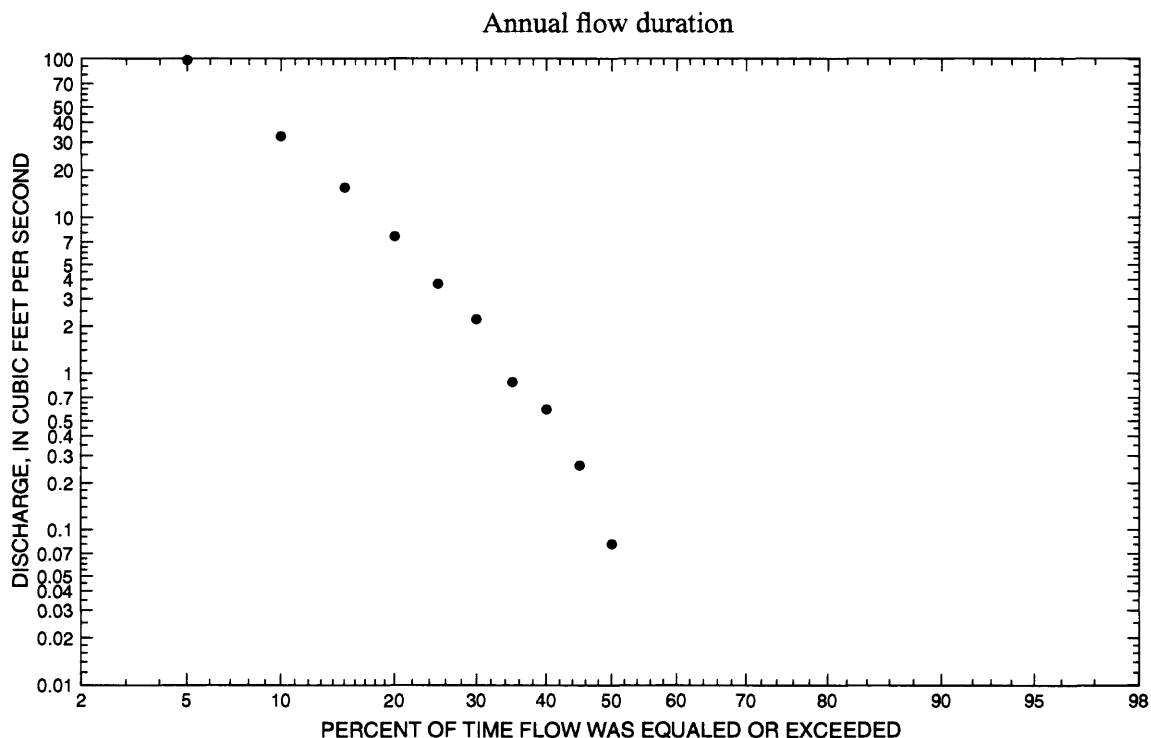


05065500 GOOSE RIVER NEAR PORTLAND, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	10.2	1965	0	m	1.15	2.59	2.25	0.33
November	6.92	1972	0	m	0.830	1.61	1.95	0.23
December	2.96	1970	0	m	0.380	0.78	2.04	0.11
January	1.77	1970	0	m	0.190	0.41	2.22	0.05
February	3.75	1954	0	m	0.230	0.67	2.93	0.06
March	408	1966	0	m	47.2	79.64	1.69	13.3
April	1,080	1950	0	1981	204	254	1.25	57.5
May	1,390	1950	0	1981	64.0	215	3.36	18.1
June	103	1964	0	m	22.4	26.0	1.16	6.32
July	52.5	1952	0	m	8.98	12.6	1.40	2.54
August	45.5	1966	0	m	3.07	9.10	2.97	0.87
September	29.9	1957	0	m	2.09	5.77	2.75	0.59
Annual	214	1950	0	1981	29.5	38.8	1.31	100



05065500 GOOSE RIVER NEAR PORTLAND, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.06	0.10	0	0	0	0	0	0	0	0
90	0	0	0	0.99	0.27	0	0	0	0	0	0	0	0
85	0	0	0	2.00	0.52	0	0	0	0	0	0	0	0
80	0	0	0	4.73	1.00	0.13	0	0	0	0	0	0	0
75	0	0	0	7.56	1.40	0.49	0.02	0	0	0	0	0	0
70	0	0	0	12.1	1.90	1.30	0.09	0	0	0	0	0	0
65	0	0	0	15.6	3.28	2.50	0.23	0	0	0	0	0	0
60	0	0	0	21.2	4.05	3.52	0.59	0	0	0	0	0	0
55	0	0	0	29.7	5.22	5.07	1.10	0	0	0	0	0	0
50	0	0	0.02	41.1	7.28	7.13	1.50	0	0	0	0	0	0.08
45	0	0	0.17	55.1	10.1	9.93	2.10	0.08	0	0	0	0	0.26
40	0	0	0.48	73.6	15.4	13.0	4.06	0.08	0	0	0.10	0.03	0.59
35	0	0	0.98	98.8	21.2	15.8	5.60	0.35	0	0	0.22	0.09	0.88
30	0.03	0	3.20	127	28.3	19.6	7.44	0.48	0.07	0.09	0.33	0.20	2.21
25	0.10	0	13.1	162	36.3	24.0	8.82	1.20	0.22	0.19	0.50	0.35	3.75
20	0.22	0.08	27.3	216	50.5	29.8	12.1	2.10	0.68	0.52	0.93	0.50	7.54
15	0.49	0.34	57.4	308	67.1	40.3	16.2	3.67	1.20	1.40	1.70	0.73	15.5
10	0.57	0.44	114	522	110	59.7	23.9	5.16	2.80	4.13	3.20	1.10	32.6
5	1.10	0.70	284	1,020	195	99.1	39.3	14.0	9.72	7.13	5.14	2.20	98.5

05065500 GOOSE RIVER NEAR PORTLAND, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	0	0	0	0
0.95	1.05	86.1	26.4	19.2	13.9	9.94
0.90	1.11	139	62.5	45.9	32.2	21.3
0.80	1.25	242	142	105	71.2	44.8
0.50	2	667	512	383	246	149
0.20	5	1,710	1,500	1,120	689	424
0.10	10	2,720	2,460	1,840	1,110	705
0.04	25	4,360	4,010	2,990	1,770	1,170
0.02	50	5,860	5,390	4,000	2,340	1,610
0.01	100	7,580	6,940	5,140	2,970	2,130
0.005	200	9,530	8630	6,380	3,660	2,710
0.002	500	12,500	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0	0
0.50	2	0	0	0	0	0	0	0	0	0.032

05065500 GOOSE RIVER NEAR PORTLAND, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0.025
0.50	2	0	0	0	0	0	0	0	1.48
		June-July-August				September-October-November			
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
		0	0	0	0.090	0	0	0	0

05065500 GOOSE RIVER NEAR PORTLAND, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1940	April 16	7.88	487	1963	April 8	5.83	150
1941	April 9	12.59	1,130	1964	June 22	7.96	381
1942	April 5	11.51	850	1965	April 13	18.22	3,740
1943	March 26	14.90	1,200	1966	March 21	14.19	1,190
1944	April 10	5.10	169	1967	April 23	16.05	2,080
1945	March 15	6.70	340	1968	June 10	8.22	448
1946	March 20	9.14	530	1969	April 13	18.17	3,660
1947	March 28	6.95	260	1970	April 27	14.62	1,670
1948	April 21	21.30	4,700	1971	April 9	12.63	1,150
1949	April 7	13.60	1,200	1972	April 17	15.27	1,720
1950	May 9	20.12	8,530	1973	March 17	7.71	247
1951	March 30	12.50	650	1974	April 14	16.40	2,200
1952	April 3	11.45	600	1975	April 19	14.92	1,340
1953	July 4	7.77	367	1976	April 1	10.15	680
1954	June 15	4.28	58	1981	--	--	0
1955	March 31	10.80	600	1982	April 1	12.32	810
1956	April 16	11.07	550	1983	March 16	9.97	450
1957	September 5	5.95	134	1984	March 27	13.09	1,170
1958	July 27	5.47	95.0	1985	March 17	7.95	270
1959	April 3	4.94	72.0	1986	March 25	10.71	818
1960	April 8	11.45	924	1987	April 8	17.58	2,500
1961	March 10	4.13	71.0	1988	March 29	11.20	500
1962	April 8	15.39	1,610				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	May 9	20.12	8,530	1982	April 1	12.32	810
1948	April 21	21.30	4,700	1976	April 1	10.15	680
1965	April 13	18.22	3,740	1951	March 30	12.50	650
1969	April 13	18.17	3,660	1952	April 3	11.45	600
1987	April 8	17.58	2,500	1955	March 31	10.80	600
1974	April 14	16.40	2,200	1956	April 16	11.07	550
1967	April 23	16.05	2,080	1946	March 20	9.14	530
1972	April 17	15.27	1,720	1988	March 29	11.20	500
1970	April 27	14.62	1,670	1940	April 16	7.88	487
1962	April 8	15.39	1,610	1983	March 16	9.97	450
1975	April 19	14.92	1,340	1968	June 10	8.22	448
1943	March 26	14.90	1,200	1964	June 22	7.96	381
1949	April 7	13.60	1,200	1953	July 4	7.77	367
1966	March 21	14.19	1,190	1945	March 15	6.70	340
1984	March 27	13.09	1,170	1985	March 17	7.95	270
1971	April 9	12.63	1,150	1947	March 28	6.95	260
1941	April 9	12.59	1,130	1973	March 17	7.71	247
1960	April 8	11.45	924	1944	April 10	5.10	169
1942	April 5	11.51	850	1963	April 8	5.83	150
1986	March 25	10.71	818	1957	September 5	5.95	134

05065500 GOOSE RIVER NEAR PORTLAND, ND--Continued

Annual peak discharge and corresponding gage height—Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height—Continued							
1958	July 27	5.47	95.0	1954	June 15	4.28	58
1959	April 3	4.94	72.0	1981	--	--	0
1961	March 10	4.13	71.0				

05065500 GOOSE RIVER NEAR PORTLAND, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1940	0	0	0	0	0	0	49.3	0.635	0.007	0	0	0	4.10
1941	0	0	0	0	0	0.355	254.8	4.41	13.4	1.57	0	0	22.6
1942	0	0.277	0	0	0	3.51	150.2	28.0	4.78	0.268	0.013	0	15.5
1943	0	0	0	0	0	152.3	57.2	9.98	30.7	2.58	0.023	0	21.2
1944	0	0	0	0	0	0	38.0	1.55	3.17	0.919	3.75	1.30	4.01
1945	0.226	1.58	0.429	0	0	62.2	11.9	5.90	5.80	0.142	0.023	0	7.44
1946	0	0	0	0	0	113.2	18.2	2.80	0.877	0.681	0	0	11.5
1947	0	0	0	0	0	52.2	65.0	3.00	14.7	0.681	0.019	0	11.3
1948	0	0	0	0	0	0	819.5	66.2	7.27	6.23	3.03	0	74.2
1949	0	0.100	0.129	0.100	0	0.165	257.0	11.0	57.7	4.85	0.874	0	27.3
1950	0.061	0.133	0.119	0	0	12.2	1,081	1,390	58.0	17.8	1.32	0.543	214.4
1951	0.139	0.613	0.781	0.571	0.400	54.4	94.0	6.09	1.90	0.135	0	0	13.2
1952	0	0	0	0	0	2.45	121.8	1.03	0	52.5	0.516	0	14.8
1953	0	0	0	0	0	10.1	2.58	4.86	55.8	43.1	0.081	0.947	9.81
1954	0	0	0	0	3.75	12.0	14.8	4.55	4.63	0.239	0	0	3.31
1955	0	0	0	0	0	3.29	92.4	1.38	30.7	0.855	0.019	0	10.6
1956	0	0	0	0	0	0	116.9	26.7	22.2	1.18	0	0	13.8
1957	0	0	0	0	0	6.71	2.72	0.148	2.21	3.74	0.006	29.9	3.76
1958	6.06	4.86	1.32	0	0	0.052	3.30	0.190	0.227	5.07	0.342	0	1.80
1959	0	0	0	0	0	9.20	12.4	0.758	1.72	0	0	0	2.01
1960	0	0	0	0	0	35.2	170.5	3.87	0.963	0.019	0	0	17.4
1961	0	0	0	0	0	12.9	3.37	0.703	0	0	0	0	1.43
1962	0	0	0	0	0	0	280.3	41.4	72.8	9.03	2.08	1.03	33.6
1963	0.142	0.510	0.252	0.013	0	12.6	35.1	2.47	0.527	0.703	0.016	0	4.34
1964	0	0	0	0	0	0	46.6	5.18	103.2	11.1	0.197	9.97	14.5
1965	10.2	1.31	0.335	0.148	0.068	0.097	635.0	43.1	21.0	13.0	5.45	6.96	60.7
1966	8.50	4.11	2.54	1.49	0.754	407.7	198.9	67.9	31.0	43.8	45.5	5.16	68.8
1967	0.984	1.22	0.530	0.844	0.705	68.3	449.9	183.3	24.7	9.25	0.659	0.009	61.6
1968	0.052	0.368	0.026	0.021	0	53.5	19.8	7.35	55.0	15.3	4.05	2.70	13.2
1969	0.169	0.789	0.574	0.319	0.550	0.903	710.7	36.0	20.3	15.5	3.69	20.2	66.7
1970	7.42	4.29	2.96	1.77	1.57	2.32	539.2	108.9	73.5	10.6	2.77	4.40	62.8
1971	0.727	2.25	0.839	0.457	0.355	23.1	258.7	24.0	17.8	18.0	2.49	0.612	28.9
1972	2.34	6.92	2.88	0.779	0.448	175.5	379.2	52.9	20.6	1.55	1.06	0.137	53.5
1973	0.006	0.029	0.075	0.018	0	64.3	9.28	2.51	7.96	0.885	0	0	7.17
1974	3.71	0.298	0.180	0.051	0.011	0.014	600.4	177.2	63.6	15.3	6.71	1.22	72.0

05065500 GOOSE RIVER NEAR PORTLAND, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1975	2.98	1.75	0.526	0.457	0.024	2.74	360.4	152.0	58.3	15.6	0.190	0.015	49.4
1981	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	33.3	177.7	19.7	5.27	1.89	0.106	0	19.7
1983	--	--	--	--	--	147.2	113.0	34.5	21.4	20.6	39.4	--	--
1984	--	--	--	--	--	186.7	149.2	35.9	17.6	7.96	0.749	0	--
1985	--	--	--	--	--	78.9	19.2	1.99	0.022	0	0	0	--
1986	--	--	--	--	--	180.6	130.3	115.7	8.41	24.5	3.71	0.717	--

05066500 GOOSE RIVER AT HILLSBORO, ND

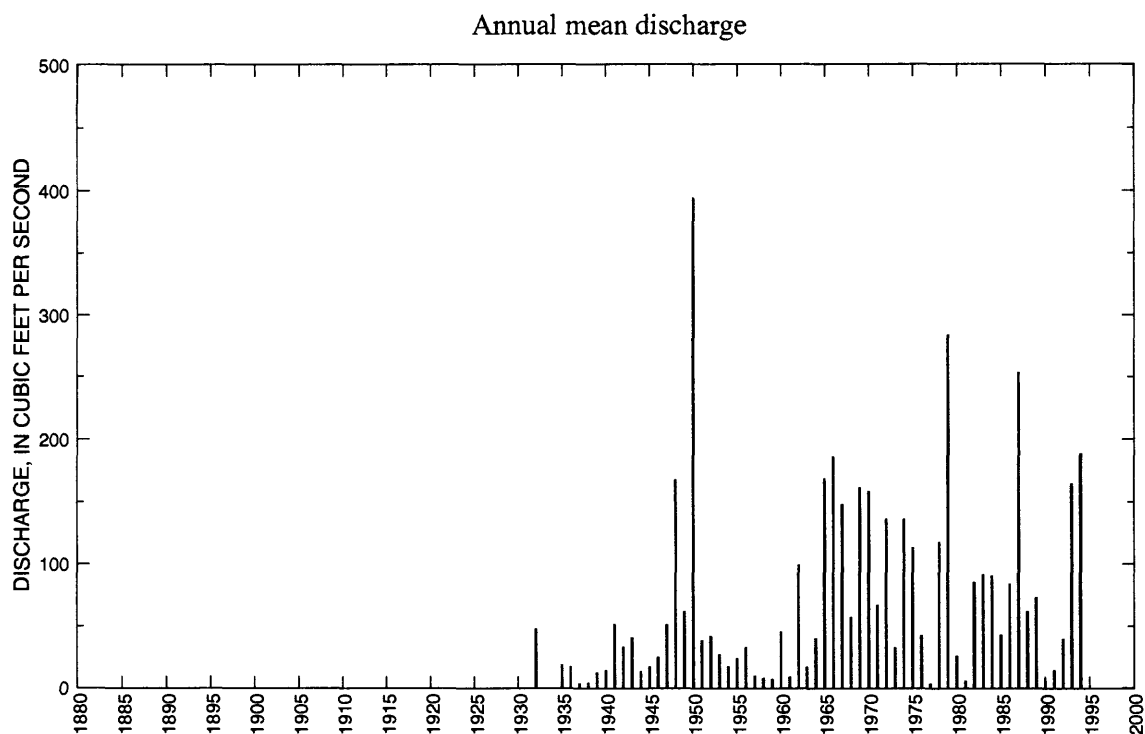
LOCATION.--Lat 47°24'34", long 97°03'39", NW¹/₄ sec.5, T.145 N., R.50 W., Traill County, Hydrologic Unit 09020109, on right bank 600 ft upstream from Foogman Dam in Hillsboro and 27.5 mi upstream from mouth.

DRAINAGE AREA.--1,203 mi² of which about 110 mi² is probably noncontributing.

PERIOD OF RECORD.--March 1931 to current year. No winter records during 1932-34. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder and masonry dam. Datum of gage is 879.52 ft above sea level. Sept. 26, 1941, to Oct. 27, 1965, at site 600 ft downstream at same datum. See WSP 1728 or 1913 for history of changes prior to Sept. 26, 1941.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft³/s, Apr. 21, 1979, gage height, 16.76 ft; no flow at times.



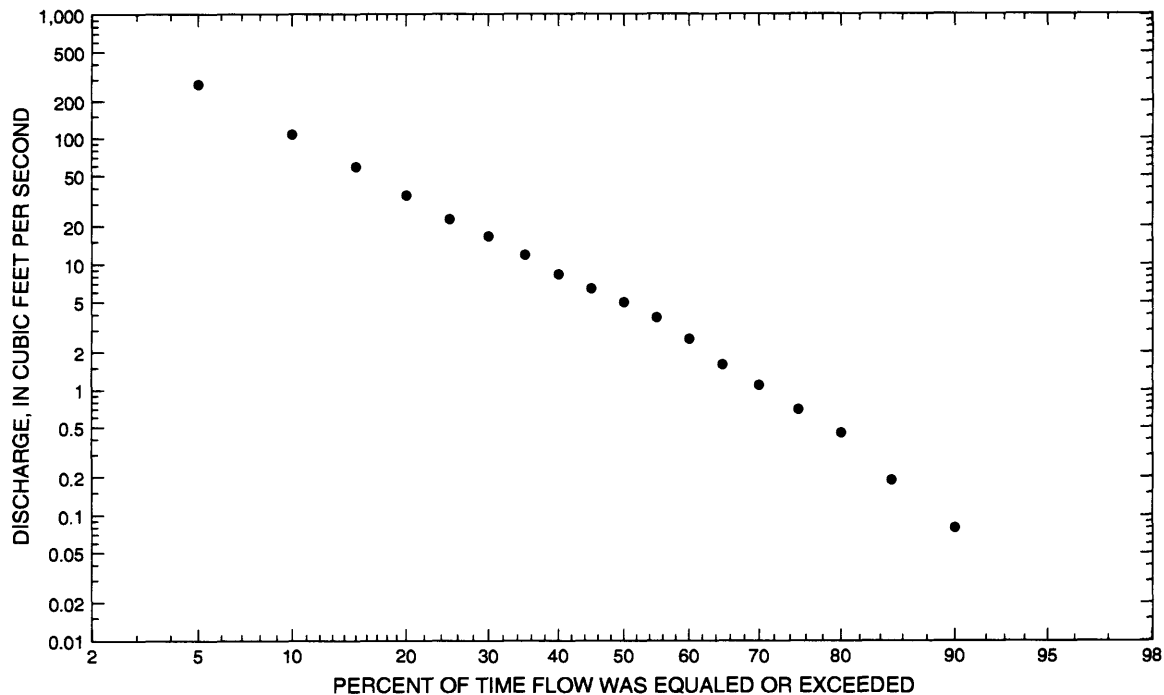
05066500 GOOSE RIVER AT HILLSBORO, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	62.9	1983	0	m	7.19	13.4	1.86	0.85
November	46.5	1972	0	m	7.12	9.49	1.33	0.84
December	31.1	1994	0	m	5.03	6.63	1.32	0.59
January	23.2	1994	0	m	3.11	4.22	1.36	0.37
February	16.1	1954	0	m	3.41	4.40	1.29	0.40
March	1,110	1966	0	1940	139	215	1.55	16.4
April	2,880	1979	6.51	1938	428	577	1.35	50.5
May	2,280	1950	1.12	1939	107	292	2.73	12.6
June	385	1968	1.35	1938	59.4	74.1	1.25	7.02
July	729	1993	0	1940	49.7	123	2.47	5.87
August	515	1993	0	m	22.2	73.3	3.30	2.63
September	326	1994	0	m	16.3	50.1	3.08	1.92
Annual	395	1950	3.47	1937	72.8	77.6	1.07	100

Annual flow duration



05066500 GOOSE RIVER AT HILLSBORO, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	5.75	2.30	0.97	0.06	0	0	0	0	0	0
90	0	0	0.10	9.72	4.67	1.70	0.27	0	0	0	0	0	0.08
85	0.09	0.10	0.35	16.1	6.36	3.61	0.56	0.09	0.08	0.08	0.18	0.17	0.19
80	0.17	0.18	0.49	22.6	7.76	4.76	0.81	0.29	0.16	0.17	0.24	0.17	0.45
75	0.17	0.27	0.92	28.3	10.7	6.30	1.70	0.60	0.23	0.28	0.40	0.37	0.70
70	0.36	0.40	1.30	33.8	13.8	8.69	2.73	0.87	0.33	0.36	0.68	0.53	1.10
65	0.45	0.48	1.70	43.7	16.1	11.3	3.72	0.87	0.47	0.47	0.88	0.77	1.60
60	0.57	0.59	2.40	55.5	19.8	14.1	5.22	1.30	0.66	0.60	1.50	1.30	2.55
55	0.73	0.88	4.08	68.5	23.8	16.5	6.71	1.30	0.94	0.77	2.00	1.60	3.82
50	1.20	1.60	4.96	88.2	28.1	19.9	9.00	1.80	1.30	0.98	2.50	2.30	5.01
45	1.50	1.90	6.45	115	33.8	24.9	11.7	1.80	1.30	1.30	4.45	2.80	6.45
40	2.40	2.30	9.70	153	40.5	32.6	14.0	3.43	1.90	1.60	5.26	3.40	8.39
35	3.00	3.50	16.5	207	50.5	43.0	16.7	4.54	1.90	2.70	6.20	3.40	11.9
30	3.00	4.30	31.0	275	64.0	54.0	22.5	6.46	3.36	4.63	7.82	5.38	16.6
25	4.45	4.99	60.1	371	84.6	66.3	31.1	8.49	4.65	6.20	9.23	6.50	22.8
20	5.18	5.59	101	525	109	82.9	42.2	11.1	8.53	9.34	13.0	7.79	35.2
15	6.43	6.16	180	774	146	106	57.9	16.5	14.8	14.3	16.0	11.6	59.2
10	8.65	7.78	359	1,170	212	146	83.5	28.9	31.2	22.0	20.4	15.8	108
5	11.8	14.1	876	2,040	363	232	139	112	61.7	39.4	29.2	20.0	275

05066500 GOOSE RIVER AT HILLSBORO, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	21.3	17.1	15.6	11.8	9.25
0.95	1.05	78.2	69.7	59.6	43.3	30.5
0.90	1.11	148	137	115	81.8	55.0
0.80	1.25	307	292	238	167	108
0.50	2	1,070	1,020	819	561	347
0.20	5	3,110	2,840	2,280	1,540	960
0.10	10	5,080	4,440	3,600	2,430	1,540
0.04	25	8,160	6,720	5,540	3,750	2,440
0.02	50	10,800	8,510	7,120	4,820	3,220
0.01	100	13,700	10,300	8,750	5,940	4,070
0.005	200	16,800	12,100	10,400	7,090	4,980
0.002	500	21,100	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0	0.014
0.10	10	0	0	0	0	0	0	0	0.016	0.176
0.20	5	0	0	0	0	0	0.088	0.185	0.281	0.453
0.50	2	0.071	0.083	0.142	0.207	0.310	0.620	0.961	1.43	1.97

05066500 GOOSE RIVER AT HILLSBORO, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0.463
0.10	10	0	0	0	0	0	0	0.016	1.04
0.20	5	0	0	0.063	0.087	0.126	0.201	0.399	2.50
0.50	2	0.708	0.741	0.773	0.906	1.38	1.76	2.48	11.3
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0	0	0.007	0	0	0	0
0.10	10	0	0	0	0.098	0	0	0	0
0.20	5	0.028	0.061	0.130	0.319	0	0	0.021	0.119
0.50	2	0.614	0.837	1.16	2.02	0.194	0.350	0.440	0.746

05066500 GOOSE RIVER AT HILLSBORO, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
¹ 1882	April ²	--	6,700	1961	March 7	0.66	82.0
¹ 1897	April ²	--	5,700	1962	April 9	8.64	2,350
¹ 1904	April ²	--	5,300	1963	April 8	1.24	290
¹ 1916	April ²	--	4,700	1964	June 14	3.61	1,110
1931	April 7	4.20	100	1965	April 13	14.01	6,800
1932	March 3	15.14	959	1966	March 23	12.17	3,290
1933	March ²	10.40	300	1967	April 24	7.81	2,650
1934	April 2	4.95	107	1968	June 12	4.48	1,420
1935	June 14	8.45	697	1969	April 12	14.19	7,640
1936	April 16	13.06	1,660	1970	April 9	9.18	3,040
1937	April 15	3.57	46.0	1971	April 10	4.41	1,550
1938	March 15	4.44	104	1972	April 15	6.62	2,380
1939	March 26	11.00	564	1973	March 15	4.05	1,280
1940	April 17	1.66	710	1974	April 15	9.43	3,450
1941	April 11	2.26	1,320	1975	April 19	11.11	3,810
1942	April 6	2.27	1,140	1976	March 29	3.98	1,260
1943	March 29	8.84	3,480	1977	April 11	2.01	86.0
1944	April 10	1.11	304	1978	April 1	10.56	3,800
1945	March 17	1.09	293	1979	April 21	16.76	14,800
1946	March 22	3.22	1,300	1980	March 31	3.55	790
1947	April 13	5.30	1,700	1981	June 25	1.83	25.6
1948	April 16	10.63	4,180	1982	April 3	8.89	2,900
1949	April 8	3.38	1,640	1983	March 17	--	1,140
1950	April 19	14.94	9,420	1984	March 29	7.99	2,660
1951	March 31	3.48	1,130	1985	March 16	4.17	1,240
1952	April 4	3.33	1,300	1986	March 24	4.81	1,630
1953	July 6	1.36	408	1987	March 26	10.22	3,570
1954	June 15	0.99	231	1988	March 28	3.86	1,060
1955	April 3	2.44	1,220	1989	April 8	9.80	3,000
1956	April 19	2.58	1,390	1990	April 6	2.01	94.0
1957	September 7	1.17	200	1991	June 1	2.75	351
1958	July 3	0.69	88.0	1992	March 8	3.69	975
1959	April 5	0.84	143	1993	July 30	12.90	4,360
1960	April 9	3.37	1,360	1994	March 23	6.91	2,160
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 21	16.76	14,800	1948	April 16	10.63	4,180
1950	April 19	14.94	9,420	1975	April 19	11.11	3,810
1969	April 12	14.19	7,640	1978	April 1	10.56	3,800
1965	April 13	14.01	6,800	1987	March 26	10.22	3,570
¹ 1882	April ²	--	6,700	1943	March 29	8.84	3,480
¹ 1897	April ²	--	5,700	1974	April 15	9.43	3,450
¹ 1904	April ²	--	5,300	1966	March 23	12.17	3,290
¹ 1916	April ²	--	4,700	1970	April 9	9.18	3,040
1993	July 30	12.90	4,360	1989	April 8	9.80	3,000

05066500 GOOSE RIVER AT HILLSBORO, ND--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1982	April 3	8.89	2,900	1988	March 28	3.86	1,060
1984	March 29	7.99	2,660	1992	March 8	3.69	975
1967	April 24	7.81	2,650	1932	March 3	15.14	959
1972	April 15	6.62	2,380	1980	March 31	3.55	790
1962	April 9	8.64	2,350	1940	April 17	1.66	710
1994	March 23	6.91	2,160	1935	June 14	8.45	697
1947	April 13	5.30	1,700	1939	March 26	11.00	564
1936	April 16	13.06	1,660	1953	July 6	1.36	408
1949	April 8	3.38	1,640	1991	June 1	2.75	351
1986	March 24	4.81	1,630	1944	April 10	1.11	304
1971	April 10	4.41	1,550	1933	March ²	10.40	300
1968	June 12	4.48	1,420	1945	March 17	1.09	293
1956	April 19	2.58	1,390	1963	April 8	1.24	290
1960	April 9	3.37	1,360	1954	June 15	0.99	231
1941	April 11	2.26	1,320	1957	September 7	1.17	200
1946	March 22	3.22	1,300	1959	April 5	0.84	143
1952	April 4	3.33	1,300	1934	April 2	4.95	107
1973	March 15	4.05	1,280	1938	March 15	4.44	104
1976	March 29	3.98	1,260	1931	April 7	4.20	100
1985	March 16	4.17	1,240	1990	April 6	2.01	94.0
1955	April 3	2.44	1,220	1958	July 3	0.69	88.0
1942	April 6	2.27	1,140	1977	April 11	2.01	86.0
1983	March 17	--	1,140	1961	March 7	0.66	82.0
1951	March 31	3.48	1,130	1937	April 15	3.57	46.0
1964	June 14	3.61	1,110	1981	June 25	1.83	25.6

¹Determined by U.S. Army Corps of Engineers; not used in statistics.

²Day of month unknown.

05066500 GOOSE RIVER AT HILLSBORO, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1931	--	--	--	--	--	--	26.8	3.56	4.24	1.27	1.33	0.330	--
1932	0.300	0.200	0.200	0.200	20.0	272.2	238.6	27.4	12.6	0.984	0.294	0.390	47.8
1933	0.526	--	--	--	--	--	105.7	16.5	6.01	--	--	--	--
1934	--	--	--	--	--	--	33.1	2.05	2.75	1.24	1.45	2.77	--
1935	0.700	0.200	0.200	0.200	0.300	70.0	32.0	19.9	86.0	12.0	1.00	0.400	18.6
1936	0.300	0.400	0.200	0.200	0.200	1.00	190.4	14.1	2.77	0.577	0.100	0.100	17.3
1937	0.100	0.100	0.100	0.100	0.200	0.500	15.4	7.49	9.65	2.43	3.73	2.00	3.47
1938	0.100	0.100	0.100	0.100	0.100	35.1	6.51	5.35	1.35	0.013	0	0	4.12
1939	0	0	0	0	0	99.0	37.5	1.12	9.02	0.119	0	0	12.3
1940	0	0	0	0	0	0	156.3	9.05	1.63	0	4.69	0.013	14.1
1941	0	0	0	0	0	24.5	517.2	14.0	61.4	6.93	1.26	2.53	51.7
1942	6.06	5.24	2.33	0.074	0	9.25	256.9	81.1	31.4	6.05	3.55	2.72	33.6
1943	0.916	0.820	0.742	0.445	0.321	215.0	122.0	33.3	91.4	21.5	2.12	0.457	40.9
1944	0.232	0.407	0.174	0.174	0.121	2.02	65.5	16.6	21.2	5.72	39.0	12.7	13.6
1945	2.87	13.5	5.60	0.661	0.643	98.5	40.5	18.2	17.1	5.98	1.30	1.09	17.3
1946	1.66	0.527	0.510	0.471	0.557	209.8	51.6	16.0	9.11	8.85	0.542	0.837	25.3
1947	1.36	1.46	0.671	0.216	0.139	121.5	394.7	38.3	52.0	9.17	1.94	0.887	51.6
1948	0.768	2.19	1.46	0.452	0.100	0.532	1,840	148.0	23.2	15.6	9.90	0.950	168.0
1949	0.445	3.78	1.61	0.458	0.257	1.14	516.2	37.9	158.9	18.6	12.5	1.11	62.1
1950	3.23	6.61	4.96	2.69	2.37	45.1	2,168	2,275	135.0	57.9	12.0	7.18	394.5
1951	6.08	7.88	7.35	6.27	5.81	92.1	289.3	27.4	14.4	3.61	1.58	4.29	38.7
1952	2.64	4.43	1.86	0	1.84	14.2	328.0	11.2	1.43	131.4	9.13	1.41	42.1
1953	1.08	2.05	2.73	1.88	1.92	28.4	21.8	28.6	135.7	101.6	2.17	2.86	27.6
1954	0.765	2.45	2.96	2.55	16.1	57.8	61.2	19.3	41.2	4.69	0.697	0.350	17.4
1955	0.200	0.260	0.297	0.568	0.700	0.981	214.6	6.35	61.7	5.66	2.58	0.163	24.2
1956	0.200	0.483	0.635	0.581	0.500	0.706	281.7	55.4	57.3	6.05	0.994	0.967	33.4
1957	0.384	1.82	1.43	0.994	0.739	18.3	17.8	7.88	10.5	5.30	0.106	53.0	9.81
1958	16.5	14.8	4.20	0.961	0.814	1.57	15.8	4.87	3.15	29.0	3.52	0.460	8.03
1959	0.319	0.050	0	0	0	33.6	37.2	6.70	6.81	0.484	1.33	0.293	7.24
1960	0.339	0.667	0.910	0.877	0.803	71.8	435.5	15.0	12.7	10.2	4.13	1.61	45.7
1961	0.258	1.05	0.984	0.768	0.818	54.4	26.9	19.6	3.47	0.158	0.081	0.403	9.15
1962	2.45	0.690	0.606	0.568	0.521	0.848	690.0	179.0	146.1	48.0	11.0	122.8	99.5
1963	16.5	14.4	9.10	2.32	0.296	29.3	89.0	18.4	10.5	11.8	2.08	0.350	17.0
1964	0.858	0.557	0.116	0	0	1.52	149.8	18.5	275.6	29.7	5.31	8.27	40.3
1965	26.6	7.42	3.72	3.00	1.84	1.38	1,632	171.5	69.8	67.9	23.4	36.2	168.9

05066500 GOOSE RIVER AT HILLSBORO, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1966	50.2	27.5	17.5	10.8	6.86	1,106	473.3	164.5	88.1	118.3	132.2	18.6	186.3
1967	9.56	10.5	4.47	4.76	3.90	282.9	946.0	403.1	97.7	17.1	2.18	1.04	148.5
1968	1.96	3.74	3.37	4.22	2.38	119.3	52.2	34.9	385.2	53.5	19.2	12.8	57.4
1969	7.52	11.8	7.88	3.97	3.56	5.79	1,585	133.3	80.1	73.6	14.9	31.8	161.7
1970	27.5	15.5	14.5	10.3	10.9	13.3	1,186	316.3	265.2	38.6	8.58	8.89	158.6
1971	3.56	13.4	7.54	3.57	4.96	78.9	489.7	65.5	69.4	62.0	6.63	4.07	67.1
1972	30.2	46.5	16.1	7.39	4.93	421.6	764.4	235.8	97.0	11.3	6.79	2.71	136.8
1973	1.09	6.75	3.96	3.67	5.97	275.4	50.5	18.5	12.2	3.62	1.78	4.41	32.7
1974	9.89	8.66	4.77	1.33	3.06	2.44	1,068	284.7	183.9	37.8	40.9	6.06	136.8
1975	1.63	5.89	7.45	6.91	6.18	26.7	919.9	243.0	89.4	58.6	2.84	2.22	113.6
1976	1.00	4.69	3.58	3.86	5.05	235.3	230.1	23.0	6.47	1.14	0.061	0	42.9
1977	0	0	0.232	0.300	0.296	2.26	17.6	9.72	5.06	4.18	0.145	1.96	3.48
1978	4.25	12.7	6.63	4.06	2.06	302.9	961.8	78.4	34.7	9.93	1.32	5.44	118.2
1979	1.04	1.02	1.62	1.70	2.05	3.14	2,878	421.1	71.7	44.3	15.1	3.22	284.4
1980	4.32	6.74	8.45	5.02	4.73	55.3	215.4	9.76	2.65	0.437	1.48	2.25	26.2
1981	0.782	2.43	2.40	2.16	4.85	9.88	6.61	7.48	14.4	7.64	8.15	2.76	5.79
1982	4.89	7.84	11.0	5.23	4.19	80.6	816.7	64.3	19.1	18.8	1.60	0.415	85.5
1983	62.9	20.7	22.0	8.96	8.00	418.6	230.9	57.1	129.6	62.7	29.0	44.3	91.8
1984	26.5	25.7	15.3	8.42	7.06	403.2	402.0	83.0	114.5	4.14	0.058	0	90.8
1985	5.90	4.50	0.672	0.828	2.40	344.5	75.6	40.7	13.7	0.581	19.0	0.814	43.0
1986	4.06	5.17	5.55	6.08	5.31	391.3	265.5	217.9	41.8	46.7	7.45	4.94	84.2
1987	14.4	15.1	18.0	12.7	6.81	922.9	1,043	147.8	102.5	532.5	160.1	50.0	253.6
1988	15.4	25.0	22.5	12.4	13.9	349.1	248.7	37.5	13.5	4.52	0.780	0.537	62.1
1989	0.735	2.50	3.76	4.58	4.16	6.46	789.4	51.7	20.8	3.15	1.32	1.44	73.3
1990	0.568	0.492	0.190	0.842	1.21	2.57	23.7	10.5	8.65	13.9	4.24	0	5.58
1991	0	0.006	0	0.275	2.94	7.20	23.6	80.2	47.8	8.91	0.547	0	14.3
1992	0.021	2.01	1.57	0.374	0.210	274.9	29.4	12.3	10.7	108.0	13.8	18.2	39.8
1993	6.43	16.5	9.15	3.95	5.31	157.8	223.4	42.7	48.4	729.1	515.0	200.0	164.9
1994	55.0	36.2	31.1	23.2	16.9	555.4	250.9	164.6	142.0	426.2	221.9	326.1	188.8

05067500 MARSH RIVER NEAR SHELLY, MN

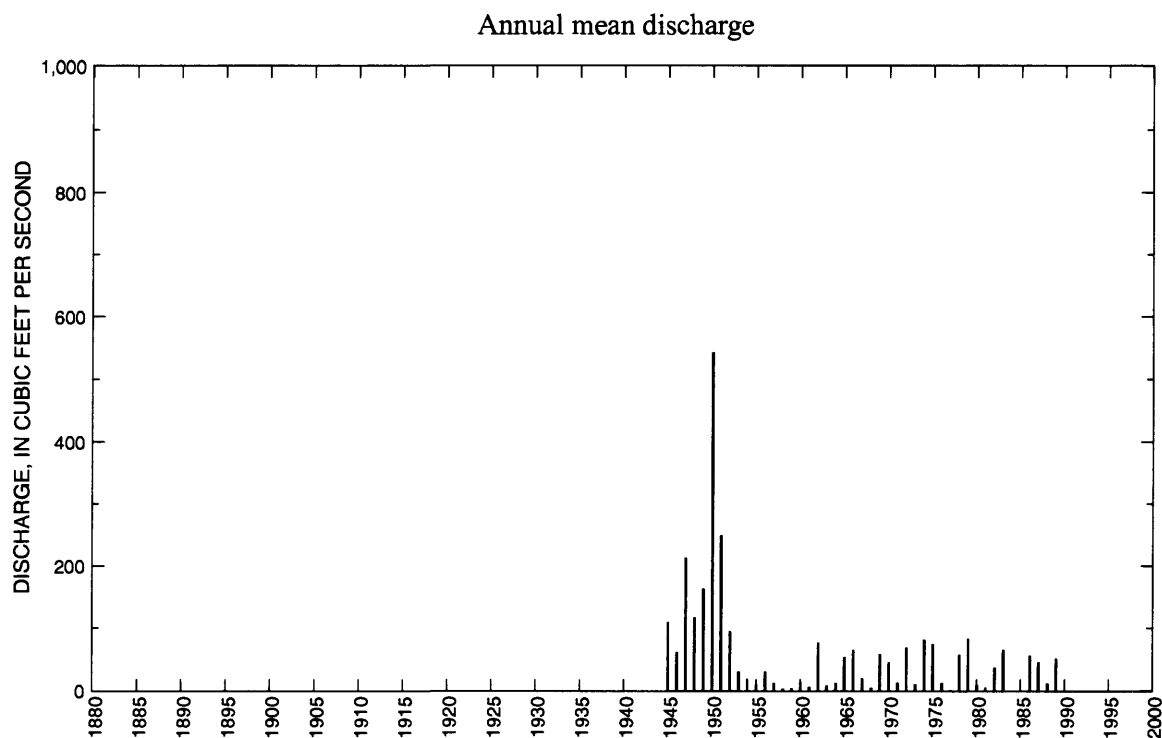
LOCATION.--Lat 47°24'45", long 96°45'50", NE¹/₄NW¹/₄ sec.3, T.145 N., R.48 W., Norman County, Hydrologic Unit 09020107, near center of span on downstream truss of bridge, 3.8 mi southeast of Shelly and 10 mi upstream from mouth.

DRAINAGE AREA.--151 mi².

PERIOD OF RECORD.--March 1944 to September 1983, April 1985 to current year. No winter records since 1989. Monthly discharge only for March 1944, published in WSP 1308. Operated as a high-flow partial-record station October 1983 to March 1985.

GAGE.--Water-stage recorder. Datum of gage is 841.14 ft above mean sea level (levels by U.S. Army Corps of Engineers). Prior to Oct. 1, 1965, nonrecording gage at datum 3.0 ft higher. Oct. 1, 1965, to May 17, 1989, nonrecording gage at present site and datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,880 ft³/s, Apr. 19, 1979, gage height, 23.36 ft, from floodmark; no flow at times.



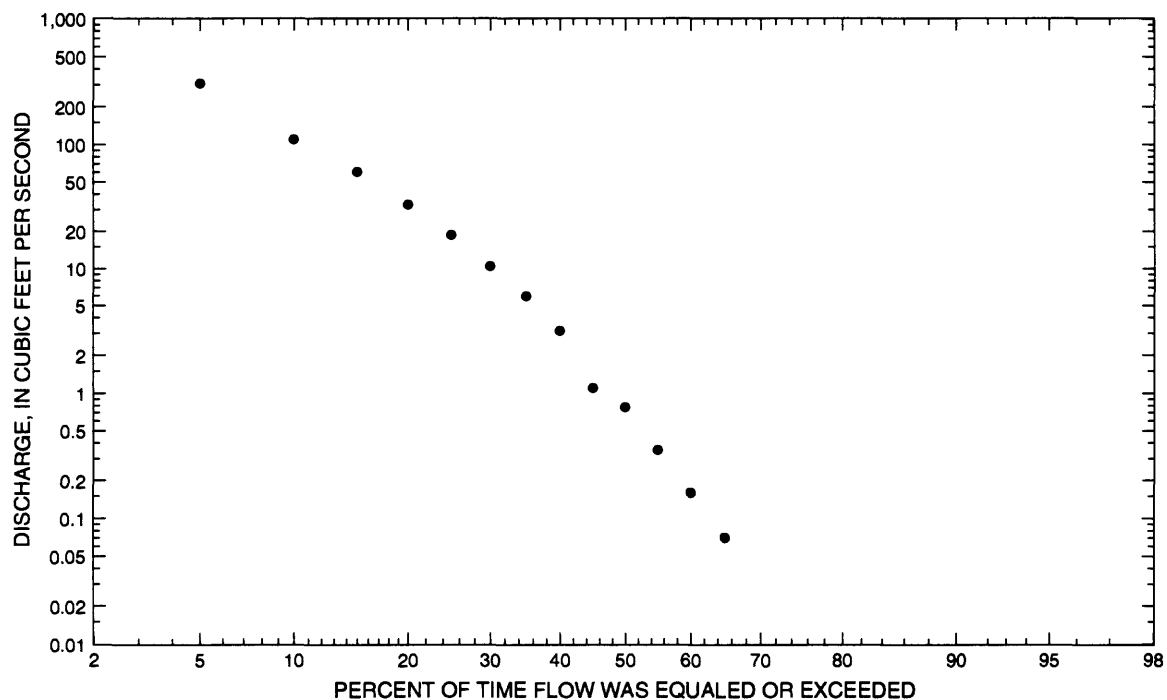
05067500 MARSH RIVER NEAR SHELLY, MN--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	130	1952	0	m	12.4	29.0	2.34	1.75
November	102	1952	0	m	10.7	24.8	2.32	1.51
December	77.1	1951	0	m	5.60	16.1	2.87	0.79
January	64.5	1951	0	m	3.79	12.0	3.16	0.53
February	62.1	1951	0	m	3.29	10.8	3.29	0.46
March	437	1945	0	m	69.5	115	1.66	9.80
April	1,270	1947	0.780	1991	289	360	1.25	40.72
May	2,620	1950	1.35	1958	126	381	3.03	17.8
June	1,030	1950	0	1980	81.6	182	2.23	11.5
July	821	1950	0	m	73.6	154	2.10	10.4
August	363	1949	0	m	20.8	58.9	2.84	2.93
September	144	1944	0	m	13.2	31.4	2.38	1.86
Annual	543	1950	1.24	1977	63.3	92.7	1.46	100

Annual flow duration



05067500 MARSH RIVER NEAR SHELLY, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.16	0.23	0	0	0	0	0	0	0	0
90	0	0	0	1.60	0.76	0.22	0	0	0	0	0	0	0
85	0	0	0	5.46	1.70	0.71	0	0	0	0	0	0	0
80	0	0	0	7.95	3.26	1.00	0.10	0	0	0	0	0	0
75	0	0	0	10.8	4.46	1.50	0.29	0	0	0	0	0	0
70	0	0	0	14.6	6.46	3.09	0.43	0	0	0	0	0	0
65	0	0	0.06	19.7	8.76	3.78	0.90	0	0	0	0	0	0.07
60	0	0	0.13	26.7	10.7	5.16	1.30	0.02	0	0	0.08	0	0.16
55	0	0	0.18	35.9	15.0	6.45	1.90	0.08	0	0.02	0.27	0.07	0.35
50	0	0	0.37	53.1	19.1	8.44	3.32	0.30	0.14	0.21	0.49	0.16	0.77
45	0.02	0	0.76	75.6	23.7	11.2	4.58	0.60	0.27	0.38	0.67	0.28	1.10
40	0.09	0.06	4.98	106	29.3	14.4	6.98	0.85	0.53	0.70	1.20	0.37	3.13
35	0.15	0.08	14.3	152	35.8	19.6	11.7	1.20	1.00	1.30	1.60	0.49	5.90
30	0.19	0.11	21.2	218	45.8	29.0	21.1	2.40	2.00	2.30	3.39	0.64	10.4
25	0.25	0.19	31.8	308	59.9	44.2	36.7	4.27	3.72	4.53	4.68	1.10	18.6
20	0.33	0.24	52.9	438	89.2	72.7	63.6	10.1	6.89	9.94	7.42	2.00	32.6
15	0.73	0.42	84.8	599	159	115	99.7	22.9	18.3	21.4	14.4	3.94	60.3
10	14.1	12.1	182	849	257	218	164	56.6	42.9	43.6	46.2	14.9	109
5	28.8	25.1	425	1,430	577	438	468	107	79.5	84.6	75.1	48.7	306

05067500 MARSH RIVER NEAR SHELLY, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	37.8	20.9	17.5	13.4	8.17
0.95	1.05	112	72.5	56.6	40.8	25.8
0.90	1.11	191	132	101	70.9	45.6
0.80	1.25	346	258	193	133	87.2
0.50	2	946	791	587	397	267
0.20	5	2,180	1,980	1,500	1,030	706
0.10	10	3,180	2,960	2,310	1,600	1,110
0.04	25	4,530	4,320	3,480	2,460	1,720
0.02	50	5,560	5,360	4,430	3,190	2,240
0.01	100	6,600	6,390	5,420	3,970	2,790
0.005	200	7,620	7,410	6,430	4,790	3,380
0.002	500	8,940	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0	0
0.50	2	0	0	0	0	0	0	0.019	0.119	0.410

05067500 MARSH RIVER NEAR SHELLY, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0.182
0.50	2	0	0	0	0	0	0.013	0.140	3.98
		June-July-August				September-October-November			
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
		0	0	0.039	0.448	0	0	0	0.008

05067500 MARSH RIVER NEAR SHELLY, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1944	July 11	8.64	1,030	1970	April 9	13.38	1,320
1945	March 18	8.48	1,000	1971	April 1	10.11	619
1946	March 23	--	1,510	1972	April 15	16.26	2,070
1947	April 14	17.80	4,150	1973	March 16	9.30	366
1948	April 13	--	1,040	1974	April 15	18.87	2,460
1949	June 3	9.83	1,260	1975	April 19	17.81	2,330
1950	May 11	18.96	4,660	1976	March 31	11.32	785
1951	April 8	12.56	2,100	1977	April 10	4.13	42
1952	July 21	7.80	979	1978	April 9	19.22	2,240
1953	June 17	4.11	389	1979	April 19	23.36	4,880
1954	April 13	4.63	376	1980	April 3	9.99	615
1955	April 5	4.10	289	1981	May 23	11.03	896
1956	April 13	12.50	1,960	1982	April 2	13.06	1,070
1957	June 23	--	304	1983	March 8	13.84	1,240
1958	July 10	1.48	47	1984	June 11	16.17	2,260
1959	March 31	2.42	96	1985	May 13	13.23	1,380
1960	April 7	6.04	492	1986	March 30	14.59	1,720
1961	March 9	3.51	100	1987	July 24	15.80	1,730
1962	June 11	9.87	1,240	1988	March 26	7.86	250
1963	April 8	4.60	274	1989	April 7	21.18	3,490
1964	April 22	5.41	450	1990	June 2	6.65	254
1965	April 13	16.87	3,120	1991	May 23	11.88	1,120
1966	April 2	13.85	1,460	1992	March 8	10.36	430
1967	March 30	11.54	866	1993	April 2	13.78	660
1968	March 27	7.35	221	1994	September 19	11.50	995
1969	April 12	22.28	3,910				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 19	23.36	4,880	1970	April 9	13.38	1,320
1950	May 11	18.96	4,660	1962	June 11	9.87	1,240
1969	April 12	22.28	3,910	1983	March 8	13.84	1,240
1989	April 7	21.18	3,490	1991	May 23	11.88	1,120
1965	April 13	16.87	3,120	1982	April 2	13.06	1,070
1974	April 15	18.87	2,460	1948	April 13	--	1,040
1975	April 19	17.81	2,330	1944	July 11	8.64	1,030
1984	June 11	16.17	2,260	1945	March 18	8.48	1,000
1978	April 9	19.22	2,240	1994	September 19	11.50	995
1951	April 8	12.56	2,100	1952	July 21	7.80	979
1972	April 15	16.26	2,070	1981	May 23	11.03	896
1956	April 13	12.50	1,960	1967	March 30	11.54	866
1987	July 24	15.80	1,730	1976	March 31	11.32	785
1986	March 30	14.59	1,720	1993	April 2	13.78	660
1946	March 23	--	1,510	1971	April 1	10.11	619
1966	April 2	13.85	1,460	1980	April 3	9.99	615
1985	May 13	13.23	1,380	1960	April 7	6.04	492

05067500 MARSH RIVER NEAR SHELLY, MN--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1964	April 22	5.41	450	1990	June 2	6.65	254
1992	March 8	10.36	430	1988	March 26	7.86	250
1953	June 17	4.11	389	1968	March 27	7.35	221
1954	April 13	4.63	376	1961	March 9	3.51	100
1973	March 16	9.30	366	1959	March 31	2.42	96
1957	June 23	--	304	1958	July 10	1.48	47
1955	April 5	4.10	289	1977	April 10	4.13	42
1963	April 8	4.60	274				

05067500 MARSH RIVER NEAR SHELLY, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1944	--	--	--	--	--	0.142	83.3	43.5	114.2	327.2	163.9	143.8	--
1945	19.0	11.8	3.56	0.823	0.350	437.2	629.4	184.5	22.4	7.24	2.61	1.83	110.3
1946	1.29	0.820	0.084	0	0	363.5	280.2	60.7	13.0	12.8	0.058	0.453	61.4
1947	3.99	1.68	0.510	0	0	22.0	1,273	424.3	607.5	129.9	65.9	56.0	214.2
1948	73.0	55.8	47.5	35.4	25.1	28.9	656.3	265.8	102.2	76.0	40.6	11.7	117.7
1949	10.8	19.8	17.8	18.2	14.9	18.1	216.7	198.3	411.5	585.2	362.7	74.2	163.4
1950	60.5	74.3	58.6	27.2	23.8	51.9	1,537	2,617	1,030	821.0	133.7	50.8	543.3
1951	118.4	85.7	77.1	64.5	62.1	107.0	1,190	714.6	301.7	102.5	60.7	122.5	250.2
1952	129.8	101.8	13.1	12.4	10.8	14.8	390.7	125.3	90.3	201.9	54.3	3.80	95.7
1953	1.30	0.877	0.681	0.174	0.132	52.1	46.5	38.5	100.7	119.6	6.61	1.64	30.9
1954	0.039	0.227	0.742	0.206	0.050	6.64	135.4	60.2	22.4	2.21	0.106	0	19.0
1955	0	0.053	0.106	0	0	0.484	69.5	9.39	17.6	17.6	11.2	0	10.2
1956	0	0	0	0	0	0.010	317.2	37.5	23.7	1.02	0.035	0.090	31.2
1957	0	0	0	0	0	40.5	35.5	10.3	41.6	17.2	0.906	5.17	12.6
1958	3.01	7.03	0.945	0	0.339	1.33	4.13	1.35	3.00	15.5	0.255	0	3.09
1959	0	0	0	0	0.007	18.3	19.9	6.75	4.96	1.27	0	0	4.28
1960	0	0	0	0	0	23.7	108.9	10.6	12.6	8.27	0.277	3.47	13.9
1961	0	0.117	0	0	0	35.6	12.9	25.0	3.03	0	0	0.013	6.46
1962	0.387	0	0	0	0	0.258	97.9	198.5	347.1	264.3	8.75	1.50	76.8
1963	0.687	1.60	0.713	0.155	0	20.6	33.7	11.6	32.7	0.445	0	0	8.49
1964	0	0	0	0	0	0	103.4	23.2	18.6	3.26	0.061	0.167	12.3
1965	0.077	0.123	0	0	0	0	573.3	25.9	29.7	21.0	3.63	3.76	54.2
1966	26.9	5.43	2.72	0.152	0.068	389.4	291.5	50.4	9.99	2.38	1.70	2.32	65.6
1967	0.210	0.030	0	0	0	60.1	143.6	30.1	9.92	1.17	0	0	20.4
1968	0	0	0	0	0	19.9	11.8	5.42	15.7	1.06	0	0	4.49
1969	0	0	0	0	0	0	608.5	31.4	24.7	42.8	3.19	2.34	58.8
1970	2.85	2.29	0.768	0.177	0.168	1.47	350.4	58.0	137.6	2.33	0.045	0.137	45.9
1971	0.255	0.563	0.023	0	0	46.7	100.7	5.39	2.76	0.458	0	0	13.0
1972	60.7	60.2	4.57	0.500	0	317.9	321.3	52.9	4.71	5.26	2.43	0.587	69.3
1973	0.837	0	0.278	0.098	0.078	84.1	10.3	4.21	0.741	0	0	25.6	10.6
1974	30.7	5.38	1.41	0.291	0.174	0.165	775.2	149.9	20.7	1.25	3.88	0.078	81.8
1975	0.232	6.35	0.593	0.235	0.121	0.128	552.8	86.0	17.0	230.1	0.889	0.009	74.4
1976	0.001	0.866	0.008	0	0.004	68.1	71.0	2.44	4.06	0.014	0	0	12.2
1977	0	0	0	0	0	2.79	10.2	1.36	0.565	0	0	0.004	1.24
1978	0.501	0.180	0.020	0.020	0.020	15.5	676.3	9.95	0.998	0.018	0.004	0	57.9

05067500 MARSH RIVER NEAR SHELLY, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1979	0	0	0	0	0	0	894.8	43.7	13.4	53.4	1.43	0.087	83.0
1980	0	0.626	0.070	0.015	0	6.75	105.9	0.866	0	0	0.033	0	9.39
1981	0	0	0	0	1.36	1.30	0.078	47.7	3.92	1.18	0.199	4.64	5.09
1982	12.7	5.32	1.54	0.097	0.228	70.8	337.3	24.8	2.86	1.18	0.123	0	37.9
1983	12.0	7.46	5.04	1.33	0.790	342.4	68.8	4.34	247.1	55.7	20.5	18.5	65.6
1985	--	--	--	--	--	--	14.3	297.6	11.2	9.13	8.14	3.83	--
1986	4.61	1.82	0.568	0.445	0.400	164.2	321.9	135.5	19.3	18.4	4.19	0.547	56.1
1987	0.319	1.04	1.20	0.338	0.270	206.2	20.9	33.2	5.92	259.6	12.6	1.44	46.0
1988	0.745	0.706	0.626	0.197	0.164	81.9	49.7	1.56	0.100	0	2.92	5.68	12.1
1989	0.098	0.073	0	0	0	0.484	608.6	12.5	4.60	0.076	0	0	51.5
1990	4.43	--	--	--	--	--	28.1	3.57	30.7	5.15	0	0	--
1991	0	--	--	--	--	9.20	4.93	72.0	27.4	2.84	0.125	0	--
1992	0	--	--	--	--	63.7	6.35	2.73	17.4	28.7	20.6	21.9	--
1993	3.35	--	--	--	--	--	133.0	5.23	4.69	100.2	36.9	0.480	--
1994	--	--	--	--	--	--	109.8	32.3	92.9	124.6	1.83	91.9	--

05068000 SAND HILL RIVER AT BELTRAMI, MN

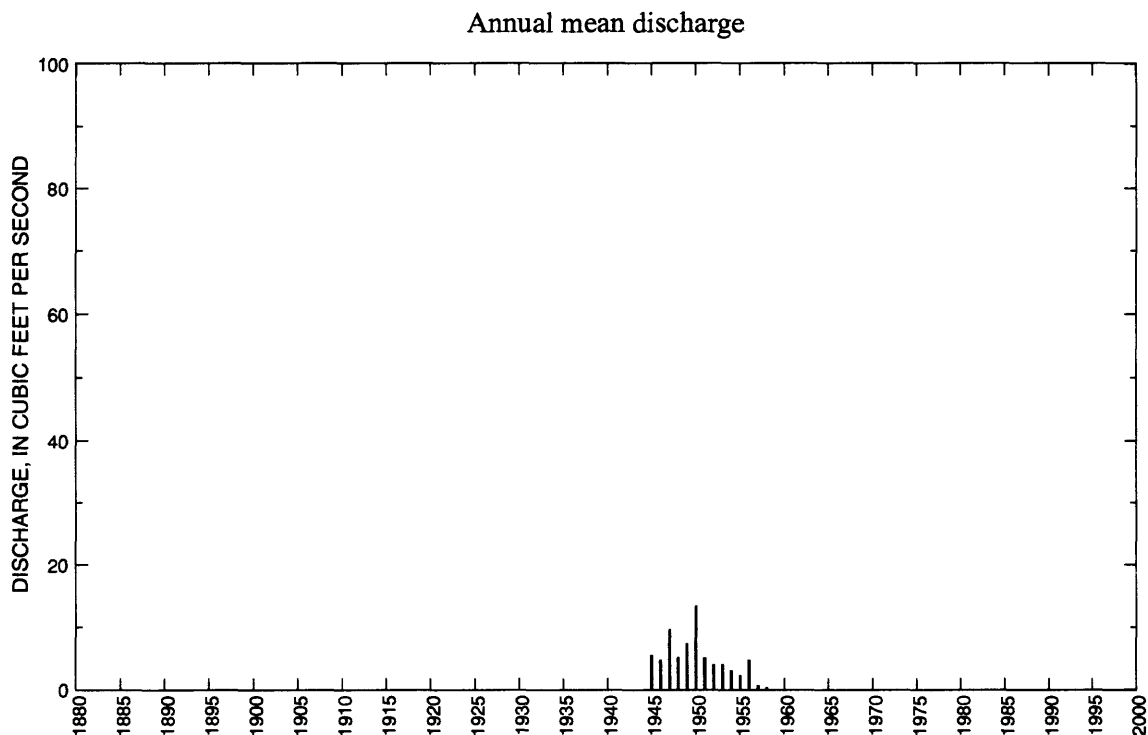
LOCATION.--Lat 47°32'50", long 96°32'00", in NE¹/₄SW¹/₄ sec.16, T.147 N., R.46 W., on upstream side of bridge abutment on U.S. Highway 75 in Beltrami, 150 ft upstream from Great Northern Railway bridge and 0.25 mi north of post office.

DRAINAGE AREA.--324 mi² includes that of Sand Hill ditch.

PERIOD OF RECORD.--April to November 1943, March 1944 to September 1958. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Staff gage. Datum of gage is 896.80 ft above mean sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Aug. 28, 1944, reference point at same site and datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 291 ft³/s, Apr. 19, 1950, gage height, 5.97 ft, from floodmark; no flow for many days most years.



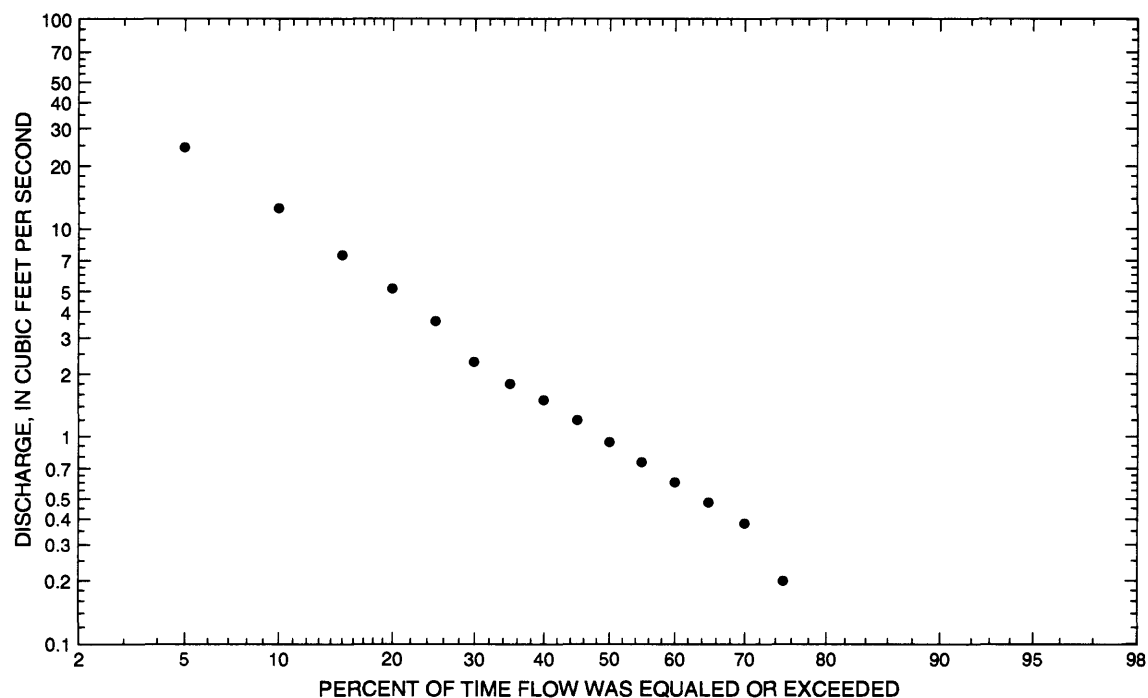
05068000 SAND HILL RIVER AT BELTRAMI, MN--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	5.32	1947	0.071	1957	2.09	1.67	0.80	3.52
November	5.43	1950	0.500	1956	1.88	1.26	0.67	3.17
December	1.43	1945	0	m	0.650	0.47	0.73	1.09
January	0.877	1947	0	m	0.310	0.34	1.12	0.52
February	0.804	1947	0	m	0.220	0.31	1.44	0.36
March	12.9	1945	0	m	2.05	3.64	1.78	3.45
April	43.1	1947	0.103	1958	19.5	12.9	0.66	32.8
May	84.2	1950	0.113	1958	15.0	20.1	1.34	25.3
June	30.4	1947	0.820	1952	9.29	7.66	0.82	15.6
July	22.7	1949	0.229	1957	4.98	5.63	1.13	8.38
August	7.96	1944	0	m	2.27	2.00	0.88	3.82
September	3.38	1945	0	m	1.20	0.98	0.81	2.03
Annual	13.4	1950	0.368	1958	5.04	3.41	0.68	100

Annual flow duration



05068000 SAND HILL RIVER AT BELTRAMI, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0	0.10	0.10	0	0	0	0	0.19	0	0
90	0	0	0	0.30	0.38	0.38	0.18	0	0	0.20	0.45	0	0
85	0	0	0	0.67	1.50	1.10	0.37	0	0	0.30	0.45	0	0
80	0	0	0	1.50	2.30	1.80	0.45	0	0.18	0.40	0.65	0	0
75	0	0	0	3.30	2.90	2.20	0.79	0.20	0.18	0.46	0.84	0.20	0.20
70	0	0	0	5.79	3.60	2.20	1.20	0.39	0.29	0.80	0.84	0.20	0.38
65	0	0	0	7.90	5.64	2.80	1.40	0.46	0.40	0.80	0.95	0.30	0.48
60	0	0	0	9.44	6.21	3.50	1.70	0.55	0.47	0.92	1.20	0.38	0.60
55	0.10	0	0	11.5	7.15	3.50	2.00	0.78	0.54	1.10	1.20	0.49	0.75
50	0.10	0	0.17	13.9	7.60	4.73	2.50	0.92	0.63	1.40	1.20	0.69	0.94
45	0.20	0	0.36	15.8	8.92	5.19	2.50	1.30	0.74	1.80	1.60	0.69	1.20
40	0.40	0	0.43	18.4	10.0	5.84	3.60	1.50	1.00	2.10	2.00	0.89	1.50
35	0.57	0.19	0.61	21.5	11.5	6.72	3.60	1.80	1.20	2.40	2.00	1.00	1.80
30	0.57	0.40	0.61	24.3	13.3	7.20	4.30	2.20	1.40	2.80	2.30	1.10	2.30
25	0.57	0.49	0.74	28.2	15.3	7.68	4.30	3.00	1.40	2.80	2.60	1.10	3.60
20	0.66	0.60	1.30	32.5	17.5	10.4	6.33	3.00	1.40	3.20	2.60	1.20	5.18
15	0.66	0.60	1.80	36.7	20.9	15.0	7.13	3.60	1.90	4.20	2.90	1.20	7.44
10	0.76	0.69	5.53	44.0	28.2	22.2	9.87	4.30	2.50	4.20	3.30	1.20	12.6
5	0.87	0.79	14.1	62.4	72.9	33.6	18.9	8.55	4.00	5.60	4.80	1.50	24.5

05068000 SAND HILL RIVER AT BELTRAMI, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	13.9	7.29	4.26	2.17	1.08
0.95	1.05	22.4	13.6	9.10	5.56	3.26
0.90	1.11	28.9	18.7	13.2	8.71	5.48
0.80	1.25	39.4	27.1	20.3	14.3	9.66
0.50	2	71.1	52.9	42.1	31.8	23.8
0.20	5	129	97.6	79.1	59.5	47.1
0.10	10	176	132	106	77.6	62.2
0.04	25	245	179	140	98.6	79.3
0.02	50	304	216	165	112	90.3
0.01	100	369	254	190	125	99.8
0.005	200	441	294	215	136	108
0.002	500	548	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.01	100	ng	ng	0	0	0	0	0	0.003	0.057
0.02	50	ng	ng	0	0	0	0	0	0.006	0.082
0.05	20	ng	ng	0	0	0	0	0	0.014	0.138
0.10	10	ng	ng	0	0	0	0	0	0.030	0.213
0.20	5	ng	ng	0	0	0	0	0	0.068	0.347
0.50	2	ng	ng	0	0	0	0	0.120	0.262	0.788

05068000 SAND HILL RIVER AT BELTRAMI, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0
0.50	2	0	0	0	0	0	0	0	0.346
		June-July-August				September-October-November			
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0.046
		0	0	0.031	0.224	0	0	0.083	0.159
		0.152	0.185	0.480	0.987	0.213	0.274	0.453	0.644

05068000 SAND HILL RIVER AT BELTRAMI, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1943	April 5	--	179	1951	April 8	4.10	71
1944	August 12	--	30	1952	April 9	3.20	46
1945	April 12	3.88	53	1953	June 17	3.60	62
1946	March 28	--	42	1954	June 16	--	49
1947	June 12	5.20	167	1955	April 4	4.51	54
1948	April 13	--	75	1956	May 13	4.62	105
1949	June 2	5.00	163	1957	June 23	--	50
1950	April 19	5.97	291	1958	July 5	3.21	22
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 19	5.97	291	1955	April 4	4.51	54
1943	April 13	--	179	1945	April 12	3.88	53
1947	June 12	5.20	167	1957	June 23	--	50
1949	June 2	5.00	163	1954	June 16	--	49
1956	May 13	4.62	105	1952	April 9	3.20	46
1948	April 13	--	75	1946	March 28	--	42
1951	April 8	4.10	71	1944	August 12	--	30
1953	June 17	3.60	62	1958	July 5	3.21	22

05068000 SAND HILL RIVER AT BELTRAMI, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1943	--	--	--	--	--	--	17.1	17.3	16.0	4.66	2.87	1.38	--
1944	1.27	1.71	--	--	--	0.029	7.44	8.69	5.05	4.04	7.96	1.65	--
1945	3.77	1.98	1.43	0.600	0	12.9	21.8	9.75	6.36	1.78	2.31	3.38	5.52
1946	3.95	2.70	0.397	0	0	7.25	18.6	11.2	4.23	4.48	1.93	2.52	4.79
1947	5.32	2.47	1.19	0.877	0.804	1.99	43.1	23.8	30.4	3.86	1.83	0.800	9.67
1948	2.05	1.46	0.181	0.032	0	0.158	33.4	5.81	3.52	9.71	4.37	1.81	5.19
1949	1.77	2.29	0.597	0.029	0	0	20.6	18.8	18.1	22.7	3.22	0.383	7.41
1950	4.49	5.43	0.694	0.400	0.307	0.152	41.6	84.2	12.3	5.68	3.44	0.753	13.4
1951	3.40	2.47	1.10	0.700	0.600	0.500	32.4	11.1	4.38	0.890	1.81	2.26	5.11
1952	1.02	0.797	0.700	0.600	0.500	0.700	25.3	3.33	0.820	11.4	2.24	1.03	4.02
1953	1.61	2.85	1.06	0.158	0	4.71	13.7	7.13	11.3	3.28	2.77	0.480	4.09
1954	1.30	1.22	1.10	0.813	0.739	1.10	12.0	6.51	9.72	1.77	0.642	0.453	3.10
1955	0.655	0.933	0.432	0.081	0	0	11.7	3.70	8.93	1.72	0.216	0	2.35
1956	0.439	0.500	0.152	0	0	0.019	10.9	28.5	13.0	1.44	0.729	1.93	4.82
1957	0.071	0.660	0	0	0	0.997	1.77	0.394	3.62	0.229	0	0.440	0.677
1958	0.252	0.790	0	0	0.061	0.213	0.103	0.113	0.860	2.00	0	0	0.368

05068500 SAND HILL DITCH AT BELTRAMI, MN

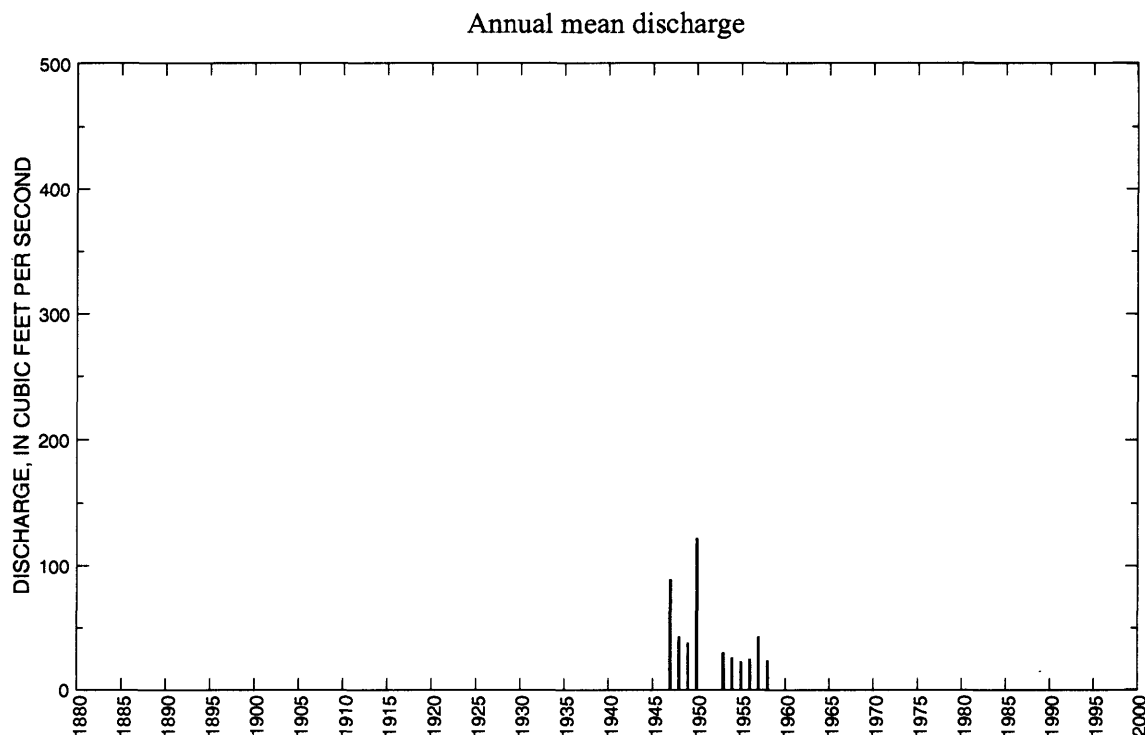
LOCATION.--Lat 47°32'10", long 96°32'00", in SE¹/₄NW¹/₄ sec.21, T.147 N., R.46 W., near center of span on downstream side of bridge on U.S. Highway 75, 150 ft upstream from Great Northern Railway bridge and 0.25 mi south of post office in Beltrami.

DRAINAGE AREA.--Not available.

PERIOD OF RECORD.--March 1943 to September 1958. Winter records incomplete some years. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Chain gage. Datum of gage is 883.50 ft above mean sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Aug. 26, 1944, reference point and Aug. 26, 1944, to Nov. 21, 1948, chain gage, at same site at datum 12.62 ft higher. Nov. 22, 1948, to Sept. 30, 1956, chain gage at same site at datum 10.00 ft higher.

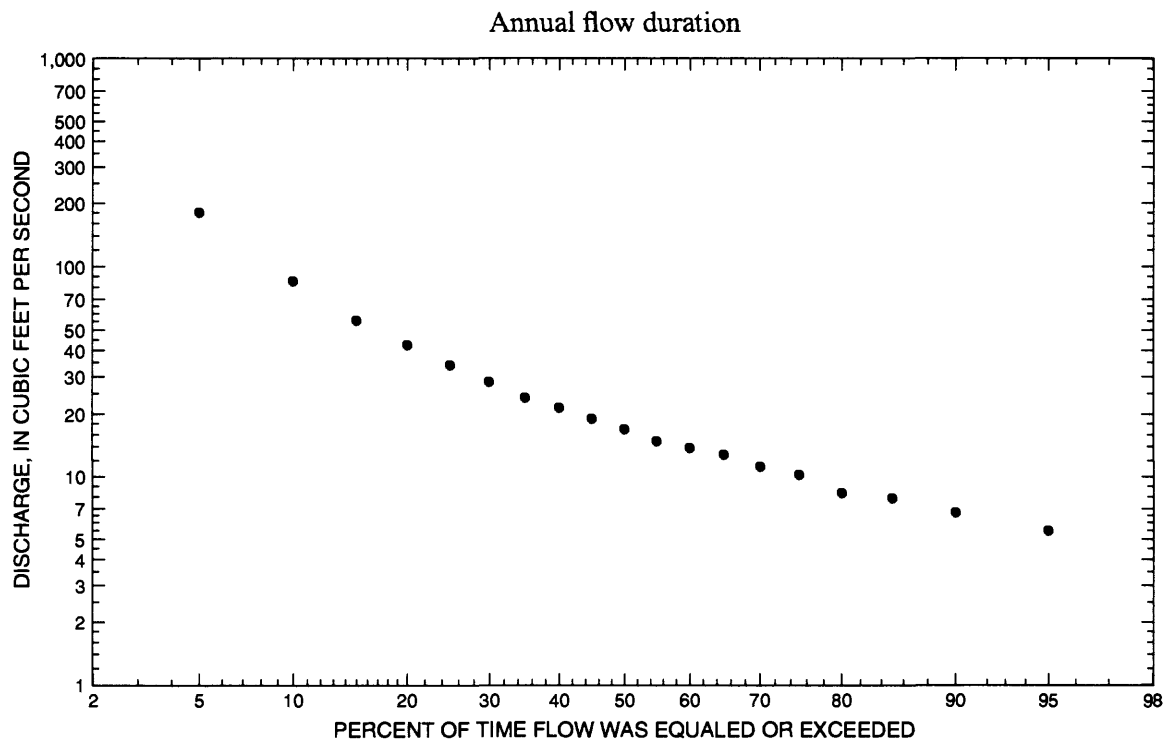
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,460 ft³/s, Apr. 20, 1950, gage height, 20.99 ft, present datum; maximum gage height, 21.59 ft, present datum, Apr. 19, 1950, from floodmark, backwater from ice; no flow at times.



05068500 SAND HILL DITCH AT BELTRAMI, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	53.4	1946	9.57	1955	21.9	12.3	0.56	3.79
November	41.7	1958	8.43	1956	21.0	9.32	0.44	3.63
December	25.0	1945	5.09	1956	13.1	5.16	0.39	2.27
January	14.0	1947	4.90	1948	8.58	2.94	0.34	1.48
February	14.4	1958	0.790	1948	8.32	4.01	0.48	1.44
March	150	1946	0	1944	37.6	48.8	1.30	6.49
April	493	1947	27.5	1958	196	144	0.74	33.8
May	588	1950	23.4	1958	98.9	136	1.37	17.1
June	222	1947	20.6	1952	76.0	62.0	0.82	13.1
July	178	1950	14.1	1951	51.6	42.8	0.83	8.91
August	113	1944	8.97	1955	25.8	25.2	0.97	4.46
September	52.3	1945	8.49	1954	20.4	16.0	0.79	3.52
Annual	122	1950	22.6	1955	46.2	33.2	0.72	100



05068500 SAND HILL DITCH AT BELTRAMI, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	4.80	0.78	0	12.0	22.5	17.4	12.2	7.10	7.10	8.20	8.80	5.00	5.48
90	5.00	0.99	0.80	22.5	25.7	20.4	14.7	7.90	8.40	10.2	12.2	7.70	6.71
85	5.60	4.80	3.80	32.0	27.8	22.2	16.4	9.24	9.10	11.4	13.4	9.00	7.82
80	6.30	4.80	3.80	45.1	30.4	24.6	18.6	10.2	10.3	12.6	14.3	10.2	8.35
75	7.00	5.40	6.82	51.2	33.1	27.5	21.7	11.3	11.3	13.3	15.0	10.6	10.2
70	7.00	6.10	7.31	60.2	36.0	31.6	24.1	12.4	11.9	14.0	16.1	11.0	11.2
65	7.00	6.80	8.32	73.2	39.3	34.3	26.3	13.6	12.5	15.4	17.2	11.3	12.8
60	7.40	6.80	10.6	89.3	43.6	37.8	28.7	15.4	13.2	17.6	18.0	11.6	13.8
55	7.80	7.70	11.2	102	49.6	41.4	32.2	17.1	13.9	18.7	18.5	12.0	14.9
50	7.80	7.70	11.9	116	55.6	44.9	36.0	19.1	14.8	19.6	19.0	12.5	16.9
45	7.80	7.70	13.2	136	61.7	48.1	39.3	21.5	15.9	20.5	19.7	13.0	18.9
40	8.70	7.70	14.8	164	68.2	53.1	42.8	23.4	16.7	22.0	20.3	13.4	21.4
35	8.70	9.23	16.9	197	75.3	61.3	48.6	25.4	17.5	23.1	20.7	13.9	23.9
30	10.3	9.88	19.2	225	84.6	69.3	54.0	28.2	18.4	24.2	21.6	14.7	28.4
25	10.8	10.3	21.6	254	94.7	81.8	58.5	31.2	20.2	25.7	23.6	15.9	34.1
20	10.3	12.1	24.8	288	109	106	65.4	33.1	24.5	30.2	28.4	17.0	42.3
15	7.75	13.3	39.2	337	133	135	77.7	34.9	36.5	35.4	33.8	18.4	55.6
10	5.17	14.2	101	451	178	183	94.5	42.7	46.1	43.8	39.6	23.0	85.7
5	2.58	14.7	226	657	324	252	155	61.1	62.3	48.3	43.6	25.5	181

05068500 SAND HILL DITCH AT BELTRAMI, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	68.8	50.1	51.8	46.2	34.6
0.95	1.05	124	92.9	87.0	71.0	49.5
0.90	1.11	168	129	116	90.7	61.7
0.80	1.25	243	192	164	124	82.9
0.50	2	478	408	328	235	160
0.20	5	918	866	673	476	351
0.10	10	1,280	1,280	992	706	559
0.04	25	1,800	1,950	1,510	1,100	958
0.02	50	2,250	2,550	2,000	1,480	1,390
0.01	100	2,730	3,240	2,570	1,940	1,970
0.005	200	3,250	4,040	3,250	2,510	2,760
0.002	500	4,010	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	1.09	1.09	1.11	1.18	1.23	1.71	3.10	5.34	7.62
0.10	10	1.86	1.87	1.92	2.07	2.18	2.76	4.07	6.05	8.18
0.20	5	3.16	3.19	3.31	3.58	3.80	4.42	5.46	7.05	9.02
0.50	2	6.25	6.34	6.59	7.12	7.59	8.17	8.65	9.41	11.3

05068500 SAND HILL DITCH AT BELTRAMI, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	1.14	1.14	1.20	1.32	0	0	0	0		
0.10	10	2.10	2.10	2.17	2.32	0.820	0.825	0.919	1.95		
0.20	5	3.80	3.80	3.88	4.06	3.08	3.10	3.41	4.91		
0.50	2	8.08	8.08	8.12	8.24	9.30	9.37	10.0	15.6		
		June-July-August				September-October-November					
		0.05	20	5.30	5.70	6.16	7.28	5.00	5.34	5.99	7.15
		0.10	10	6.50	7.00	7.51	8.94	5.89	6.28	6.95	8.11
		0.20	5	8.30	8.97	9.56	11.5	7.23	7.71	8.42	9.60
		0.50	2	13.1	14.4	15.3	18.5	10.9	11.8	12.6	14.0

05068500 SAND HILL DITCH AT BELTRAMI, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1943	April 5	--	741	1951	April 9	8.46	823
1944	August 15	--	226	1952	April 12	--	315
1945	April 1	--	344	1953	March 29	--	190
1946	March 25	--	564	1954	April 14	--	278
1947	April 16	7.57	1,220	1955	April 7	10.07	551
1948	April 11	7.20	1,050	1956	April 19	--	480
1949	June 2	--	425	1957	June 28	--	370
1950	April 20	--	2,460	1958	July 5	--	95
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 20	--	2,460	1949	June 2	--	425
1947	April 16	7.57	1,220	1957	June 28	--	370
1948	April 11	7.20	1,050	1945	April 1	--	344
1951	April 9	8.46	823	1952	April 12	--	315
1943	April 5	--	741	1954	April 14	--	278
1946	March 25	--	564	1944	August 15	--	226
1955	April 7	10.07	551	1953	March 29	--	190
1956	April 19	--	480	1958	July 5	--	95

05068500 SAND HILL DITCH AT BELTRAMI, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1943	--	--	--	--	--	--	213.0	93.7	208.7	54.5	31.0	16.0	--
1944	21.8	16.4	--	--	--	0	38.5	39.8	46.4	89.6	113.3	61.0	--
1945	42.4	37.6	25.0	--	--	129.2	244.2	126.1	88.1	44.0	30.8	52.3	--
1946	53.4	33.7	--	--	--	150.0	181.5	73.4	44.5	42.8	8.98	12.9	--
1947	27.8	21.0	13.0	14.0	14.0	15.0	492.8	159.2	222.0	47.2	30.0	19.0	89.1
1948	19.0	19.7	14.8	4.90	0.790	2.59	307.7	64.9	30.0	24.6	20.5	12.0	43.1
1949	12.3	16.7	13.4	8.11	8.04	13.1	133.4	43.7	120.7	51.5	27.6	10.9	38.2
1950	17.1	16.8	11.0	7.00	5.00	4.52	470.3	588.1	105.6	178.1	37.7	17.4	122.2
1951	24.9	18.6	--	--	--	--	360.6	110.1	38.6	14.1	11.8	20.6	--
1952	19.9	17.7	--	--	--	--	167.9	42.5	20.6	28.5	14.8	11.7	--
1953	14.9	18.0	11.7	6.69	7.51	57.5	59.4	45.9	58.1	40.9	22.8	14.9	30.0
1954	11.5	13.0	12.0	10.6	10.0	13.5	102.9	49.3	45.4	23.8	9.92	8.49	25.8
1955	9.57	14.5	9.45	8.00	8.43	17.0	118.8	28.8	26.0	14.4	8.97	8.97	22.6
1956	10.5	8.43	5.09	5.21	6.30	7.23	115.7	58.2	47.2	14.6	11.0	9.40	24.8
1957	15.1	21.8	10.5	9.15	8.73	53.7	97.7	34.9	88.2	111.4	22.9	39.5	42.9
1958	29.0	41.7	18.6	12.1	14.4	24.8	27.5	23.4	25.6	45.1	11.0	11.3	23.7

05069000 SAND HILL RIVER AT CLIMAX, MN

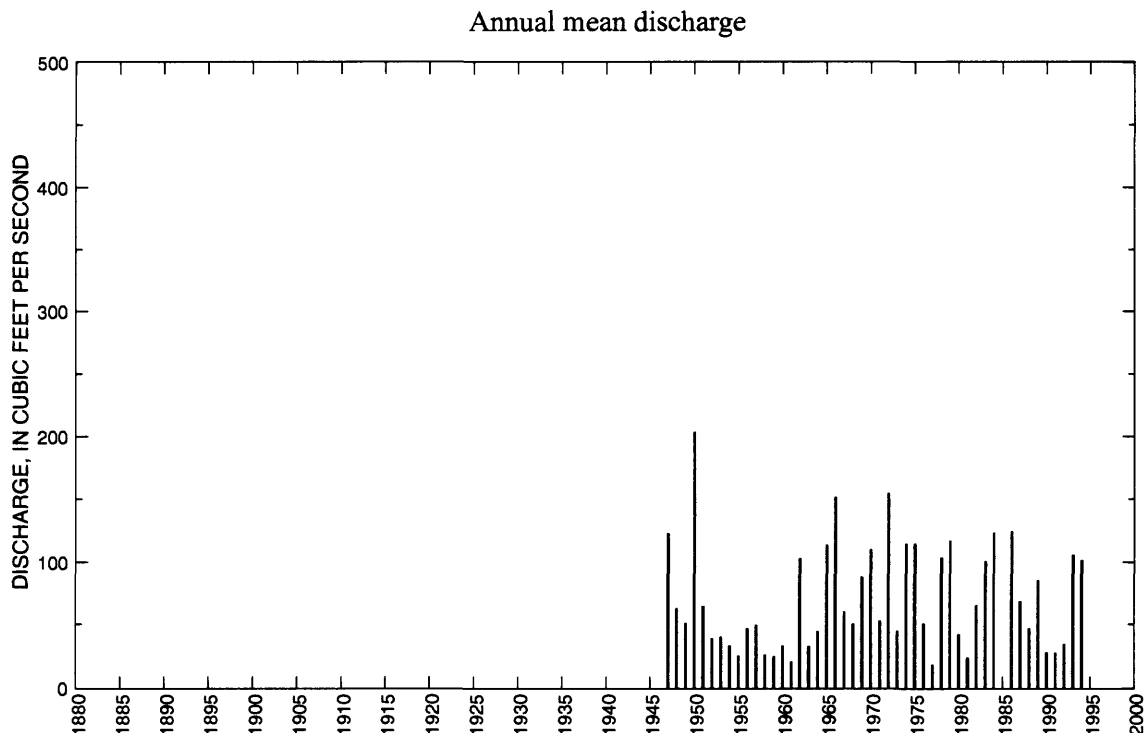
LOCATION.--Lat 47°36'43", long 96°48'52", in NE¹/₄NE¹/₄ sec.30, T.148 N., R.48 W., Polk County, Hydrologic Unit 09020301, on left bank 25 ft upstream from bridge on U.S. Highway 75 in Climax and 3.7 mi upstream from mouth.

DRAINAGE AREA.--426 mi².

PERIOD OF RECORD.--March 1943 to September 1984, June 1985 to current year. Winter records incomplete prior to 1947. Monthly discharge only for some periods, published in WSP 1308 and 1728. October 1984 to May 1985, operated as a high-flow partial-record station.

GAGE.--Water-stage recorder. Datum of gage is 820.10 ft above mean sea level (levels by U.S. Army Corps of Engineers). Prior to Oct. 1, 1966, nonrecording gage at site 3.2 mi upstream at datum 12.78 ft higher. Oct. 1, 1966, to Sept. 5, 1989, nonrecording gage at present site and datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,560 ft³/s, Apr. 14, 1965, gage height, 17.81 ft; maximum gage height, 32.79 ft, Apr. 23, 1979, from floodmark, backwater from Red River of the North; minimum daily discharge, 1.0 ft³/s, Jan. 17-18, 1962.



05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	4.40	4.90	6.32	24.0	24.3	15.4	10.0	6.62	6.50	9.36	10.1	5.80	6.36
90	4.90	5.40	8.02	33.4	29.6	19.7	13.3	7.72	7.40	10.8	11.4	7.10	8.48
85	6.10	6.10	8.63	43.6	32.9	23.0	15.1	8.78	9.35	11.8	12.5	8.60	10.1
80	6.70	6.80	10.2	52.5	35.8	25.6	16.6	10.4	10.3	12.7	13.6	10.1	11.3
75	7.50	7.60	11.4	61.3	39.0	28.8	18.2	11.3	11.6	13.5	14.7	10.7	12.9
70	8.60	7.60	12.6	72.8	42.4	32.4	20.2	12.6	12.5	14.5	15.8	11.3	14.1
65	10.1	9.48	13.6	86.0	46.7	36.6	22.4	13.8	13.5	15.6	16.8	11.9	15.4
60	10.9	10.3	14.6	99.8	51.4	40.1	25.4	15.1	14.6	17.6	18.3	12.7	17.1
55	11.5	11.4	16.4	122	57.6	43.5	29.2	16.6	15.7	19.4	19.9	14.0	19.1
50	12.0	12.0	18.7	147	66.2	48.0	33.2	18.2	17.1	21.1	21.5	14.8	21.2
45	12.6	12.5	20.7	176	74.4	52.7	37.3	20.1	18.5	22.2	23.4	15.7	24.3
40	13.2	13.0	23.8	215	82.7	59.9	41.7	22.6	20.0	23.7	25.4	16.6	27.5
35	14.0	13.6	28.7	266	93.5	67.5	47.2	25.4	21.8	25.9	27.1	17.9	31.9
30	14.9	14.2	36.3	322	107	75.6	54.8	28.6	24.2	28.8	28.9	19.8	38.1
25	15.8	14.8	50.2	385	124	88.0	64.8	32.6	28.2	32.3	30.8	22.3	46.9
20	17.4	16.0	71.7	479	150	110	77.4	38.0	36.0	37.5	33.2	24.6	60.5
15	18.8	17.4	103	622	179	145	102	46.7	46.2	50.9	36.5	26.7	84.4
10	21.1	18.7	190	857	231	213	152	62.2	61.1	67.7	44.1	30.3	132
5	25.9	23.2	377	1,400	332	333	255	120	84.5	95.0	52.8	35.7	285

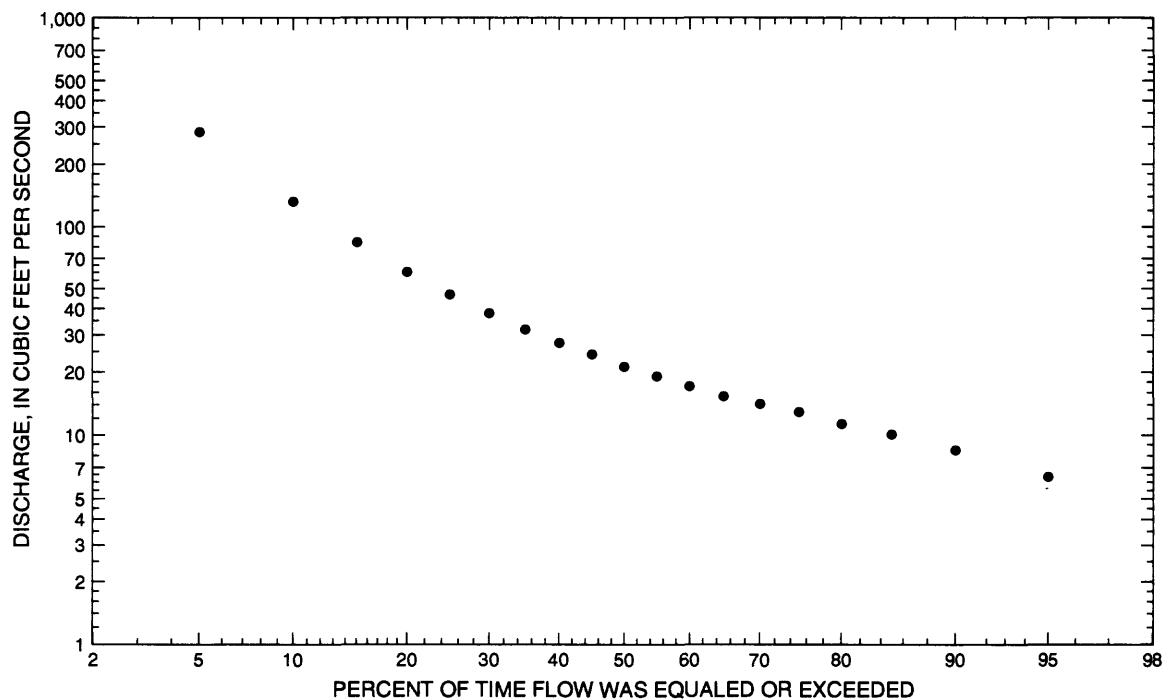
05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	224	1972	9.43	1977	31.7	34.9	1.10	3.67
November	209	1972	8.64	1956	27.1	28.4	1.05	3.14
December	48.7	1972	5.11	1964	16.9	9.18	0.54	1.96
January	30.1	1986	2.02	1962	12.4	5.96	0.48	1.44
February	46.8	1984	3.55	1962	12.2	6.80	0.56	1.42
March	385	1966	5.81	1948	74.2	91.8	1.24	8.60
April	946	1978	25.3	1981	343	285	0.83	39.7
May	1,160	1950	23.7	1958	117	163	1.39	13.6
June	596	1984	11.5	1980	95.6	105	1.10	11.1
July	376	1994	8.95	1980	67.5	75.8	1.12	7.82
August	426	1993	6.30	1961	38.2	67.3	1.76	4.42
September	124	1994	6.49	1955	27.1	25.2	0.93	3.14
Annual	204	1950	18.4	1977	71.3	43.1	0.60	100

Annual flow duration



05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	106	73.3	60.1	45.7	34.4
0.95	1.05	218	158	128	95.7	69.6
0.90	1.11	314	233	188	140	99.9
0.80	1.25	481	369	296	217	153
0.50	2	1,040	847	673	482	328
0.20	5	2,120	1,830	1,440	1,010	670
0.10	10	3,010	2,660	2,110	1,450	951
0.04	25	4,290	3,920	3,100	2,100	1,360
0.02	50	5,350	4,980	3,930	2,640	1,700
0.01	100	6,490	6,140	4,850	3,220	2,070
0.005	200	7,700	7,400	5,850	3,850	2,460
0.002	500	9,420	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	2.55	2.68	2.88	3.22	3.71	4.56	5.37	6.52	8.13
0.10	10	3.30	3.48	3.70	4.05	4.60	5.45	6.30	7.46	9.13
0.20	5	4.40	4.65	4.90	5.24	5.86	6.71	7.64	8.84	10.7
0.50	2	7.12	7.46	7.79	8.09	8.84	9.75	11.0	12.4	15.0

05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	2.80	3.01	3.34	3.77	5.01	5.69	6.08	7.22		
0.10	10	3.81	4.06	4.37	4.79	6.19	6.77	7.26	9.35		
0.20	5	5.34	5.64	5.89	6.28	7.88	8.36	9.04	13.0		
0.50	2	9.14	9.48	9.61	9.91	12.0	12.6	14.0	25.6		
		June-July-August				September-October-November					
		0.05	20	4.67	5.57	6.10	7.57	4.83	5.64	6.42	7.34
		0.10	10	5.57	6.50	7.14	8.75	5.67	6.61	7.42	8.52
		0.20	5	7.00	7.99	8.80	10.7	6.97	8.10	8.96	10.3
		0.50	2	11.3	12.6	14.0	17.1	10.7	12.3	13.4	15.6

05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1943	April 7	10.48	941	1969	April 14	24.57	4,180
1944	August 18	--	226	1970	April 16	13.64	1,980
1945	April 11	9.18	767	1971	April 8	13.60	1,460
1946	March 27	--	675	1972	April 13	14.03	2,160
1947	April 19	13.28	1,840	1973	March 17	11.25	897
1948	April 14	--	1,640	1974	April 16	15.87	1,890
1949	June 1	10.40	990	1975	April 20	19.24	2,550
1950	April 22	16.31	3,040	1976	April 2	13.60	1,390
1951	April 11	11.90	1,250	1977	May 31	--	298
1952	April 12	9.52	544	1978	April 10	27.21	3,060
1953	March 29	--	219	1979	April 20	--	3,400
1954	June 15	--	489	1980	April 5	10.10	879
1955	April 8	10.35	842	1981	May 24	7.20	362
1956	April 20	10.72	1,370	1982	April 15	10.00	820
1957	June 29	7.06	481	1983	June 14	11.00	1,230
1958	July 5	--	168	1984	June 9	15.60	2,850
1959	April 2	7.64	310	1985	August 17	10.50	974
1960	April 6	8.80	460	1986	March 29	16.21	2,000
1961	March 25	4.86	140	1987	July 29	7.95	492
1962	July 8	11.70	1,570	1988	March 5	8.94	610
1963	April 7	6.34	300	1989	March 10	25.00	2,430
1964	April 17	9.40	730	1990	June 2	7.52	405
1965	April 14	17.81	4,560	1991	May 23	8.71	613
1966	April 2	17.33	4,220	1992	August 25	--	312
1967	March 30	14.46	2,060	1993	August 3	16.13	1,320
1968	June 7	12.71	1,400	1994	July 8	12.67	1,660
Annual peak discharge, from highest to lowest, and corresponding gage height							
1965	April 14	17.81	4,560	1962	July 8	11.70	1,570
1966	April 2	17.33	4,220	1971	April 8	13.60	1,460
1969	April 14	24.57	4,180	1968	June 7	12.71	1,400
1979	April 20	--	3,400	1976	April 2	13.60	1,390
1978	April 10	27.21	3,060	1956	April 20	10.72	1,370
1950	April 22	16.31	3,040	1993	August 3	16.13	1,320
1984	June 9	15.60	2,850	1951	April 11	11.90	1,250
1975	April 20	19.24	2,550	1983	June 14	11.00	1,230
1989	March 10	25.00	2,430	1949	June 1	10.40	990
1972	April 13	14.03	2,160	1985	August 17	10.50	974
1967	March 30	14.46	2,060	1943	April 7	10.48	941
1986	March 29	16.27	2,000	1973	March 17	11.25	897
1970	April 16	13.64	1,980	1980	April 5	10.10	879
1974	April 16	15.87	1,890	1955	April 8	10.35	842
1947	April 19	13.28	1,840	1982	April 15	10.00	820
1994	July 8	12.67	1,660	1945	April 11	9.18	767
1948	April 14	--	1,640	1964	April 17	9.40	730

05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

Annual peak discharge and corresponding gage height—Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height—Continued							
1946	March 27	--	675	1981	May 24	7.20	362
1991	May 23	8.71	613	1992	August 25	--	312
1988	March 5	8.94	610	1959	April 2	7.64	310
1952	April 12	9.52	544	1963	April 7	6.34	300
1987	July 29	7.95	492	1977	May 31	--	298
1954	June 15	--	489	1944	August 18	--	226
1957	June 29	7.06	481	1953	March 29	--	219
1960	April 6	8.80	460	1958	July 5	--	168
1990	June 2	7.52	405	1961	March 25	4.86	140

05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1943	--	--	--	--	--	--	307.4	117.5	234.9	66.2	33.4	19.5	--
1944	18.4	17.1	--	--	--	--	63.8	58.7	58.3	98.0	125.3	72.6	--
1945	46.2	46.5	26.1	--	--	181.0	294.9	145.0	97.5	41.7	30.5	45.4	--
1946	57.6	34.4	--	--	--	145.3	225.2	74.6	42.4	32.3	12.9	18.7	--
1947	35.8	24.4	13.6	12.7	13.0	24.0	687.1	191.9	368.6	65.4	30.3	19.4	123.1
1948	19.3	18.6	11.3	8.74	6.45	5.81	511.0	75.9	34.7	33.8	22.3	12.7	62.8
1949	12.5	16.9	13.5	9.08	8.95	14.5	171.9	60.4	196.6	69.2	28.9	12.9	51.1
1950	24.0	27.5	18.0	11.0	7.00	9.90	818.5	115.6	115.4	181.3	43.1	18.4	203.7
1951	32.5	21.8	16.0	14.0	12.0	10.8	428.7	131.5	44.6	20.3	18.4	25.6	64.4
1952	21.1	20.7	14.0	12.0	11.0	15.0	221.9	46.8	21.5	52.9	18.6	14.6	39.0
1953	18.8	20.7	13.3	7.90	10.8	68.4	99.2	65.9	80.3	49.7	28.6	16.3	40.1
1954	12.5	13.5	10.9	5.29	6.44	20.1	144.1	57.0	81.6	29.3	10.9	7.99	33.2
1955	10.8	12.9	8.32	6.81	7.36	7.42	150.2	31.5	34.4	15.6	12.4	6.49	25.2
1956	10.4	8.64	6.13	5.23	5.41	7.42	316.7	105.3	60.1	16.0	11.5	11.5	46.7
1957	13.6	20.4	10.4	8.52	7.54	48.6	120.3	41.1	118.6	130.5	23.6	52.0	49.6
1958	31.4	43.0	17.4	13.9	12.4	22.2	30.7	23.7	25.6	62.9	17.9	11.3	26.1
1959	12.9	17.5	7.24	4.81	3.84	36.9	78.6	68.2	27.5	16.5	14.3	7.89	24.8
1960	18.7	11.8	12.2	12.0	9.78	16.3	162.1	39.3	47.0	41.6	16.1	14.5	33.3
1961	11.8	16.2	8.38	6.71	7.28	64.3	52.8	41.7	13.3	10.2	6.30	9.83	20.8
1962	17.2	12.5	6.58	2.02	3.55	6.21	253.7	232.5	292.6	298.0	60.1	46.8	102.9
1963	36.0	32.4	17.4	9.25	4.94	37.4	94.4	47.2	57.5	33.4	12.1	10.6	32.8
1964	10.8	8.88	5.11	6.60	9.59	11.8	226.2	88.8	48.3	68.1	17.6	34.5	44.5
1965	24.8	19.6	11.5	10.8	8.34	10.6	916.7	135.5	126.0	54.9	25.4	30.7	113.7
1966	71.6	32.3	32.7	18.1	16.2	384.6	934.6	191.7	67.7	25.2	27.7	21.9	151.9
1967	18.9	12.3	10.5	12.5	14.3	90.0	340.9	102.4	73.0	26.5	12.7	12.1	60.3
1968	13.4	12.9	13.0	10.2	7.96	100.8	67.9	37.6	269.3	48.5	15.0	12.2	50.5
1969	21.0	19.4	12.6	4.70	5.64	7.50	669.0	129.7	103.2	50.0	15.0	24.8	88.4
1970	30.5	19.7	16.3	13.0	11.1	12.7	751.3	241.2	165.3	37.5	16.8	13.3	110.2
1971	25.0	30.4	11.3	11.6	12.5	43.3	345.1	61.3	36.5	17.3	10.5	33.2	52.8
1972	223.5	209.3	48.7	25.8	19.1	318.5	716.6	169.5	49.2	29.0	33.4	17.4	154.7
1973	22.5	32.7	12.7	11.0	12.2	228.1	51.1	37.5	22.5	12.2	12.6	80.3	44.9
1974	95.0	45.6	23.3	18.7	18.0	19.0	711.5	300.4	87.5	19.4	24.6	18.6	114.8
1975	18.5	33.9	17.0	11.9	13.7	23.5	756.1	220.8	48.9	182.3	35.3	18.6	114.8
1976	22.9	27.1	19.2	15.9	15.1	83.8	316.8	41.3	33.3	19.5	10.7	7.34	50.8
1977	9.43	10.2	8.91	7.86	8.18	18.9	51.6	32.6	40.6	10.9	6.96	15.4	18.4

05069000 SAND HILL RIVER AT CLIMAX, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1978	21.1	26.3	27.9	18.3	13.2	37.2	946.0	63.4	53.5	21.6	15.3	17.2	104.1
1979	13.6	14.8	13.3	12.1	12.9	17.2	868.9	160.5	71.1	166.0	45.2	17.8	117.3
1980	18.0	28.1	24.0	19.2	21.3	42.9	280.0	33.5	11.5	8.95	10.2	11.1	42.1
1981	15.4	15.3	9.56	8.05	12.2	32.8	25.3	50.7	38.8	24.3	17.1	34.5	23.7
1982	59.5	35.4	22.3	12.1	10.3	49.9	347.5	144.4	35.7	42.4	12.7	10.2	65.2
1983	81.8	27.5	26.9	19.2	19.0	333.9	181.4	54.7	228.1	113.2	49.4	72.0	101.0
1984	70.2	49.9	35.9	26.8	46.8	201.5	336.8	55.5	595.8	44.6	17.0	11.8	123.5
1985	--	--	--	--	--	--	--	--	168.3	181.3	256.2	93.9	--
1986	88.1	47.0	38.1	30.1	22.9	217.4	579.4	269.1	69.5	82.9	26.8	21.2	124.6
1987	24.0	28.1	22.4	17.2	16.1	185.2	80.1	110.1	60.1	138.3	104.2	27.8	68.4
1988	26.5	27.2	24.5	20.3	16.4	126.4	209.1	37.1	36.4	13.8	9.88	14.0	46.7
1989	13.2	17.0	15.0	13.8	11.2	14.2	776.6	79.7	40.8	28.4	12.2	14.4	85.6
1990	14.9	14.5	7.08	8.58	11.3	59.7	88.6	39.3	58.9	16.8	8.05	7.73	27.9
1991	9.99	12.1	10.3	6.27	10.9	51.0	48.9	97.1	30.8	31.2	9.78	10.1	27.5
1992	12.9	10.7	10.0	10.5	14.1	80.2	53.9	36.3	20.4	28.3	53.3	84.9	34.6
1993	22.0	27.2	23.6	14.2	12.1	39.4	338.5	46.2	50.8	224.9	426.1	41.2	106.2
1994	22.7	21.6	25.2	17.4	14.0	52.5	221.7	105.3	175.0	375.5	63.7	123.6	101.9

05074500 RED LAKE RIVER NEAR RED LAKE, MN

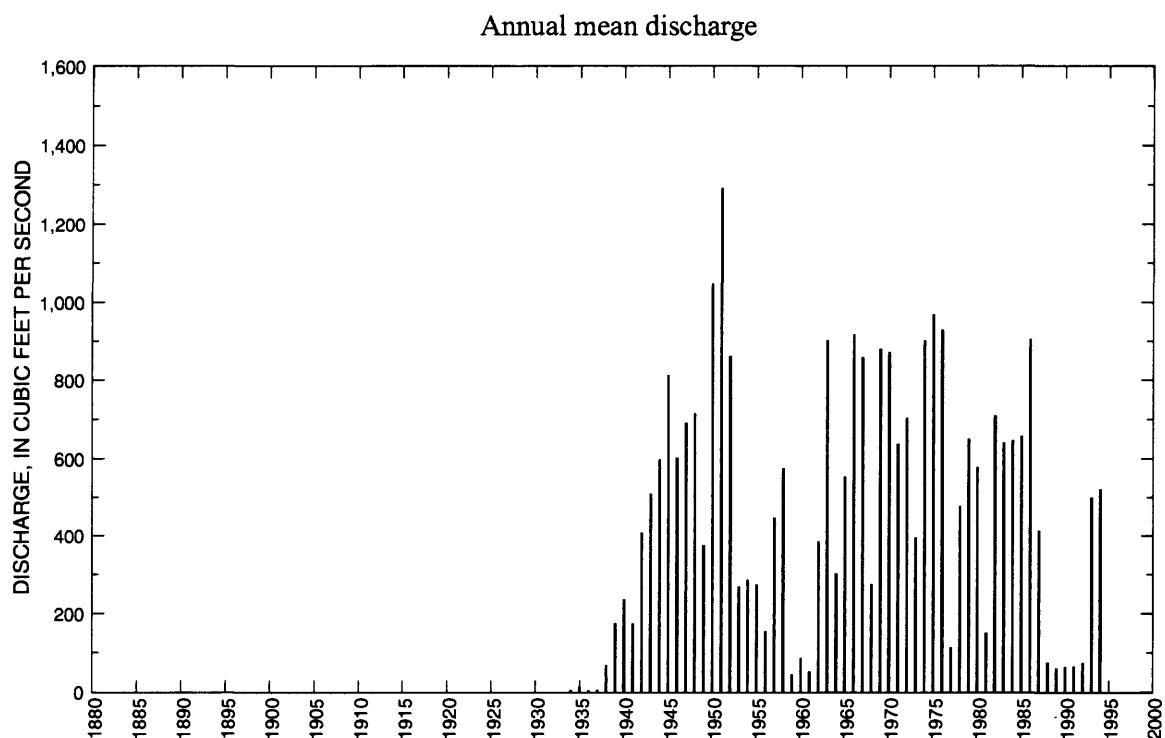
LOCATION.--Lat 47°57'27", long 95°16'35", in SW¹/₄NW¹/₄ sec.28, T.152 N., R.36 W., Clearwater County, Hydrologic Unit 09020302, on Red Lake Indian Reservation, on left bank 50 ft downstream from dam at outlet of Lower Red Lake and 13 mi northwest of city of Red Lake.

DRAINAGE AREA.--1,950 mi², approximately.

PERIOD OF RECORD.--May 1933 to September 1994. Monthly discharge only for May 1933, published WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,100.00 ft, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Sept. 7, 1934, nonrecording gage at site 50 ft upstream at datum 69.00 ft higher. Sept. 7, 1934, to Nov. 26, 1951, water-stage recorder at present site at datum 69.00 ft higher. Nov. 27, 1951, to Sept. 30, 1986, water-stage recorder at present site at datum 67.00 ft higher.

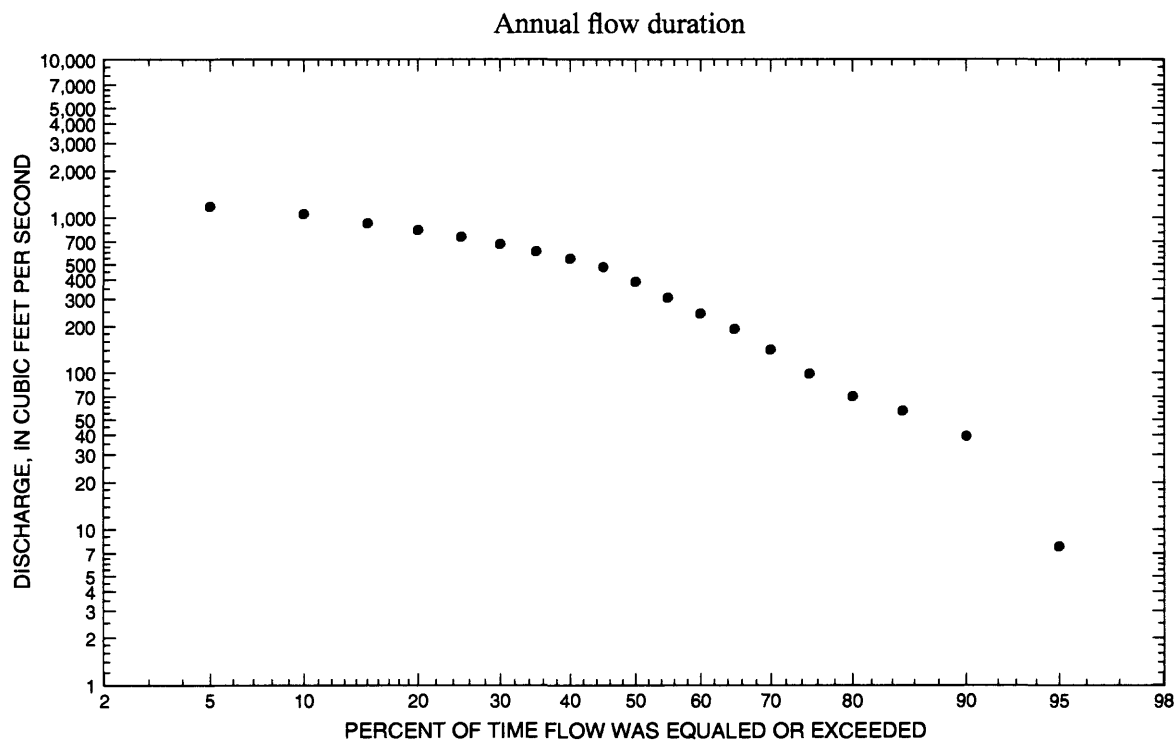
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,600 ft³/s, June 25, 1950, gage height, 78.19 ft; no flow at times.



05074500 RED LAKE RIVER NEAR RED LAKE, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	2,070	1951	5.10	1934	471	439	0.93	8.43
November	1,650	1951	3.57	1934	456	368	0.81	8.16
December	1,500	1951	0.952	1934	453	339	0.75	8.11
January	1,420	1951	0.355	1934	466	356	0.76	8.35
February	1,340	1951	0.400	1934	461	351	0.76	8.26
March	1,400	1951	0.597	1936	423	326	0.77	7.58
April	1,200	1951	4.00	1936	332	299	0.90	5.95
May	1,620	1950	0.603	1933	483	442	0.92	8.65
June	2,020	1950	2.15	1933	571	481	0.84	10.2
July	1,840	1950	4.63	1934	534	432	0.81	9.57
August	1,460	1975	2.73	1936	469	388	0.83	8.40
September	1,710	1950	1.61	1934	464	413	0.89	8.31
Annual	1,290	1951	5.55	1936	469	330	0.70	100



05074500 RED LAKE RIVER NEAR RED LAKE, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	3.42	2.90	3.40	11.6	3.81	4.05	13.4	6.11	6.00	8.85	8.98	6.66	7.77
90	45.0	47.6	42.9	29.5	17.2	22.5	41.3	34.4	28.7	52.1	54.1	43.0	39.3
85	54.4	59.3	60.6	39.9	33.3	49.2	60.0	56.4	54.8	62.3	63.5	57.3	57.3
80	66.9	66.7	70.6	54.4	52.5	70.7	76.7	76.8	68.0	85.4	80.4	69.8	70.5
75	115	127	102	65.3	63.7	85.6	120	101	90.1	122	136	128	98.6
70	163	168	135	75.4	73.2	132	168	136	136	153	163	168	142
65	211	218	180	104	111	220	216	194	176	186	201	225	193
60	298	296	244	123	197	298	271	247	235	220	251	284	244
55	390	374	327	163	294	372	342	319	274	260	325	347	308
50	491	451	380	211	382	476	444	402	348	306	390	462	389
45	541	523	430	263	473	604	567	468	412	360	468	502	482
40	590	575	487	317	537	744	665	542	474	455	523	542	547
35	640	628	545	406	598	833	742	622	564	553	566	601	611
30	688	680	616	512	676	894	809	699	681	647	608	687	679
25	738	732	686	569	859	956	875	772	796	783	694	753	756
20	786	785	749	622	959	1,020	950	845	881	878	795	801	834
15	836	843	812	704	1,050	1,130	1,050	938	966	964	896	849	927
10	941	940	875	842	1,130	1,250	1,150	1,060	1,100	1,090	1,020	898	1,060
5	1,050	1,040	1,050	1,020	1,310	1,460	1,360	1,180	1,250	1,340	1,190	1,010	1,190

05074500 RED LAKE RIVER NEAR RED LAKE, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	24.3	16.7	15.0	13.3	10.5
0.95	1.05	76.7	65.1	60.0	55.5	47.6
0.90	1.11	133	122	114	107	95.4
0.80	1.25	247	240	228	217	200
0.50	2	685	683	662	646	620
0.20	5	1,560	1,440	1,420	1,400	1,360
0.10	10	2,240	1,920	1,910	1,880	1,830
0.04	25	3,120	2,430	2,440	2,400	2,320
0.02	50	3,770	2,740	2,770	2,710	2,600
0.01	100	4,400	3,000	3,030	2,970	2,830
0.005	200	5,000	3,210	3,250	3,180	3,010
0.002	500	5,740	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0.700	0.773	¹ 1.35	1.95	3.66	4.97	8.27	10.3	14.2
0.10	10	3.46	3.96	¹ 4.90	5.93	9.89	12.9	20.1	24.5	31.2
0.20	5	11.5	13.3	14.9	18.8	28.0	35.8	51.4	61.4	72.3
0.50	2	59.6	67.9	91.8	98.0	129	165	210	241	265

¹Graphical interpretation.

05074500 RED LAKE RIVER NEAR RED LAKE, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	5.64	6.15	6.42	6.75	1.83	¹ 1.90	2.77	4.17		
0.10	10	20.0	21.2	21.8	22.7	5.87	5.91	8.48	12.0		
0.20	5	69.6	72.2	73.7	76.2	18.3	22.0	27.2	36.2		
0.50	2	342	354	361	374	94.9	134	147	182		
		June-July-August				September-October-November					
		0.05	20	1.81	2.62	4.18	9.11	1.12	3.86	5.96	10.1
		0.10	10	5.92	8.70	12.8	23.4	7.01	12.7	16.1	23.5
		0.20	5	20.7	30.3	41.2	63.0	27.0	39.9	45.9	58.2
		0.50	2	137	185	222	274	153	194	217	238

¹Graphical interpretation.

05074500 RED LAKE RIVER NEAR RED LAKE, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1933	July 4	72.02	46.0	1964	October 23	--	1,030
1934	May 1	71.52	57.0	1965	July 22	--	848
1935	June 13	72.02	140	1966	May 19	--	1,480
1936	September 14	--	52.0	1967	July 2	--	1,240
1937	September 30	72.14	61.0	1968	July 16	--	705
1938	July 5	74.80	317	1969	June 5	--	1,200
1939	June 16	74.76	432	1970	October 20	--	1,190
1940	June 2	75.18	534	1971	June 19	--	889
1941	June 7	--	449	1972	May 17	--	1,220
1942	May 13	75.58	926	1973	October 21	--	808
1943	June 3	--	1,510	1974	July 10	--	1,440
1944	June 17	--	1,420	1975	July 31	75.02	1,680
1945	June 1	76.27	1,650	1976	October 14	73.06	1,560
1946	May 31	75.81	1,400	1977	October 1	70.30	252
1947	June 10	76.41	1,960	1978	July 5	72.88	996
1948	May 23	--	1,210	1979	July 3	72.21	1,260
1949	April 24	--	561	1980	November 29	71.97	742
1950	June 25	78.19	3,600	1981	August 31	71.46	461
1951	October 6	75.57	2,320	1982	July 4	72.94	1,170
1952	May 18	72.97	1,610	1983	October 14	72.23	961
1953	June 15	70.97	492	1984	July 13	73.28	1,100
1954	June 29	--	725	1985	May 31	72.41	1,200
1955	April 5	--	384	1986	May 28	72.59	1,470
1956	October 12	69.53	252	1987	October 3	72.45	940
1957	July 20	--	1,870	1988	August 23	69.54	108
1958	October 1	73.10	1,360	1989	July 20	70.44	72.0
1959	November 18	--	68.0	1990	July 3	--	72.0
1960	November 19	--	162	1991	June 26	70.19	76.0
1961	June 24	--	240	1992	September 19	--	225
1962	August 23	--	1,260	1993	August 30	73.81	955
1963	October 5	--	1,250	1994	June 28	--	1,040
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	June 25	78.19	3,600	1944	June 17	--	1,420
1951	October 6	75.57	2,320	1946	May 31	75.81	1,400
1947	June 10	76.41	1,960	1958	October 1	73.10	1,360
1957	July 20	--	1,870	1962	August 23	--	1,260
1975	July 31	75.02	1,680	1979	July 3	72.21	1,260
1945	June 1	76.27	1,650	1963	October 5	--	1,250
1952	May 18	72.97	1,610	1967	July 2	--	1,240
1976	October 14	73.06	1,560	1972	May 17	--	1,220
1943	June 3	--	1,510	1948	May 23	--	1,210
1966	May 19	--	1,480	1969	June 5	--	1,200
1986	May 28	72.59	1,470	1985	May 31	72.41	1,200
1974	July 10	--	1,440	1970	October 20	--	1,190

05074500 RED LAKE RIVER NEAR RED LAKE, MN--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1982	July 4	72.94	1,170	1941	June 7	--	449
1984	July 13	73.28	1,100	1939	June 16	74.76	432
1994	June 28	--	1,040	1955	April 5	--	384
1964	October 23	--	1,030	1938	July 5	74.80	317
1978	July 5	72.88	996	1956	October 12	69.53	252
1983	October 14	72.23	961	1977	October 1	70.30	252
1993	August 30	73.81	955	1961	June 24	--	240
1987	October 3	72.45	940	1992	September 19	--	225
1942	May 13	75.58	926	1960	November 19	--	162
1971	June 19	--	889	1935	June 13	72.02	140
1965	July 22	--	848	1988	August 23	69.54	108
1973	October 21	--	808	1991	June 26	70.19	76.0
1980	November 29	71.97	742	1989	July 20	70.44	72.0
1954	June 29	--	725	1990	July 3	--	72.0
1968	July 16	--	705	1959	November 18	--	68.0
1949	April 24	--	561	1937	September 30	72.14	61.0
1940	June 2	75.18	534	1934	May 1	71.52	57.0
1953	June 15	70.97	492	1936	September 14	--	52.0
1981	August 31	71.46	461	1933	July 4	72.02	46.0

05074500 RED LAKE RIVER NEAR RED LAKE, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1933	--	--	--	--	--	--	--	--	2.15	20.5	8.83	5.63	--
1934	5.10	3.57	0.952	0.355	0.400	1.19	25.0	26.7	6.00	4.63	1.61	1.61	6.61
1935	6.56	11.1	7.98	3.19	3.83	4.89	25.9	41.5	29.1	11.7	6.26	8.99	13.4
1936	8.47	7.87	5.48	2.46	1.08	0.597	4.00	0.842	11.2	13.2	2.73	8.70	5.55
1937	8.23	7.42	4.55	2.78	0.979	0.626	14.1	2.92	3.47	10.1	5.88	7.14	5.69
1938	28.7	45.8	41.7	41.0	43.9	33.3	9.89	13.3	124.4	186.5	124.1	124.9	68.2
1939	139.1	148.2	148.7	128.7	134.3	168.5	220.5	273.9	260.5	202.3	124.3	165.0	176.3
1940	206.1	218.3	210.8	190.0	202.8	222.6	285.0	403.9	388.0	262.4	118.9	134.8	236.9
1941	176.7	191.9	199.0	218.7	207.9	213.5	47.1	92.6	140.3	214.4	231.9	162.0	174.8
1942	358.9	496.8	479.4	469.7	484.3	498.1	538.8	620.3	523.0	150.9	128.6	165.5	408.7
1943	261.0	314.7	328.4	352.3	365.7	401.9	465.3	656.6	920.4	784.3	673.5	591.5	510.1
1944	636.4	599.0	545.2	551.0	544.1	526.1	512.3	578.9	792.2	624.8	553.9	738.2	599.8
1945	737.0	822.4	823.5	776.8	751.8	755.8	1,064	1,142	1,009	760.8	573.1	542.1	813.2
1946	578.5	574.5	601.3	583.1	536.3	553.3	826.1	912.5	786.2	636.0	376.8	264.6	602.9
1947	398.0	452.6	474.8	451.6	405.7	407.1	622.9	1,030	1,373	1,103	791.2	785.8	692.3
1948	840.9	738.0	783.2	723.1	643.9	662.3	807.9	1,029	875.6	647.3	454.0	384.0	716.3
1949	344.3	308.2	273.5	265.8	262.9	405.4	513.5	494.5	436.9	357.1	405.0	435.5	375.6
1950	554.2	531.3	546.8	521.0	532.1	564.5	741.5	1,624	2,025	1,840	1,358	1,712	1,048
1951	2,071	1,649	1,498	1,418	1,342	1,396	1,199	1,569	1,484	1,014	409.8	440.5	1,292
1952	448.6	578.9	803.4	1,037	1,026	969.3	693.2	1,261	1,410	1,081	546.6	489.8	862.0
1953	349.6	267.3	308.2	312.8	327.5	264.8	81.5	162.0	288.1	287.5	300.3	272.7	268.5
1954	232.3	189.6	205.6	202.2	208.4	196.1	209.7	318.0	512.0	556.6	337.5	267.3	286.8
1955	250.0	328.5	328.4	312.5	305.4	341.9	250.8	243.7	233.7	243.0	236.7	219.5	274.4
1956	180.2	145.3	145.3	143.0	146.4	145.5	151.6	135.7	164.5	186.1	170.5	153.9	155.7
1957	221.6	229.4	209.2	170.0	158.7	262.5	24.9	9.90	314.9	1,464	1,178	1,094	447.4
1958	1,265	1,083	547.5	739.2	662.1	844.9	629.9	277.2	308.2	340.9	171.9	46.8	576.3
1959	46.0	44.3	44.1	49.1	46.4	50.3	42.7	38.0	37.7	45.8	50.4	37.3	44.4
1960	153.4	160.4	147.6	118.3	116.2	112.5	104.2	32.4	18.2	24.1	31.3	14.9	86.1
1961	101.9	111.0	35.0	35.0	35.0	35.0	34.4	22.1	46.3	47.7	38.0	84.8	52.1
1962	114.5	86.2	56.0	56.0	56.0	55.9	49.1	48.9	658.2	1,070	1,154	1,202	385.2
1963	1,237	1,102	860.3	906.1	876.2	772.7	917.3	1,012	1,022	671.3	633.4	823.3	902.4
1964	940.3	525.9	538.8	517.8	460.2	252.6	82.4	30.7	37.5	91.7	90.6	55.7	302.5
1965	234.2	526.9	545.3	582.4	622.5	635.2	292.8	365.7	471.8	783.1	769.8	819.3	553.8
1966	867.3	957.8	993.9	987.1	937.5	540.4	283.2	1,284	1,157	1,007	930.1	1,061	917.5
1967	1,035	940.3	933.2	904.5	988.6	925.6	515.4	707.5	961.3	963.6	695.0	735.9	858.6

05074500 RED LAKE RIVER NEAR RED LAKE, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1968	360.7	324.1	227.1	212.3	201.4	117.3	32.6	13.0	212.8	556.1	534.9	503.6	275.1
1969	431.7	566.2	926.7	1,069	1,157	1,115	387.2	1,001	1,142	955.8	811.4	1,008	879.9
1970	1,136	1,114	908.0	902.9	860.5	821.5	300.8	903.1	1,024	872.5	778.4	826.6	871.4
1971	665.3	608.3	656.9	627.7	736.4	797.7	467.5	760.3	864.1	662.2	528.9	280.7	638.1
1972	176.7	369.2	713.5	811.2	828.0	696.9	445.5	866.5	951.9	707.9	951.9	940.1	704.6
1973	795.0	563.6	488.5	518.7	523.4	325.8	140.2	315.9	267.0	176.8	200.0	431.5	395.0
1974	776.5	1,026	807.1	809.7	846.4	766.2	379.2	849.2	957.1	1,282	1,061	1,255	901.7
1975	1,327	1,053	855.4	767.7	713.0	639.4	391.6	763.7	1,354	803.0	1,464	1,475	968.2
1976	1,463	1,100	683.4	1,033	1,012	803.8	821.4	1,030	939.8	854.5	856.9	552.4	929.4
1977	178.5	162.9	126.1	121.5	122.1	123.7	104.7	75.4	81.8	108.5	82.7	78.6	113.9
1978	219.6	283.8	449.9	490.5	498.3	501.8	256.3	520.0	821.4	859.0	506.2	322.5	477.9
1979	354.2	393.1	400.0	397.3	391.8	391.5	293.3	922.3	1,126	1,033	1,051	1,039	650.8
1980	887.1	663.3	846.7	833.3	828.4	809.5	566.8	529.0	574.4	218.4	111.0	94.6	580.0
1981	71.3	67.8	57.5	54.0	57.3	70.6	55.4	62.9	100.1	376.4	428.3	405.0	151.2
1982	646.6	644.6	632.8	651.3	668.6	645.9	106.9	714.0	956.3	987.2	977.6	878.6	710.2
1983	902.7	747.3	750.0	884.1	746.9	297.2	541.4	611.0	638.3	622.1	523.9	428.3	640.8
1984	233.1	764.3	802.2	786.1	786.9	660.5	521.3	449.7	428.6	1,014	790.9	535.1	647.9
1985	187.4	439.7	757.4	804.8	800.0	615.7	323.6	701.1	940.9	835.5	751.4	752.9	658.5
1986	905.5	827.5	766.8	786.8	776.1	738.5	888.9	1,077	1,225	996.8	945.3	924.5	905.3
1987	603.6	600.4	663.2	663.2	669.6	460.5	194.7	170.3	285.0	186.5	239.9	247.7	414.2
1988	94.5	81.2	65.0	65.0	65.0	65.0	65.9	63.4	86.5	90.3	91.7	71.6	75.5
1989	55.7	54.2	55.2	56.0	56.0	56.1	58.2	61.0	67.5	70.1	68.5	63.7	60.2
1990	62.9	62.0	62.0	62.0	62.5	63.5	65.1	65.4	66.8	68.9	63.5	60.5	63.8
1991	63.0	61.0	61.5	62.1	62.9	63.7	64.7	68.0	67.4	69.6	68.1	66.2	64.9
1992	75.5	72.6	69.5	69.0	66.7	72.1	74.0	74.3	65.2	55.6	60.9	130.4	73.7
1993	187.8	203.6	526.1	501.8	497.0	488.9	290.1	548.5	783.8	625.2	762.1	597.1	501.4
1994	815.0	535.7	587.5	619.8	643.1	390.9	154.2	254.4	521.9	340.3	673.4	739.9	522.4

05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN

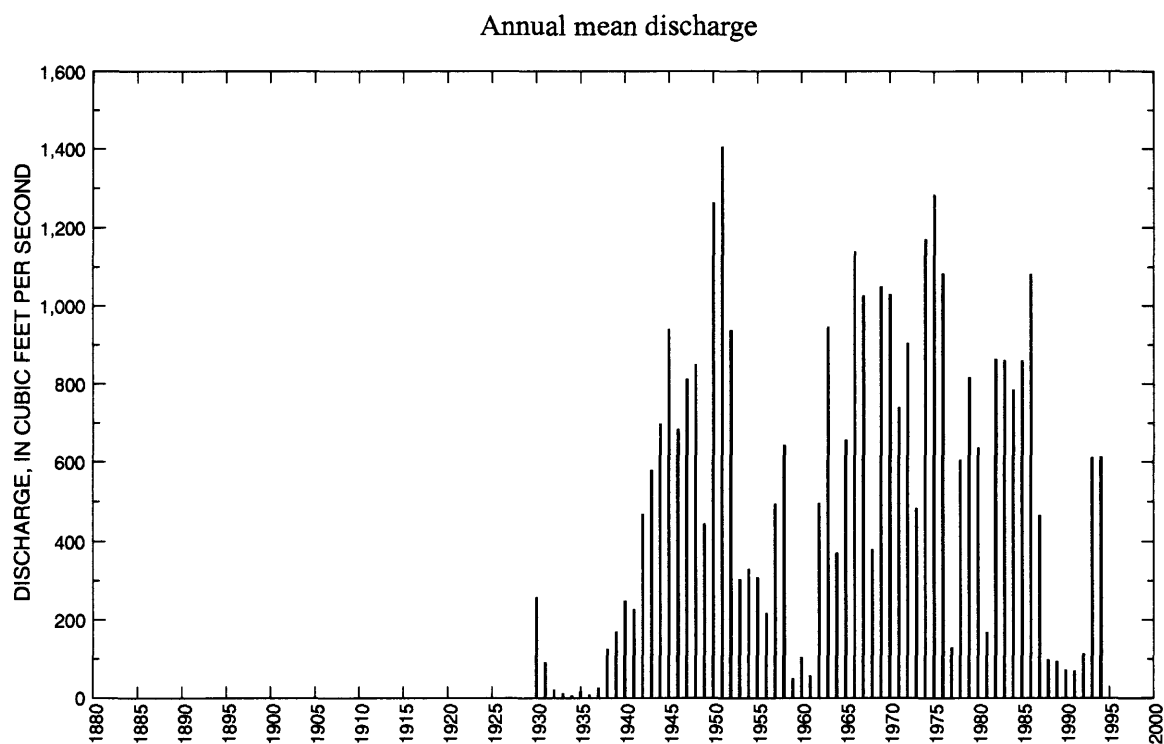
LOCATION.--Lat 48°02'34", long 95°48'28", in NW¹/₄NW¹/₄ sec.28, T.153 N., R.40 W., Pennington County, Hydrologic Unit 09020303, on left bank 50 ft upstream from highway bridge at High Landing, 7 mi south of Goodridge and 33 mi upstream from Thief River.

DRAINAGE AREA.--2,300 mi², approximately.

PERIOD OF RECORD.--September 1929 to current year. Prior to October 1930, published as "at Kratka".

GAGE.--Water-stage recorder. Datum of gage is 1,141.57 ft above sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). See WSP 1308 or 1738 for history of changes prior to Oct. 1, 1949.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,060 ft³/s, July 7, 1975, gage height, 13.39 ft; maximum gage height, 13.44 ft, July 3, 1975; no flow at times.



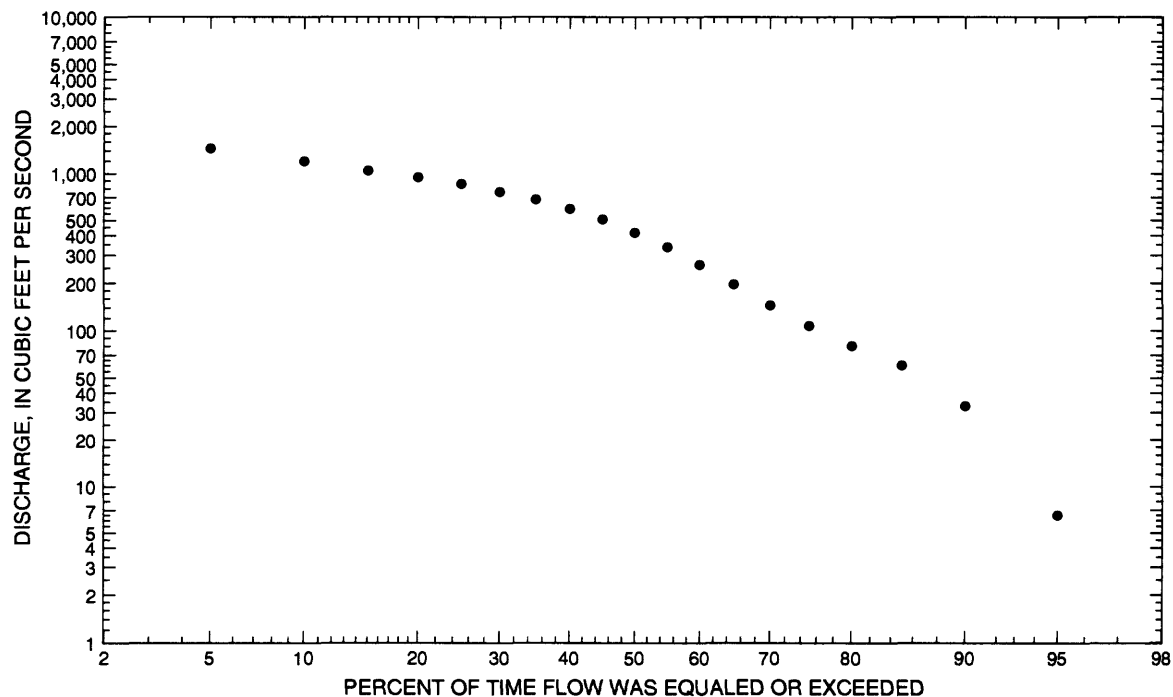
05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	1,960	1951	2.11	1934	523	490	0.94	8.20
November	1,730	1951	1.61	1934	492	422	0.86	7.72
December	1,540	1951	0	1934	447	363	0.81	7.02
January	1,420	1951	0	1934	446	366	0.82	7.00
February	1,370	1951	0	m	443	365	0.82	6.95
March	1,450	1951	0	m	476	381	0.80	7.47
April	1,980	1951	24.7	1933	652	531	0.81	10.2
May	3,180	1950	5.58	1933	658	617	0.94	10.3
June	2,160	1950	1.04	1936	658	542	0.82	10.3
July	2,470	1975	5.92	1934	567	511	0.90	8.90
August	1,480	1975	0.026	1934	495	421	0.85	7.76
September	1,730	1950	0	1934	516	445	0.86	8.10
Annual	1,410	1951	6.21	1934	531	396	0.75	100

Annual flow duration



05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equalled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	1.00	0.76	1.60	29.2	19.3	8.00	11.6	8.17	3.42	6.86	6.47	4.21	6.52
90	31.3	28.2	40.5	56.3	40.1	29.7	35.8	27.2	20.0	29.0	36.0	22.9	33.1
85	57.9	52.6	69.0	80.1	57.6	60.7	65.2	62.9	54.4	59.4	62.3	46.9	60.0
80	71.9	65.8	100	102	74.9	85.2	89.6	85.2	69.3	73.7	75.0	68.2	80.2
75	96.7	97.5	127	139	92.7	111	113	102	93.8	109	108	93.1	108
70	132	130	161	185	124	178	146	127	142	144	146	139	145
65	171	173	202	238	229	261	187	172	200	184	196	184	197
60	227	219	246	314	307	346	243	247	281	236	234	242	264
55	301	313	318	400	400	438	340	326	350	290	312	326	338
50	414	405	384	492	515	582	457	404	418	346	371	404	418
45	494	478	464	590	621	716	599	483	491	416	465	505	505
40	546	533	547	682	720	837	673	563	568	507	557	550	594
35	598	592	626	775	818	923	746	646	666	617	633	596	681
30	667	661	698	869	958	1,000	822	731	780	766	701	659	768
25	741	729	770	963	1,100	1,080	905	820	875	887	784	748	860
20	816	796	842	1,120	1,230	1,150	988	910	964	993	882	824	955
15	903	862	913	1,290	1,360	1,290	1,070	1,020	1,050	1,100	999	888	1,050
10	992	936	1,010	1,530	1,480	1,450	1,240	1,140	1,200	1,270	1,130	953	1,200
5	1,080	1,090	1,180	1,890	1,800	1,620	1,490	1,270	1,390	1,450	1,360	1,090	1,450

05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	40.5	33.7	25.0	20.4
0.95	1.05	194	139	119	94.6	76.9
0.90	1.11	314	247	214	175	142
0.80	1.25	535	459	402	337	277
0.50	2	1,280	1,200	1,070	928	782
0.20	5	2,580	2,400	2,170	1,910	1,660
0.10	10	3,470	3,140	2,850	2,510	2,230
0.04	25	4,560	3,930	3,590	3,140	2,860
0.02	50	5,310	4,410	4,040	3,520	3,250
0.01	100	6,000	4,810	4,400	3,820	3,580
0.005	200	6,630	5,140	4,710	4,070	3,850
0.002	500	7,390	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non- exceed- ance prob- ability	Recur- rence inter- val (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	1.12	3.80	7.63
0.10	10	0	0	1.76	2.47	6.34	¹ 8.50	¹ 11.0	14.8	21.2
0.20	5	¹ 10.0	¹ 13.0	17.8	23.5	32.8	¹ 41.0	¹ 51.0	52.9	61.3
0.50	2	108	¹ 125	161	¹ 180	191	¹ 205	¹ 240	274	288

¹Graphical interpretation.

**05075000 RED LAKE RIVER AT HIGH LANDING NEAR
GOODRIDGE, MN--Continued**

Probability of occurrence of seasonal low discharges

Non- exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0.184	0.306	0.438	0.569	0.072	0.204	0.500	2.23
0.10	10	11.4	13.6	15.6	17.3	5.92	9.04	12.8	14.6
0.20	5	53.5	58.2	62.3	65.8	31.5	39.9	47.7	59.9
0.50	2	305	310	315	323	213	233	246	319
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0.199	0.539	3.01	0	0.020	0.395	3.43
0.10	10	3.33	3.40	4.65	13.0	4.19	5.20	¹ 7.00	13.4
0.20	5	27.8	¹ 30.0	32.2	55.0	29.9	33.4	¹ 40.0	49.0
0.50	2	235	273	309	348	181	253	¹ 263	280

¹Graphical interpretation.

05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1930	April 5	4.08	912	1963	April 8	8.31	1,600
1931	April 3	2.38	254	1964	October 24	7.32	1,170
1932	April 9	3.45	241	1965	April 13	11.42	2,740
1933	April 18	3.84	85.0	1966	April 3	12.68	3,340
1934	May 3	1.60	58.0	1967	March 30	10.84	2,480
1935	April 13	2.68	111	1968	July 18	11.98	2,770
1936	April 17	3.80	248	1969	April 10	10.49	2,320
1937	July 15	5.08	285	1970	June 16	9.90	2,120
1938	May 13	7.18	1,460	1971	April 8	10.54	1,610
1939	April 21	7.44	1,300	1972	May 29	8.75	1,580
1940	April 19	6.22	1,300	1973	September 25	7.93	1,290
1941	June 15	--	912	1974	April 28	11.07	2,670
1942	April 2	7.81	1,800	1975	July 7	13.39	4,060
1943	April 8	7.22	2,010	1976	October 25	8.56	1,890
1944	April 11	9.20	1,320	1977	May 19	5.31	667
1945	March 27	7.91	2,540	1978	April 8	11.93	2,440
1946	March 30	7.67	2,310	1979	April 25	12.30	3,660
1947	June 15	8.30	2,660	1980	April 5	9.05	1,500
1948	April 20	9.20	3,390	1981	June 29	5.71	577
1949	April 13	5.70	1,360	1982	April 15	10.37	1,800
1950	May 11	13.42	3,720	1983	October 12	8.54	1,510
1951	April 29	10.24	2,170	1984	June 9	10.03	2,210
1952	May 19	8.76	1,730	1985	August 18	11.61	2,490
1953	June 9	5.12	670	1986	April 29	10.82	2,470
1954	June 23	5.31	742	1987	May 26	6.48	961
1955	April 8	8.04	1,240	1988	April 4	7.75	600
1956	April 20	10.29	1,330	1989	April 14	7.55	600
1957	June 28	9.91	1,960	1990	March 13	5.65	150
1958	October 17	7.95	1,520	1991	July 13	5.32	154
1959	April 3	5.42	326	1992	April 21	--	390
1960	April 6	7.45	530	1993	July 26	10.74	1,860
1961	April 20	2.92	282	1994	July 8	10.66	2,020
1962	June 11	12.10	3,060				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1975	July 7	13.39	4,060	1947	June 15	8.30	2,660
1950	May 11	13.42	3,720	1945	March 27	7.91	2,540
1979	April 25	12.30	3,660	1985	August 18	11.61	2,490
1948	April 20	9.20	3,390	1967	March 30	10.84	2,480
1966	April 3	12.68	3,340	1986	April 29	10.82	2,470
1962	June 11	12.10	3,060	1978	April 8	11.93	2,440
1968	July 18	11.98	2,770	1969	April 10	10.49	2,320
1965	April 13	11.42	2,740	1946	March 30	7.67	2,310
1974	April 28	11.07	2,670	1984	June 9	10.03	2,210

**05075000 RED LAKE RIVER AT HIGH LANDING NEAR
GOODRIDGE, MN--Continued**

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1951	April 29	10.24	2,170	1964	October 24	7.32	1,170
1970	June 16	9.90	2,120	1987	May 26	6.48	961
1994	July 8	10.66	2,020	1930	April 5	4.08	912
1943	April 8	7.22	2,010	1941	June 15	--	912
1957	June 28	9.91	1,960	1954	June 23	5.31	742
1976	October 25	8.56	1,890	1977	May 19	5.31	667
1993	July 26	10.74	1,860	1953	June 9	5.12	670
1942	April 2	7.81	1,800	1988	April 4	7.75	600
1982	April 15	10.37	1,800	1989	April 14	7.55	600
1952	May 19	8.76	1,730	1981	June 29	5.71	577
1971	April 8	10.54	1,610	1960	April 6	7.45	530
1963	April 8	8.31	1,600	1992	April 21	--	390
1972	May 29	8.75	1,580	1959	April 3	5.42	326
1958	October 17	7.95	1,520	1937	July 15	5.08	285
1983	October 12	8.54	1,510	1961	April 20	2.92	282
1980	April 5	9.05	1,500	1931	April 3	2.38	254
1938	May 13	7.18	1,460	1936	April 17	3.80	248
1949	April 13	5.70	1,360	1932	April 9	3.45	241
1956	April 20	10.29	1,330	1991	July 13	5.32	154
1944	April 11	9.20	1,320	1990	March 13	5.65	150
1939	April 21	7.44	1,300	1935	April 13	2.68	111
1940	April 19	6.22	1,300	1933	April 18	3.84	85.0
1973	September 25	7.93	1,290	1934	May 3	1.60	58.0
1955	April 8	8.04	1,240				

05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1930	253.0	232.9	206.5	154.8	118.5	239.6	486.8	566.3	388.2	228.5	126.0	86.6	258.0
1931	88.1	98.8	87.0	90.1	119.7	140.8	175.2	137.6	101.4	37.7	17.9	9.07	91.7
1932	21.9	44.0	23.3	29.5	11.9	17.0	67.7	11.2	5.81	12.3	11.8	3.86	21.7
1933	16.4	28.8	13.6	10.3	5.14	4.78	24.7	5.58	5.25	12.1	11.4	3.56	11.8
1934	2.11	1.61	0	0	0	0.513	25.8	26.5	11.9	5.92	0.026	0	6.21
1935	6.90	10.1	4.77	2.00	1.05	17.8	47.2	47.5	37.3	16.1	6.22	7.38	17.1
1936	6.64	4.45	2.69	0.487	0	0	67.7	11.4	1.04	7.27	0.394	1.84	8.60
1937	7.36	2.41	1.36	0.206	0	0	38.6	35.5	17.2	80.3	86.7	46.0	26.5
1938	21.8	28.6	21.5	25.1	28.4	110.5	41.1	735.5	129.8	116.5	93.5	134.7	125.1
1939	140.3	136.3	138.7	126.5	108.9	119.0	320.0	262.1	240.7	136.8	113.9	198.3	170.0
1940	232.3	217.7	181.3	179.0	186.6	211.6	510.7	433.7	378.0	172.6	141.9	148.9	249.2
1941	162.8	187.2	184.2	189.7	187.5	204.8	330.3	110.2	509.9	95.5	210.4	355.2	226.3
1942	325.6	531.8	369.7	415.5	414.3	628.7	860.3	748.7	502.4	188.9	180.3	481.8	469.8
1943	271.4	343.9	333.5	340.6	345.0	354.8	1,052	846.2	964.9	570.7	749.0	790.7	579.9
1944	747.3	672.7	497.7	488.7	524.1	508.7	794.3	746.0	962.9	771.2	769.0	908.2	698.7
1945	876.6	1,063	948.4	716.8	714.3	1,274	1,601	1,274	1,010	691.3	497.5	617.6	940.8
1946	785.8	672.9	553.2	550.0	503.6	881.9	1,253	971.0	794.4	449.5	367.5	421.4	684.1
1947	525.6	539.5	467.1	455.5	409.3	404.5	1,197	1,304	1,936	846.5	719.3	945.2	812.1
1948	1,046	886.1	764.5	687.1	569.0	637.1	1,790	1,467	884.1	613.7	447.5	399.5	849.3
1949	369.5	346.2	283.9	274.8	268.6	384.5	753.5	570.4	655.8	384.5	522.5	524.6	445.0
1950	619.2	566.6	521.6	517.7	473.6	531.0	1,559	3,179	2,161	1,869	1,388	1,733	1,264
1951	1,955	1,730	1,539	1,424	1,366	1,453	1,980	1,791	1,573	1,158	453.1	463.8	1,407
1952	464.2	600.3	856.8	1,072	1,068	1,055	948.2	1,354	1,433	1,253	621.4	533.1	938.2
1953	372.4	285.6	309.9	311.0	328.5	331.2	163.8	258.6	405.8	288.7	305.8	290.4	304.3
1954	250.0	204.3	226.1	216.9	227.0	229.5	389.0	420.8	585.7	569.0	368.4	268.6	330.1
1955	252.2	326.7	325.3	273.6	297.4	327.7	549.3	307.6	278.4	276.9	261.2	231.9	308.7
1956	196.9	148.7	145.1	148.4	150.1	153.4	556.2	370.7	195.1	170.6	186.5	189.0	217.3
1957	236.7	245.3	207.7	184.4	146.2	227.6	325.6	98.3	671.2	1,252	1,180	1,140	494.6
1958	1,467	1,304	658.8	669.1	653.5	878.4	722.2	312.2	333.7	441.2	233.8	56.7	644.5
1959	43.6	35.9	38.5	47.1	45.9	66.4	120.0	45.5	36.4	43.4	49.1	38.8	50.9
1960	149.4	142.8	146.9	136.0	126.3	138.4	229.2	40.1	49.9	42.3	38.7	18.3	104.7
1961	83.0	108.4	37.3	36.5	32.3	62.4	95.9	33.5	41.0	48.8	32.8	76.8	57.3
1962	122.2	86.9	45.7	47.8	48.9	47.7	205.5	487.5	1,469	1,136	1,017	1,235	496.7
1963	1,401	1,210	863.2	900.6	886.8	915.5	1,036	1,014	1,003	677.0	618.6	830.1	946.0
1964	1,068	586.5	535.9	498.8	470.3	289.4	264.1	162.4	235.0	144.1	100.2	94.4	371.0

05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1965	276.3	546.5	593.5	591.6	592.0	615.5	1,021	610.5	788.5	778.8	681.5	799.8	657.1
1966	1,044	991.0	1,014	977.7	966.4	968.4	1,623	1,683	1,229	989.2	1,046	1,139	1,139
1967	1,130	1,057	941.3	922.3	1,003	1,136	1,186	1,292	1,181	903.1	782.0	792.3	1,027
1968	422.2	352.7	264.0	224.9	205.9	253.0	93.4	43.4	271.5	1,080	662.9	672.8	380.2
1969	575.8	822.8	1,018	1,086	1,167	1,125	1,395	1,311	1,230	920.3	810.5	1,170	1,050
1970	1,309	1,122	990.3	952.4	918.0	898.1	861.6	1,316	1,257	892.9	830.9	1,004	1,030
1971	818.9	715.7	676.3	656.0	743.4	869.0	803.9	943.7	927.6	683.8	632.7	408.6	740.2
1972	512.0	711.5	741.2	843.5	896.6	904.7	1,017	1,123	1,060	784.1	1,104	1,170	904.8
1973	964.8	687.7	559.9	520.1	564.8	539.9	207.1	399.8	300.3	189.4	233.9	641.1	483.7
1974	989.4	1,072	858.5	874.2	905.0	814.0	1,346	1,813	1,363	1,428	1,283	1,290	1,171
1975	1,387	1,146	914.2	789.4	727.9	692.8	1,229	1,397	1,545	2,474	1,478	1,579	1,284
1976	1,791	1,377	816.8	1,127	1,040	966.5	1,115	1,199	1,062	855.9	971.4	674.1	1,083
1977	231.4	172.0	125.9	119.2	126.6	136.1	113.0	123.1	90.8	105.5	95.3	110.9	129.3
1978	244.4	304.4	440.4	510.5	525.9	544.8	1,085	657.3	975.5	1,005	607.3	370.8	605.8
1979	385.5	433.1	410.0	410.0	415.1	426.1	1,335	1,345	1,261	1,224	1,117	1,031	817.3
1980	964.7	748.1	821.0	821.4	845.2	847.4	784.5	674.1	628.5	246.9	160.7	104.2	636.9
1981	80.6	78.3	60.1	60.3	71.3	103.0	82.0	75.9	123.1	361.5	457.5	457.5	168.2
1982	777.0	800.9	722.3	680.0	682.9	717.4	665.3	1,149	1,081	1,116	1,017	940.8	863.7
1983	1,285	1,036	946.8	944.4	849.6	542.9	825.5	772.7	822.3	791.5	703.9	808.7	860.8
1984	591.9	947.6	804.2	773.5	814.8	824.5	879.4	645.3	756.7	1,009	809.3	575.4	785.8
1985	280.0	524.5	849.7	893.2	890.0	915.7	510.7	847.0	1,178	907.4	1,396	1,122	859.5
1986	1,199	966.0	779.0	805.2	824.6	1,048	1,641	1,391	1,286	1,042	990.1	1,000	1,082
1987	713.3	595.6	696.8	702.3	662.1	577.5	280.8	286.5	315.8	221.9	277.9	269.5	466.2
1988	104.5	91.6	86.7	84.4	84.6	123.6	186.4	82.7	91.5	78.6	87.4	75.7	98.1
1989	69.5	72.3	74.0	75.0	73.0	73.5	251.2	89.5	94.1	89.9	91.2	73.6	93.8
1990	60.5	62.4	62.6	62.8	64.1	90.4	78.3	74.6	88.4	79.2	73.8	66.1	72.0
1991	60.0	61.6	61.8	62.0	62.1	81.7	69.2	72.3	66.4	94.7	73.2	63.7	69.2
1992	69.1	58.7	58.8	61.5	63.3	132.8	226.1	125.1	88.6	108.1	111.4	262.3	113.6
1993	201.7	152.1	540.8	540.0	536.8	624.2	610.9	640.8	867.3	924.5	911.5	786.6	612.1
1994	837.3	618.8	609.0	600.8	607.9	498.5	277.8	393.5	702.6	685.2	721.8	806.2	613.5

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN

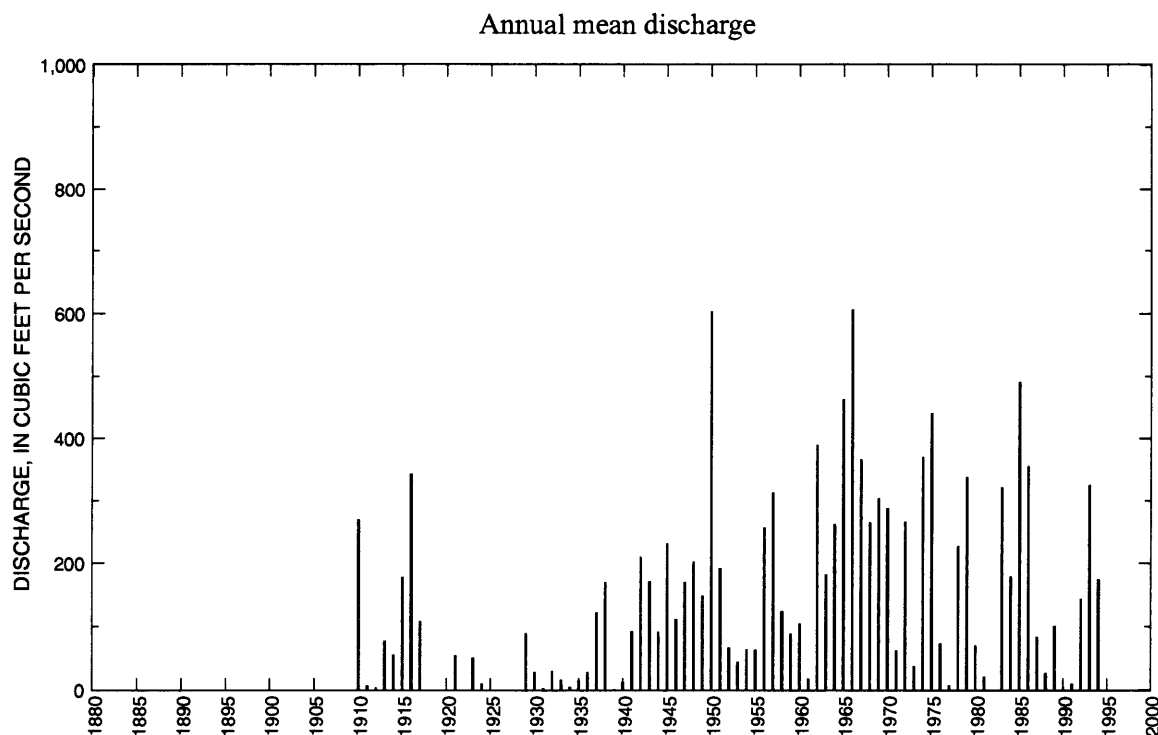
LOCATION.--Lat 48°11'08", long 96°10'11", in NW¹/₄SW¹/₄ sec.3, T.154 N., R.43 W., Marshall County, Hydrologic Unit 09020304, on right bank, 0.2 mi upstream from highway bridge, 5 mi north of Thief River Falls, 7 mi upstream from mouth, and 9 mi downstream from Mud Lake National Wildlife Refuge.

DRAINAGE AREA.--959 mi².

PERIOD OF RECORD.--July 1909 to September 1917, April 1920 to September 1921, October 1922 to September 1924, October 1928 to September 1981, March 1982 to current year. Monthly discharge only for some periods, annual maximums for water years 1919, 1922, 1925, 1926, published in WSP 1308. October 1981 to February 1982, operated as a high-flow partial-record station.

GAGE.--Water-stage recorder and control of grouted boulders. Datum of gage is 1,112.33 ft above mean sea level (levels by Minnesota Department of Transportation). Prior to May 4, 1939, nonrecording gages as same site and datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,610 ft³/s, May 13, 1950, gage height, 17.38 ft; no flow at times.

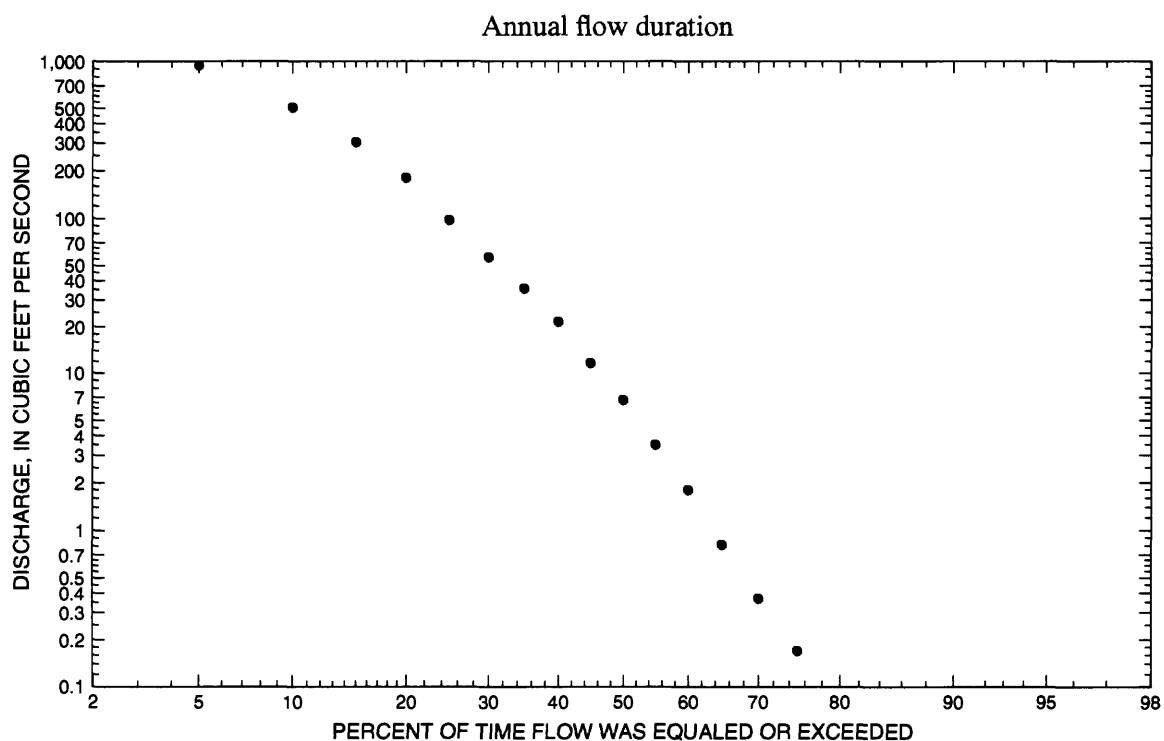


05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	637	1986	0	m	86.6	151	1.74	4.43
November	844	1972	0	m	62.8	126	2.00	3.21
December	206	1945	0	m	19.1	42.1	2.20	0.98
January	100	1910	0	m	5.55	14.9	2.69	0.28
February	45.0	1910	0	m	3.50	8.76	2.50	0.18
March	608	1983	0	m	67.4	123	1.82	3.45
April	2,830	1966	7.75	1981	573	564	0.98	29.3
May	4,270	1950	1.83	1990	454	653	1.44	23.2
June	1,770	1962	0.032	1980	282	376	1.33	14.4
July	2,100	1975	0	m	208	343	1.64	10.7
August	1,010	1993	0	m	94.5	200	2.12	4.83
September	1,010	1993	0	m	99.3	200	2.02	5.08
Annual	607	1966	1.28	1939	162	149	0.92	100



05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	1.30	2.76	0.25	0	0	0	0	0	0	0
90	0	0	0	5.42	5.92	0.72	0.08	0	0	0	0	0	0
85	0	0	0	14.5	12.3	2.10	0.52	0	0	0	0	0	0
80	0	0	0	23.8	22.7	5.10	1.10	0.09	0.04	0	0	0	0
75	0	0	0	39.2	33.6	12.1	3.42	0.29	0.16	0.10	0.17	0	0.17
70	0	0	0	59.1	47.8	20.0	7.14	0.42	0.45	0.40	0.47	0.04	0.37
65	0	0	0.09	87.4	66.3	27.6	10.6	0.89	0.91	1.20	0.96	0.08	0.82
60	0	0	0.19	125	91.9	39.0	17.0	1.90	1.30	2.10	1.40	0.16	1.80
55	0.07	0	0.40	181	126	58.1	24.6	3.95	2.82	4.29	3.07	0.45	3.50
50	0.09	0	0.58	240	170	85.5	33.9	6.11	4.39	6.70	4.38	0.90	6.78
45	0.20	0.09	0.85	323	228	122	46.8	10.4	8.07	9.99	6.61	1.30	11.7
40	0.44	0.20	1.80	423	296	160	67.0	16.8	15.4	15.9	9.49	1.80	21.6
35	0.99	0.46	3.07	543	376	204	102	23.1	24.9	27.4	15.0	3.72	35.5
30	1.30	0.80	5.92	699	476	264	164	32.2	39.2	45.6	27.0	5.99	56.8
25	2.20	1.10	10.3	868	602	350	240	52.5	67.5	83.2	45.1	9.20	97.8
20	2.90	2.40	23.1	1,030	777	482	342	86.0	116	143	83.3	16.1	180
15	5.67	3.61	58.2	1,260	1,000	658	481	162	218	212	145	26.8	305
10	17.8	9.76	145	1,610	1,320	863	651	310	337	335	217	55.0	508
5	38.8	30.1	495	2,350	1,830	1,350	987	575	600	474	323	100	946

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	28.2	23.7	15.8	9.76
0.95	1.05	259	120	99.3	67.8	44.2
0.90	1.11	400	231	191	133	89.6
0.80	1.25	647	459	381	276	192
0.50	2	1,420	1,250	1,080	853	638
0.20	5	2,620	2,410	2,190	1,920	1,550
0.10	10	3,400	3,010	2,830	2,630	2,200
0.04	25	4,310	3,560	3,470	3,410	2,960
0.02	50	4,910	3,840	3,820	3,900	3,470
0.01	100	5,450	4,040	4,090	4,310	3,910
0.005	200	5,930	4,180	4,290	4,650	4,280
0.002	500	6,490	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0	0.082
0.50	2	0	0	0	0	0	0.037	0.163	0.761	4.64

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0.175
0.50	2	0	0	0	0.011	0.017	0.108	0.215	4.80
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0.182	0	0	0	0
0.50	2	0.873	1.55	2.52	5.91	0.360	0.566	0.999	2.61

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1909	July 19	10.60	1,970	1954	April 12	7.61	624
1910	April 3	9.05	1,440	1955	April 8	10.72	958
1911	April 26	5.40	127	1956	April 21	10.57	1,840
1912	September 30	5.60	164	1957	September 3	9.97	1,630
1913	April 7	14.00	1,530	1958	October 17	7.67	828
1914	June 11	7.42	795	1959	April 5	8.48	950
1915	June 30	10.66	1,920	1960	April 6	12.11	1,100
1916	April 23	14.50	4,080	1961	March 24	7.49	441
1917	April 11	12.72	2,600	1962	June 10	12.68	2,800
1919	July 10	16.30	5,040	1963	April 8	11.43	2,180
1920	April 8	--	1,780	1964	August 2	12.05	2,480
1921	April 6	--	1,700	1965	April 12	14.99	4,110
1922	May 12	11.90	2,680	1966	April 3	15.66	3,320
1923	April 21	8.40	1,160	1967	April 21	13.26	3,100
1924	April 21	5.30	145	1968	July 18	10.84	1,950
1925	June 11	9.10	1,420	1969	April 13	13.55	3,190
1926	June 25	--	1,660	1970	June 17	12.72	2,820
1929	March 18	13.71	1,870	1971	April 9	11.40	1,780
1930	May 12	7.26	776	1972	April 18	11.73	2,340
1931	April 15	--	39.0	1973	September 29	7.86	871
1932	April 8	9.25	1,340	1974	April 21	13.37	3,160
1933	April 18	6.35	470	1975	July 2	14.17	3,260
1934	April 7	5.67	150	1976	April 1	12.75	1,350
1935	April 13	--	318	1977	May 19	6.35	403
1936	April 19	--	890	1978	April 18	12.57	2,740
1937	August 3	9.75	1,160	1979	April 24	14.11	3,590
1938	May 19	9.00	1,130	1980	April 7	10.45	1,710
1939	April 27	4.82	35.0	1981	June 28	7.08	620
1940	April 15	7.85	728	1982	May 4	11.27	2,130
1941	June 12	7.82	822	1983	March 7	14.19	1,500
1942	May 2	9.69	1,480	1984	June 9	9.80	1,520
1943	April 8	9.43	1,060	1985	June 28	11.27	2,130
1944	June 6	7.15	666	1986	May 1	11.82	2,420
1945	April 11	10.24	1,650	1987	March 26	13.23	1,570
1946	April 6	8.77	1,170	1988	April 4	10.37	1,170
1947	June 11	9.84	1,560	1989	April 16	14.31	2,300
1948	April 19	10.67	1,850	1990	April 1	6.11	150
1949	June 1	10.00	1,620	1991	May 23	6.07	314
1950	May 13	17.38	5,610	1992	April 22	--	1,220
1951	May 2	9.81	1,630	1993	August 31	--	2,180
1952	April 8	10.72	1,500	1994	July 9	11.38	1,960
1953	June 2	6.37	429				

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	May 13	17.38	5,610	1984	June 9	9.80	1,520
1919	July 10	16.30	5,040	1952	April 8	10.72	1,500
1965	April 12	14.99	4,110	1983	March 7	14.19	1,500
1916	April 23	14.50	4,080	1942	May 2	9.69	1,480
1979	April 24	14.11	3,590	1910	April 3	9.05	1,440
1966	April 3	15.66	3,320	1925	June 11	9.10	1,420
1975	July 2	14.17	3,260	1976	April 1	12.75	1,350
1969	April 13	13.55	3,190	1932	April 8	9.25	1,340
1974	April 21	13.37	3,160	1992	April 22	--	1,220
1967	April 21	13.26	3,100	1946	April 6	8.77	1,170
1970	June 17	12.72	2,820	1988	April 4	10.37	1,170
1962	June 10	12.68	2,800	1923	April 21	8.40	1,160
1978	April 18	12.57	2,740	1937	August 3	9.75	1,160
1922	May 12	11.90	2,680	1938	May 19	9.00	1,130
1917	April 11	12.72	2,600	1960	April 6	12.11	1,100
1964	August 2	12.05	2,480	1943	April 8	9.43	1,060
1986	May 1	11.82	2,420	1955	April 8	10.72	958
1972	April 18	11.73	2,340	1959	April 5	8.48	950
1989	April 16	14.31	2,300	1936	April 19	--	890
1963	April 8	11.43	2,180	1973	September 29	7.86	871
1993	August 31	--	2,180	1958	October 17	7.67	828
1982	May 4	11.27	2,130	1941	June 12	7.82	822
1985	June 28	11.27	2,130	1914	June 11	7.42	795
1909	July 19	10.60	1,970	1930	May 12	7.26	776
1994	July 9	11.38	1,960	1940	April 15	7.85	728
1968	July 18	10.84	1,950	1944	June 6	7.15	666
1915	June 30	10.66	1,920	1954	April 12	7.61	624
1929	March 18	13.71	1,870	1981	June 28	7.08	620
1948	April 19	10.67	1,850	1933	April 18	6.35	470
1956	April 21	10.57	1,840	1961	March 24	7.49	441
1920	April 8	--	1,780	1953	June 2	6.37	429
1971	April 9	11.40	1,780	1977	May 19	6.35	403
1980	April 7	10.45	1,710	1935	April 13	--	318
1921	April 6	--	1,700	1991	May 23	6.07	314
1926	June 25	--	1,660	1912	September 30	5.60	164
1945	April 11	10.24	1,650	1934	April 7	5.67	150
1951	May 2	9.81	1,630	1990	April 1	6.11	150
1957	September 3	9.97	1,630	1924	April 21	5.30	145
1949	June 1	10.00	1,620	1911	April 26	5.40	127
1987	March 26	13.23	1,570	1931	April 15	--	39.0
1947	June 11	9.84	1,560	1939	April 27	4.82	35.0
1913	April 7	14.00	1,530				

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1909	--	--	--	--	--	--	--	--	--	444.0	395.7	299.7	--
1910	362.7	290.2	200.0	100.0	45.0	330.0	1,151	438.5	160.3	108.5	44.2	8.12	270.3
1911	0	0	0	0	0	12.2	46.2	6.88	10.1	1.34	0.242	0.483	6.42
1912	1.13	0.180	0	0	0	0.484	8.70	4.85	2.53	2.23	1.42	24.3	3.78
1913	41.4	32.7	14.0	10.4	8.79	7.03	656.9	112.1	26.9	12.8	8.47	9.53	77.9
1914	21.3	24.8	15.6	5.00	1.00	3.00	146.3	131.7	175.5	69.3	29.3	50.6	56.1
1915	91.5	84.4	62.6	42.0	33.0	59.0	293.0	246.6	550.3	544.9	88.0	32.4	177.8
1916	46.4	43.7	8.58	1.65	0.586	1.81	2,060	1,017	244.8	103.6	245.8	372.3	343.7
1917	160.4	109.0	12.7	5.00	3.00	4.29	831.1	122.4	32.8	19.0	2.03	3.55	108.1
1920	--	--	--	--	--	--	944.8	147.1	365.8	36.4	5.15	0.867	--
1921	6.76	1.10	0.200	0.200	0.200	0.300	441.7	48.8	121.2	22.0	8.35	15.0	55.0
1923	8.39	5.83	1.00	0.800	0.600	0.700	346.7	221.1	15.5	9.84	1.68	1.09	51.1
1924	1.71	2.80	1.50	1.00	0.700	2.00	49.3	25.0	19.0	15.1	2.62	0.113	10.0
1929	42.5	7.93	5.00	2.00	1.00	516.1	370.8	96.5	24.7	2.27	0.090	0	89.7
1930	0	0	0	0	0	0	149.3	164.8	25.8	3.32	0.045	0	28.7
1931	0	0	0	0	0	4.68	16.5	5.40	4.17	0.826	0.100	0	2.64
1932	0	0	0	0	0	0.265	342.5	25.3	0.527	0	0	0.253	30.3
1933	0.510	0.200	0	0	0	3.94	138.0	19.7	26.1	0.706	0	0	15.6
1934	0	0	0	0	0	0.145	47.6	4.63	0.460	1.53	0	0	4.48
1935	0	0	0	0	0	29.5	112.2	16.8	2.74	8.98	1.77	0.427	14.3
1936	0	0	0	0	0	0	278.8	58.3	2.55	0	0	0	28.0
1937	0	0	0	0	0	0	65.9	106.8	76.1	190.9	635.2	384.2	122.5
1938	61.1	11.1	8.31	4.58	6.00	131.3	129.6	926.1	624.3	131.7	0.219	0	170.6
1939	0	0	0	0	0	0.142	12.1	2.43	0.600	0.194	0	0	1.28
1940	0	0	0	0	0	0	129.0	21.0	0.977	0.010	0	0	12.4
1941	0	0	0	0	0	0	288.9	131.1	490.5	183.5	2.41	18.6	92.5
1942	165.1	5.53	3.00	0.323	0	139.5	944.3	904.9	208.3	21.1	55.6	70.1	210.5
1943	4.94	1.43	0.006	0	0	19.8	502.9	324.5	763.6	380.0	32.5	28.9	171.3
1944	4.80	0.280	0.035	0	0	0	72.3	32.8	414.8	256.8	129.4	196.6	92.0
1945	37.4	248.8	205.7	0.674	2.74	390.5	1,156	570.0	95.0	39.0	13.1	22.8	232.1
1946	8.79	4.02	5.98	0.277	0.146	269.6	804.2	226.5	16.2	9.67	0	0.873	112.1
1947	0.223	0.063	0.023	0.042	0.011	0.197	161.2	217.1	1,049	561.3	49.6	3.57	170.1
1948	8.78	55.5	74.9	1.91	0.655	19.5	993.0	978.2	35.7	62.7	94.1	108.0	202.8
1949	0.103	0.320	0.113	0.100	0.100	0.110	356.0	210.9	326.2	75.4	523.9	283.4	148.2
1950	43.8	78.0	58.2	26.9	7.63	0.758	740.4	4,274	1,279	616.5	35.2	24.5	604.3

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1951	141.6	4.37	0.858	0.545	8.08	71.2	955.7	941.6	110.0	11.5	5.92	48.8	192.2
1952	6.14	5.92	4.52	0.184	0.017	0.852	560.0	111.4	24.9	75.4	25.0	0.050	67.4
1953	0	0	0	0	0	39.0	75.9	157.4	208.7	48.7	0.448	2.51	44.5
1954	2.53	3.01	0.326	0.081	0.011	0.181	160.1	367.0	213.7	18.2	1.69	1.39	64.2
1955	0.190	0.593	0.145	0	0	0	255.9	91.1	373.8	42.6	5.24	0	63.6
1956	0	0.350	0.097	0	0	2.05	618.8	896.2	275.4	583.8	49.6	666.0	257.6
1957	60.2	226.2	152.7	0.939	0	169.5	605.2	606.6	498.4	639.5	150.0	647.2	313.6
1958	535.9	257.9	41.7	33.6	21.3	11.0	34.6	50.7	30.8	452.9	7.01	0.003	124.4
1959	0.126	1.34	0.187	0	0	26.9	513.9	285.7	65.8	116.9	30.2	24.0	88.8
1960	7.66	5.02	0.900	0.155	0	0.681	651.1	355.8	149.0	89.6	5.58	1.52	105.1
1961	0.619	2.12	0.081	0	0	54.5	59.3	73.2	2.60	0.110	0.097	14.8	17.4
1962	8.31	2.23	0.294	0	0	0.045	597.8	1,017	1,774	721.4	368.9	181.4	389.8
1963	16.2	9.08	4.01	0.123	0.229	68.1	974.5	575.4	423.5	100.2	16.0	1.18	182.0
1964	0.168	0.047	0	0	0	0	200.5	337.1	1,207	706.2	523.5	179.6	262.8
1965	512.7	188.7	13.6	1.57	0.171	1.00	1,818	1,405	1,055	430.9	37.1	96.8	463.6
1966	510.9	335.4	95.8	40.8	10.1	184.5	2,827	1,874	638.1	271.2	326.5	161.9	607.1
1967	14.8	31.6	12.1	1.32	1.43	55.9	1,779	1,751	509.8	212.3	20.7	1.75	366.6
1968	28.3	55.8	5.02	0.023	0.062	101.1	36.3	22.9	762.9	1,016	709.0	441.6	265.7
1969	214.0	253.3	102.5	42.6	32.0	17.0	1,678	1,141	158.2	9.33	1.80	0.735	304.1
1970	156.8	79.1	0.392	0.057	0	0	655.4	784.5	1,375	404.5	2.72	3.93	288.3
1971	98.9	56.7	1.28	1.22	0.964	7.66	408.8	125.6	34.7	12.1	1.06	8.73	62.9
1972	469.1	844.3	16.7	2.71	1.74	163.7	1,141	473.5	86.3	10.5	5.07	2.38	266.8
1973	61.8	3.82	0.062	0.008	0.001	125.5	26.4	32.6	11.2	0.819	4.93	177.8	37.2
1974	407.3	173.4	4.65	0.127	0.020	0.688	1,340	1,642	623.6	45.6	132.5	61.6	370.3
1975	36.7	154.4	3.28	2.51	2.39	19.2	1,131	1,291	331.4	2,103	71.8	103.0	441.1
1976	110.7	33.4	48.0	0.521	0.249	46.8	556.4	37.8	50.1	2.31	4.64	1.38	73.8
1977	1.18	0.101	0.005	0	0	0.685	28.2	34.0	8.87	1.69	0.017	8.91	6.98
1978	18.3	8.25	14.4	28.5	33.9	12.2	1,646	624.1	151.8	92.8	43.7	69.5	227.6
1979	160.5	26.4	5.60	4.51	9.92	9.66	1,231	1,788	655.7	129.7	12.7	11.3	338.2
1980	91.5	57.9	12.3	0.454	0	0.033	617.2	63.4	0.032	0	0	14.0	70.7
1981	4.16	5.05	0.681	0.014	1.63	16.9	7.75	6.13	83.2	105.4	3.38	14.6	20.8
1982	--	--	--	--	--	16.8	930.8	829.8	165.8	185.6	149.3	8.90	--
1983	369.2	314.3	102.6	21.4	2.47	608.5	655.6	358.2	443.9	576.6	195.6	187.8	321.4
1984	296.3	150.8	59.7	18.4	21.3	88.5	537.1	211.2	468.8	243.1	46.9	8.66	178.9
1985	75.7	57.2	2.28	0	0	315.0	750.4	748.9	1,003	1,136	841.7	943.0	491.3

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1986	636.6	213.0	46.2	7.74	2.96	319.7	1,367	1,248	248.5	28.4	9.66	122.3	355.6
1987	3.52	2.13	0.354	0.005	0	316.7	112.9	325.7	69.8	109.3	52.3	5.45	84.3
1988	2.78	1.55	0.739	0.162	0.027	9.94	244.9	18.9	31.6	0.444	0.115	13.0	26.7
1989	1.26	1.89	0.245	0.196	0.176	1.17	726.9	227.9	161.0	85.0	10.4	0.122	100.9
1990	0	0	0.021	0	0	22.3	14.5	1.83	11.9	2.79	0.008	0	4.46
1991	0	41.3	0.789	0	0	13.7	10.2	21.7	3.95	21.2	0.980	6.06	10.0
1992	3.98	5.51	2.81	2.55	2.89	116.4	636.6	412.0	57.8	61.0	33.7	389.6	143.1
1993	161.1	18.3	5.05	1.64	0.996	71.9	639.7	89.8	171.0	710.7	1,012	1,012	325.7
1994	232.8	136.5	10.7	4.44	0.023	138.3	90.4	94.0	77.9	913.8	136.8	239.9	174.8

05076500 RED LAKE RIVER AT THIEF RIVER FALLS, MN

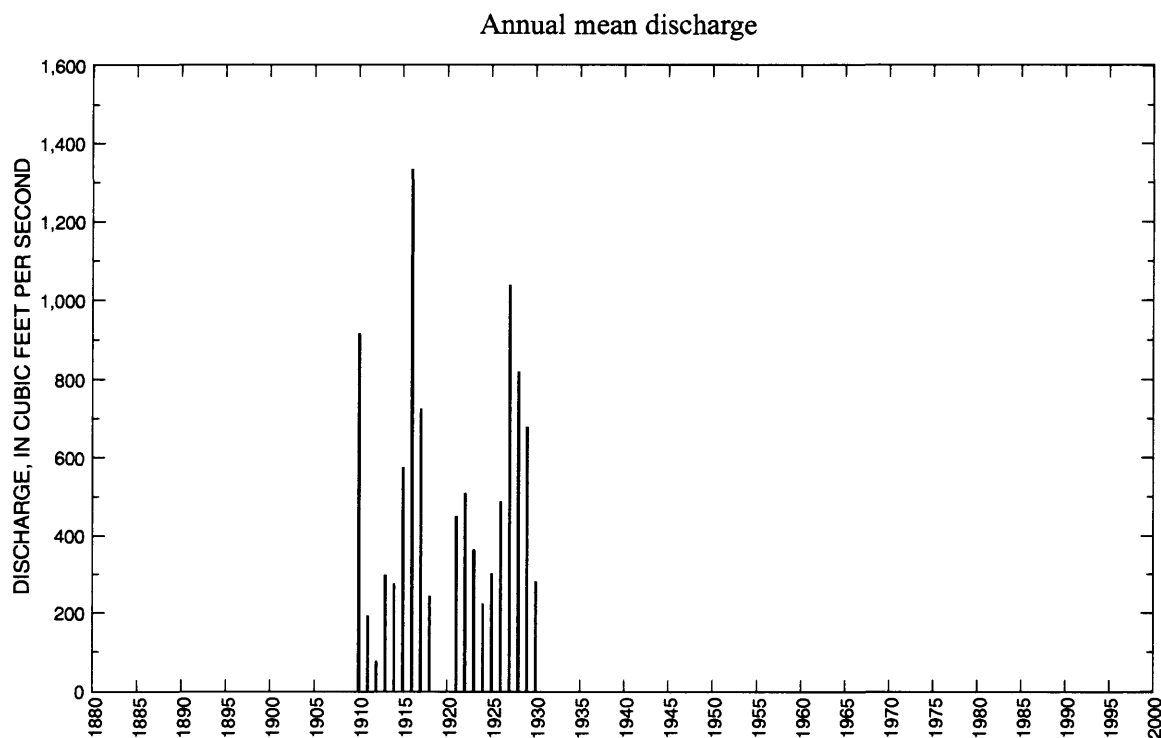
LOCATION.--Lat 48°06'40", long 96°10'50", in sec.33, T.154 N., R.43 W., at Thief River Falls, Pennington County, Hydrologic Unit 09020303, 0.3 mi downstream from Thief River Falls dam and 1 mi downstream from Thief River.

DRAINAGE AREA.--3,450 mi², approximately.

PERIOD OF RECORD.--July 1909 to September 1918, April 1920 to September 1930 (operated as continuous-record station). October 1918 to September 1919 (peak flow and gage height only).

GAGE.--Staff gage. Datum of gage is 1,093.6 ft above mean sea level, datum of 1929. Prior to Aug. 19, 1920, staff gage at site 100 ft upstream at same datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,000 ft³/s, Apr. 16, 1916, gage height, 15.0 ft, backwater from ice; no flow at times due to regulation.

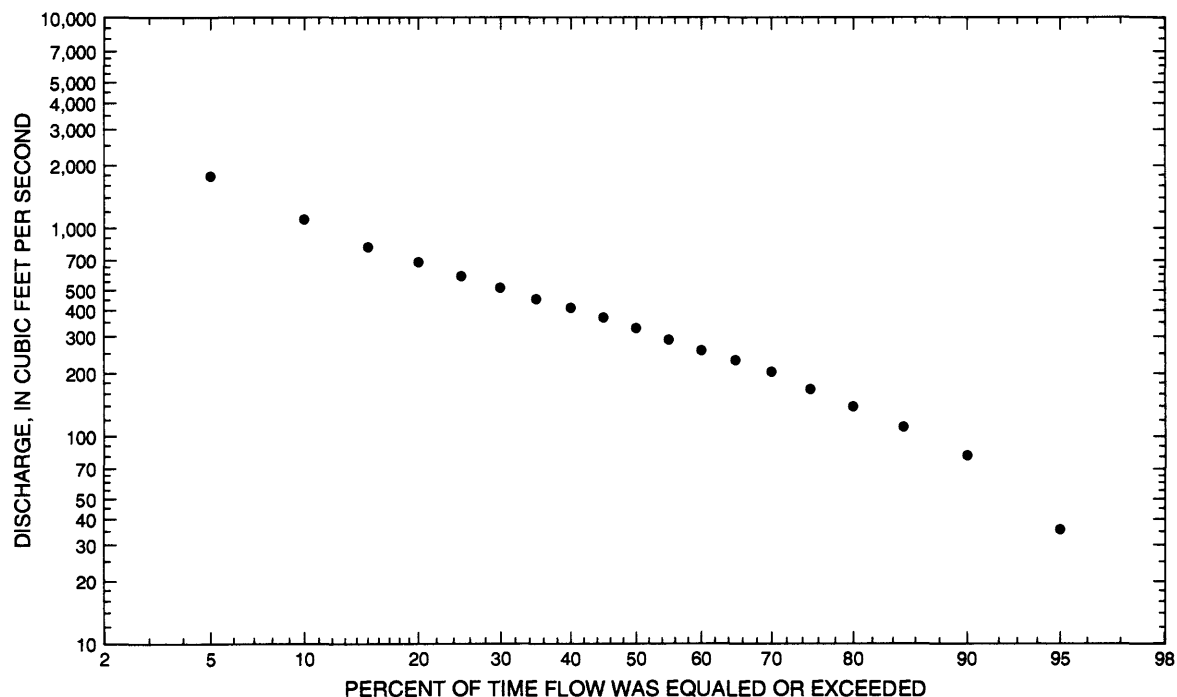


05076500 RED LAKE RIVER AT THIEF RIVER FALLS, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	1,040	1917	32.8	1912	414	273	0.66	6.46
November	828	1910	13.8	1912	341	222	0.65	5.32
December	700	1910	9.00	1912	283	188	0.66	4.43
January	530	1910	4.00	1912	220	148	0.67	3.43
February	530	1910	4.00	1912	225	159	0.71	3.51
March	2,200	1910	7.00	1912	507	551	1.09	7.92
April	3,580	1916	85.5	1912	1,260	969	0.77	19.6
May	3,750	1927	93.1	1912	990	935	0.94	15.5
June	2,320	1916	98.3	1912	859	571	0.66	13.4
July	1,890	1916	64.4	1911	562	467	0.83	8.78
August	1,100	1916	30.8	1911	363	304	0.84	5.67
September	1,300	1916	26.0	1911	379	336	0.89	5.92
Annual	1,330	1916	77.4	1912	516	330	0.64	100

Annual flow duration



05076500 RED LAKE RIVER AT THIEF RIVER FALLS, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	4.00	4.00	7.95	112	180	169	76.2	42.5	29.5	41.2	16.2	18.3	35.6
90	56.7	42.8	45.1	203	307	266	169	90.1	79.3	147	91.0	78.8	80.8
85	77.4	49.4	70.1	326	352	319	206	121	100	180	134	110	111
80	86.1	76.8	78.4	367	395	366	226	144	123	197	152	119	139
75	108	91.2	100	400	432	415	247	162	155	209	167	128	168
70	119	98.5	135	443	469	463	269	177	181	221	184	140	204
65	125	104	161	500	518	512	298	192	205	245	206	151	232
60	130	109	187	588	570	555	326	209	220	282	228	170	258
55	142	143	224	692	632	589	357	227	235	312	250	198	290
50	174	211	264	792	695	622	388	245	250	343	272	228	329
45	212	266	304	933	756	658	419	265	277	375	330	252	369
40	232	290	389	1,100	816	731	472	286	307	409	359	307	412
35	281	318	426	1,300	882	809	531	323	354	450	384	338	454
30	311	355	473	1,520	957	902	653	399	423	493	408	381	515
25	339	370	568	1,750	1,030	1,020	765	489	501	548	441	434	586
20	366	386	644	2,030	1,180	1,220	865	592	567	631	479	467	687
15	395	401	789	2,340	1,410	1,580	1,010	707	785	750	517	500	811
10	426	435	1,650	2,790	2,440	2,020	1,180	847	940	826	709	576	1,100
5	0.05	0.05	2,320	3,930	3,470	2,520	1,460	1,060	0.49	1,000	954	651	1,780

05076500 RED LAKE RIVER AT THIEF RIVER FALLS, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	561	331	312	248	205
0.95	1.05	998	667	573	448	360
0.90	1.11	1,330	934	777	605	482
0.80	1.25	1,840	1,360	1,100	861	679
0.50	2	3,240	2,520	2,040	1,630	1,280
0.20	5	5,280	4,150	3,520	2,930	2,330
0.10	10	6,630	5,150	4,560	3,920	3,150
0.04	25	8,280	6,280	5,890	5,270	4,300
0.02	50	9,450	7,030	6,880	6,330	5,230
0.01	100	10,600	7,700	7,850	7,430	6,220
0.005	200	11,600	8,310	8,820	8,570	7,270
0.002	500	13,000	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	3.21	7.46	10.6	12.4	14.5	17.3	20.5	34.5
0.10	10	3.93	7.52	15.1	20.0	24.6	30.5	35.6	42.3	62.6
0.20	5	10.2	18.5	31.8	39.5	50.3	64.6	73.9	87.3	115
0.50	2	39.1	70.9	98.7	114	142	178	198	225	265

05076500 RED LAKE RIVER AT THIEF RIVER FALLS, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	8.20	12.1	12.8	13.9	7.50	15.5	18.1	24.4		
0.10	10	16.0	23.8	26.0	28.7	14.6	28.0	33.5	51.3		
0.20	5	33.1	48.7	54.4	60.5	31.2	54.2	65.8	111		
0.50	2	104	143	160	176	115	164	194	340		
		June-July-August				September-October-November					
		0.05	20	0	13.8	33.4	50.1	2.86	15.2	21.0	41.7
		0.10	10	12.1	31.6	56.1	75.9	7.03	37.6	46.9	73.7
		0.20	5	24.9	73.3	98.5	120	18.2	88.2	102	133
		0.50	2	83.1	230	237	260	74.2	232	265	306

05076500 RED LAKE RIVER AT THIEF RIVER FALLS, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water years	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1910	March 24	8.70	3,220	1921	April 8	8.80	3,300
1911	June 9	10.00	4,550	1922	April 13	9.70	4,200
1912	September 24	6.30	1,080	1923	April 21	9.80	4,300
1913	April 7	--	3,820	1924	April 20	5.70	895
1914	June 11	6.30	1,230	1925	June 9	9.00	3,500
1915	June 29	8.40	2,880	1926	June 22	8.10	2,640
1916	April 16	15.00	8,000	1927	April 12	11.40	6,080
1917	April 10	10.70	5,270	1928	April 6	8.10	2,640
1918	March 26	5.90	995	1929	March 18	11.80	4,200
1919	July 4	12.70	7,600	1930	May 13	7.45	2,020
1920	April 16	9.20	3,700				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1916	April 16	15.00	8,000	1921	April 8	8.80	3,300
1919	July 4	12.70	7,600	1910	March 24	8.70	3,220
1927	April 12	11.40	6,080	1915	June 29	8.40	2,880
1917	April 10	10.70	5,270	1926	June 22	8.10	2,640
1911	June 9	10.00	4,550	1928	April 6	8.10	2,640
1923	April 21	9.80	4,300	1930	May 13	7.45	2,020
1922	April 13	9.70	4,200	1914	June 11	6.30	1,230
1929	March 18	11.80	4,200	1912	September 24	6.30	1,080
1913	April 7	9.40	3,820	1918	March 26	5.90	995
1920	April 16	9.20	3,700	1924	April 20	5.70	895
1925	June 9	9.00	3,500				

05076500 RED LAKE RIVER AT THIEF RIVER FALLS, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1909	--	--	--	--	--	--	--	--	--	1,385	947.7	966.8	--
1910	926.3	827.7	700.0	530.0	530.0	2,200	2,265	1,334	--	405.8	250.0	220.0	916.5
1911	214.0	156.0	162.0	125.0	95.0	150.0	375.0	290.0	785.8	64.4	30.8	26.0	192.3
1912	32.8	13.8	9.00	4.00	4.00	7.00	85.5	93.1	623.8	162.0	160.4	258.6	77.4
1913	314.0	279.7	125.0	86.3	83.9	78.5	1,371	412.9	98.3	221.3	168.7	156.2	298.5
1914	209.1	207.3	110.6	124.5	102.3	214.8	457.0	467.2	573.5	328.9	225.4	296.6	276.7
1915	414.6	269.3	274.8	215.0	370.0	523.5	707.5	762.3	1,135	1,280	490.9	444.9	575.0
1916	509.5	406.5	475.2	368.0	373.0	418.0	3,580	3,280	2,322	1,886	1,105	1,300	1,334
1917	1,040	797.8	523.7	300.5	389.1	647.4	2,435	1,040	652.8	436.0	223.1	218.1	724.7
1918	215.0	240.0	120.0	80.0	40.0	362.5	355.7	473.4	482.8	238.1	193.2	103.9	243.1
1920	--	--	--	--	--	--	2,357	1,023	1,356	761.3	531.6	498.5	--
1921	445.2	350.4	360.0	339.9	332.1	282.4	1,020	658.8	691.1	387.3	236.6	308.4	450.5
1922	329.3	199.0	343.1	208.0	285.8	300.4	1,462	1,519	703.3	306.7	216.3	244.2	510.1
1923	218.9	271.8	217.5	131.5	129.7	111.4	1,317	822.6	449.5	291.8	213.0	200.7	364.4
1924	213.9	234.8	199.9	145.6	211.3	62.5	313.4	441.9	340.6	232.5	171.3	114.3	223.3
1925	155.9	98.8	56.6	67.7	40.7	349.1	289.5	382.8	1,302	433.0	164.4	281.8	301.9
1926	515.5	371.0	395.8	355.7	281.5	771.8	777.8	493.0	896.9	492.9	236.3	257.9	487.9
1927	384.2	302.7	187.2	136.6	104.5	447.0	2,806	3,750	1,969	887.1	700.6	759.2	1,039
1928	665.2	511.9	500.0	400.0	440.0	958.2	1,159	946.1	1,451	931.3	923.6	952.7	819.8
1929	795.9	693.0	473.7	434.7	359.2	1,543	1,331	881.0	639.9	422.8	297.0	257.3	679.4
1930	258.2	238.7	150.0	120.0	101.0	207.1	688.4	728.6	416.7	245.3	136.4	90.0	282.3

05077500 CLEARWATER RIVER NEAR LEONARD, MN

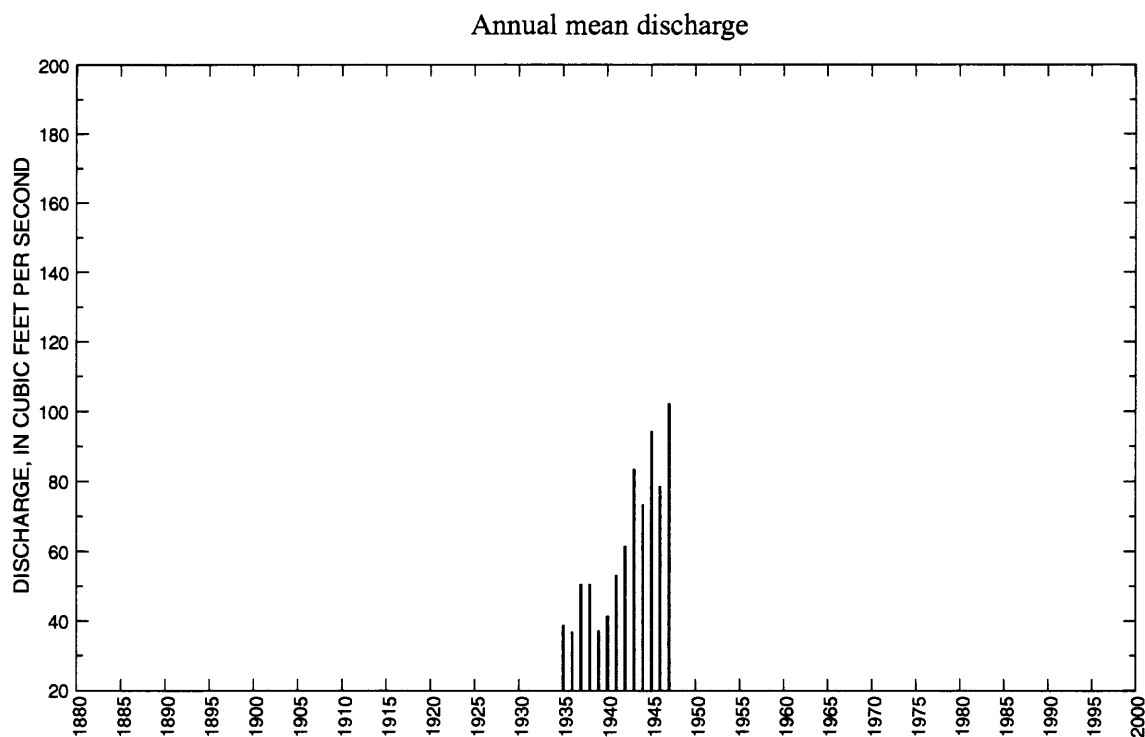
LOCATION.--Lat 47°44'00", long 95°13'00", in E¹/₂SW¹/₄ sec.12, T.149 N., R.36 W., Clearwater County, Hydrologic Unit 09020305, 300 ft downstream from dam at outlet of Clearwater Lake and 8 mi northeast of Leonard.

DRAINAGE AREA.--153 mi².

PERIOD OF RECORD.--July 1934 to September 1947.

GAGE.--Staff gage. Datum of gage is 1,261.80 ft above mean sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Sept. 10, 1934, at site 400 ft downstream at different datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 655 ft³/s, Apr. 21, 1947, gage height, 3.19 ft; minimum daily discharge, 2 ft³/s, Mar. 25 to Apr. 3, 1940, estimated leakage through stop logs.

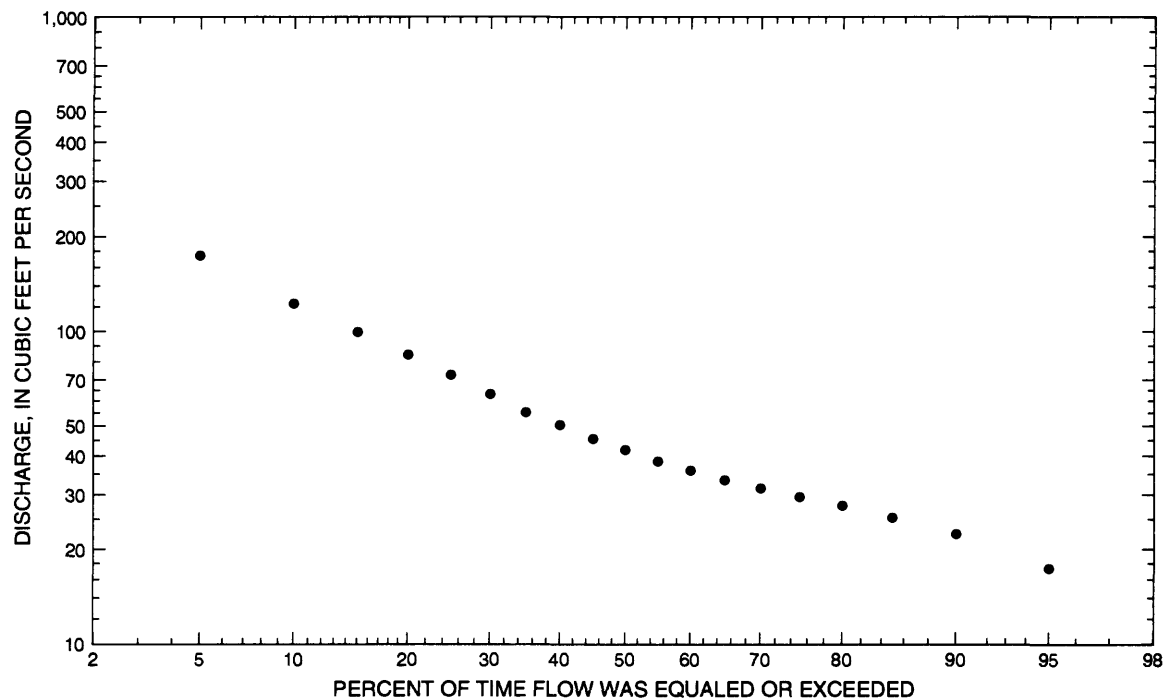


05077500 CLEARWATER RIVER NEAR LEONARD, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	87.4	1947	20.3	1941	48.2	27.3	0.57	6.57
November	82.7	1945	25.5	1935	44.8	18.1	0.40	6.11
December	63.6	1945	24.4	1935	37.6	11.4	0.30	5.13
January	47.9	1946	19.9	1940	33.1	7.66	0.23	4.51
February	48.9	1945	16.9	1937	30.7	8.71	0.28	4.19
March	178	1945	12.4	1937	55.1	50.7	0.92	7.52
April	363	1947	57.1	1938	142	81.7	0.58	19.4
May	236	1947	53.5	1935	119	54.4	0.46	16.2
June	219	1943	25.7	1936	85.9	54.5	0.63	11.7
July	81.5	1944	15.1	1936	43.4	19.2	0.44	5.91
August	114	1944	6.09	1936	41.5	28.9	0.70	5.66
September	118	1944	9.53	1934	52.3	34.5	0.66	7.13
Annual	102	1947	36.9	1936	61.8	22.5	0.36	100

Annual flow duration



05077500 CLEARWATER RIVER NEAR LEONARD, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	19.0	15.1	12.7	39.9	44.4	25.8	14.6	5.20	8.30	17.2	24.3	25.2	17.4
90	26.3	18.5	16.4	50.3	54.2	31.7	19.6	8.64	16.2	18.7	27.2	25.8	22.4
85	27.3	22.0	23.8	59.5	62.4	35.7	24.3	13.2	17.4	20.0	29.3	26.8	25.3
80	27.9	25.7	25.3	67.6	66.3	39.3	26.0	17.3	18.5	22.1	30.6	28.6	27.7
75	29.1	27.5	26.7	73.9	70.8	43.1	27.2	19.8	20.3	25.3	31.8	30.2	29.5
70	29.7	28.3	28.2	80.2	79.9	46.3	28.7	23.3	23.5	26.2	32.6	30.9	31.4
65	30.3	28.7	29.8	86.5	84.9	50.7	30.9	25.2	27.2	27.9	33.2	31.4	33.4
60	31.1	29.3	31.5	92.7	90.1	55.8	33.0	27.6	36.4	32.4	33.9	32.0	35.9
55	31.5	30.0	33.2	100	96.1	59.7	34.8	31.2	40.5	34.6	35.8	32.9	38.5
50	31.8	30.8	35.0	108	102	65.4	37.6	36.5	43.9	38.6	40.1	34.0	41.9
45	32.4	31.4	36.8	119	108	74.9	42.5	38.8	46.6	45.7	43.5	37.1	45.6
40	33.1	31.9	38.4	129	115	82.1	44.8	41.2	49.3	51.4	45.9	39.4	50.3
35	33.8	33.3	40.1	143	122	87.7	47.5	44.4	54.7	58.3	49.6	41.3	55.2
30	35.6	35.1	41.7	159	132	97.8	50.8	49.2	64.8	63.0	54.2	42.7	63.0
25	38.0	36.6	43.9	188	142	114	55.8	55.4	71.9	71.5	57.2	43.8	72.6
20	39.6	37.7	48.4	203	153	125	62.0	60.5	84.7	78.3	60.4	45.7	84.3
15	43.6	39.2	59.5	218	169	136	68.4	64.5	98.3	84.8	66.0	48.5	99.6
10	47.9	43.6	86.0	264	206	162	80.3	74.7	115	91.6	73.0	54.3	123
5	48.7	31.5	235	378	272	226	93.6	120	125	102	83.7	61.8	174

05077500 CLEARWATER RIVER NEAR LEONARD, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	67.7	65.1	63.8	58.3	63.3
0.95	1.05	104	99.9	95.8	85.1	81.5
0.90	1.11	130	124	118	104	94.2
0.80	1.25	168	161	152	132	113
0.50	2	266	256	240	205	165
0.20	5	408	395	371	317	251
0.10	10	503	490	462	396	318
0.04	25	622	610	581	500	413
0.02	50	709	699	670	580	493
0.01	100	795	788	761	662	580
0.005	200	880	877	852	747	676
0.002	500	992	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	1.66	1.86	4.12	5.98	7.59	11.3	14.8	16.6	19.0
0.10	10	3.03	3.32	6.37	8.83	10.9	14.4	17.4	19.0	21.7
0.20	5	5.80	6.20	10.2	13.3	15.8	18.8	21.0	22.5	25.7
0.50	2	16.2	16.7	20.8	24.1	26.9	28.5	29.2	30.8	35.7

05077500 CLEARWATER RIVER NEAR LEONARD, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	10.0	12.1	13.8	17.4	3.76	4.25	9.97	14.3		
0.10	10	13.0	14.8	16.4	19.8	6.85	7.90	13.4	17.4		
0.20	5	17.1	18.6	19.8	22.8	12.5	14.4	18.4	22.3		
0.50	2	26.2	26.7	27.4	29.5	27.6	30.4	¹ 33.5	37.2		
		June-July-August				September-October-November					
		0.05	20	4.96	5.70	6.29	8.07	6.90	8.65	9.04	10.5
		0.10	10	7.67	8.56	9.47	11.8	9.40	11.5	12.0	13.6
		0.20	5	12.2	13.2	14.6	17.6	13.4	15.9	16.6	18.4
		0.50	2	24.7	25.9	28.2	32.6	25.3	28.1	29.4	31.8

¹Graphical interpretation.

05077500 CLEARWATER RIVER NEAR LEONARD, MN--Continued

Annual peak discharge and corresponding gage height

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1935	May 15	1.49	100	1942	April 1	2.04	198
1936	April 19	2.06	275	1943	April 8	2.57	382
1937	September 3	1.96	236	1944	June 9	1.84	174
1938	May 11	2.43	347	1945	March 27	2.70	435
1939	April 5	1.56	115	1946	March 25	2.77	399
1940	April 16	2.22	266	1947	April 21	3.19	655
1941	April 15	2.06	237				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1947	April 21	3.19	655	1941	April 15	2.06	237
1945	March 27	2.70	435	1937	September 3	1.96	236
1946	March 25	2.77	399	1942	April 1	2.04	198
1943	April 8	2.57	382	1944	June 9	1.84	174
1938	May 11	2.43	347	1939	April 5	1.56	115
1936	April 19	2.06	275	1935	May 15	1.49	100
1940	April 16	2.22	266				

05077500 CLEARWATER RIVER NEAR LEONARD, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1934	--	--	--	--	--	--	--	--	--	23.1	8.46	9.53	--
1935	29.6	25.5	24.4	30.9	22.6	32.4	75.9	69.5	48.6	37.0	36.9	33.2	38.9
1936	24.4	32.6	31.1	31.9	27.5	29.9	116.1	80.4	25.7	15.1	6.09	22.5	36.9
1937	26.5	29.9	25.8	27.5	16.9	12.4	95.3	98.5	55.0	59.7	77.0	82.9	50.7
1938	33.3	33.1	27.8	29.6	30.1	53.6	57.1	204.5	60.0	31.9	26.7	17.5	50.7
1939	22.3	32.9	34.1	31.9	31.1	34.7	93.2	53.5	47.0	30.0	19.9	17.6	37.3
1940	25.8	26.1	29.7	19.9	19.9	22.0	128.9	117.9	42.6	26.0	19.4	20.3	41.5
1941	20.3	37.0	32.1	31.8	28.5	28.4	145.6	58.3	107.7	31.8	29.1	92.4	53.3
1942	81.8	51.3	43.0	29.7	29.7	64.4	107.3	110.8	50.9	36.0	46.0	86.7	61.6
1943	58.3	51.3	38.9	34.4	36.5	38.4	216.1	163.3	219.4	53.2	45.2	47.6	83.4
1944	47.5	47.5	41.7	29.0	29.9	29.1	84.4	124.1	132.6	81.5	114.4	118.3	73.3
1945	81.9	82.7	63.6	47.0	48.9	178.2	206.6	124.7	94.8	58.5	62.6	81.3	94.4
1946	87.0	63.3	53.8	47.9	41.9	151.3	157.3	103.9	84.6	63.3	37.9	48.5	78.6
1947	87.4	69.6	43.0	38.9	36.1	42.0	362.6	235.5	147.4	60.3	51.7	53.7	102.3

05077700 RUFFY BROOK NEAR GONVICK, MN

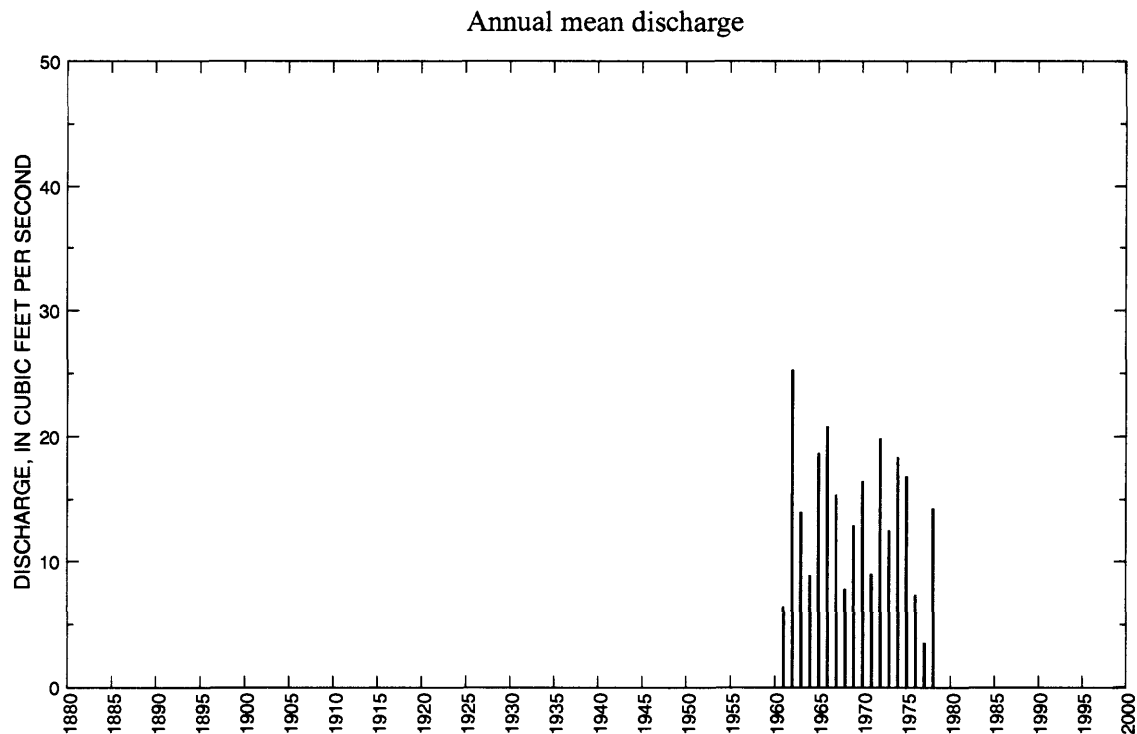
LOCATION.--Lat 47°44'50", long 95°24'45", in SE¹/₄SE¹/₄ sec.5, T.149 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, at culvert on County Highway 67, 4.0 mi upstream from mouth, and 4.8 mi east of Gonvick.

DRAINAGE AREA.--45.2 mi².

PERIOD OF RECORD.--April 1960 to current. April 1960 to September 1978, operated as a continuous-record station. October 1978 to January 1986, operated as a high-flow partial-record station. February 1986 to October 1986, operated as a continuous-record station. November 1986 to current, operated as a high-flow partial record station. Monthly and daily figures for Apr. 1, 1960, to June 30, 1960, published in WSP 1913.

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 1,227.93 ft, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Sept. 9, 1960, reference point at same site and datum.

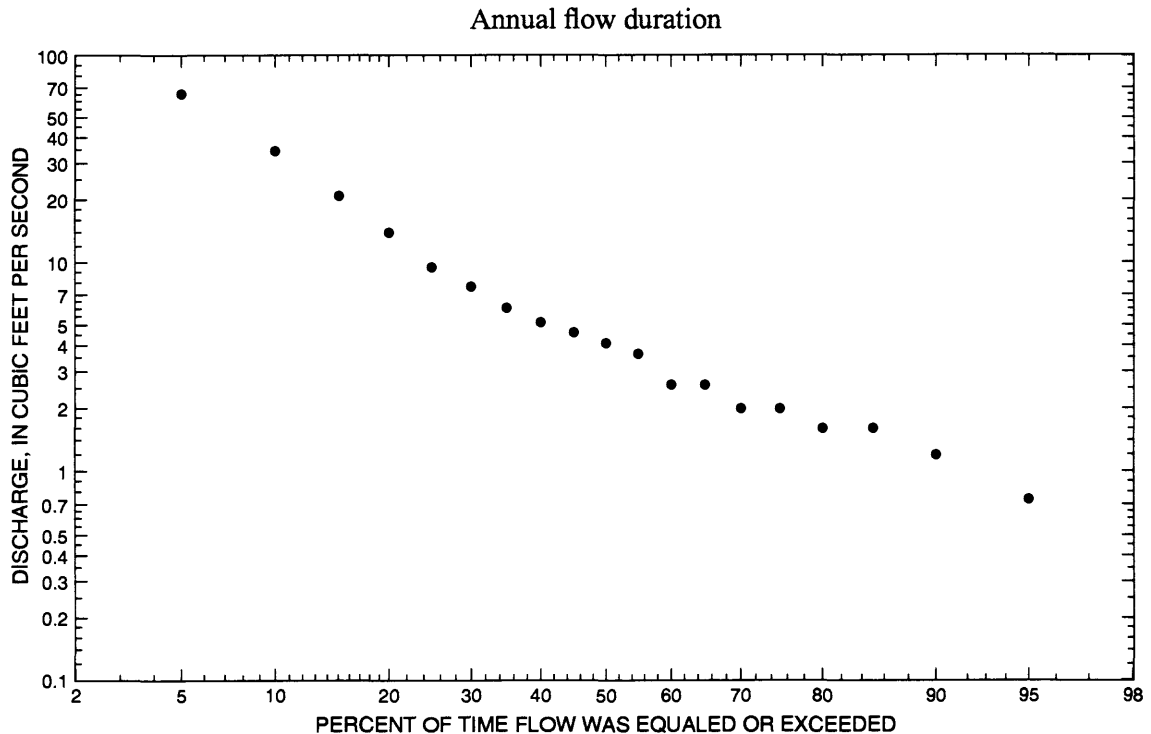
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 453 ft³/s, Mar. 30, 1967, gage height, 6.35 ft; maximum gage height, 6.62 ft, Apr. 9, 1969, backwater from ice; no flow Feb. 20 to Mar. 6, 1968.



05077700 RUFFY BROOK NEAR GONVICK, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	34.7	1972	1.15	1968	7.93	9.12	1.15	4.87
November	31.4	1972	1.45	1977	6.87	6.88	1.00	4.22
December	13.6	1978	0.314	1977	4.53	3.44	0.76	2.78
January	8.99	1974	0.396	1977	3.17	2.20	0.69	1.95
February	7.38	1974	0.393	1968	2.77	1.84	0.66	1.70
March	37.5	1966	2.07	1971	12.4	11.9	0.97	7.60
April	118	1966	6.91	1977	58.2	30.9	0.53	35.7
May	105	1962	4.61	1977	29.1	22.4	0.77	17.9
June	54.4	1962	2.29	1961	18.2	16.8	0.92	11.2
July	57.3	1962	2.10	1961	9.31	13.7	1.47	5.72
August	18.7	1966	1.09	1976	3.79	3.97	1.05	2.33
September	59.3	1973	0.623	1967	6.57	12.8	1.94	4.04
Annual	25.3	1962	3.56	1977	13.8	5.79	0.42	100



05077700 RUFFY BROOK NEAR GONVICK, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0.59	0.66	0.93	4.60	3.30	1.50	1.00	0.79	0.54	0.89	1.60	0.43	0.74
90	1.10	0.76	1.20	6.81	5.30	2.20	1.50	0.93	0.81	1.30	1.90	1.30	1.20
85	1.20	0.99	1.50	8.55	6.64	2.50	1.80	1.10	1.20	1.80	2.20	1.50	1.60
80	1.20	1.10	1.90	13.4	7.65	3.00	1.80	1.10	1.20	1.80	2.20	1.90	1.60
75	1.40	1.30	1.90	17.9	8.83	3.50	2.20	1.30	1.50	2.20	2.50	2.20	2.00
70	1.70	1.30	2.50	21.1	10.5	4.20	2.20	1.50	1.80	2.70	2.90	2.50	2.00
65	1.90	1.50	2.50	24.2	12.6	4.90	2.60	1.50	1.80	3.20	3.80	2.80	2.60
60	2.10	1.70	2.50	27.9	14.7	6.34	2.60	1.70	1.80	3.20	3.80	2.80	2.60
55	2.30	2.20	3.20	31.4	16.7	7.17	3.20	2.00	2.20	3.20	4.40	3.20	3.65
50	2.60	2.20	3.20	36.9	18.6	7.90	3.20	2.00	2.20	3.80	4.40	3.60	4.11
45	3.20	2.50	3.20	42.5	20.4	9.70	3.80	2.00	2.20	3.80	5.10	3.60	4.62
40	3.20	2.90	4.48	51.8	23.6	11.3	3.80	2.40	2.70	4.60	5.10	4.00	5.18
35	3.60	3.30	4.86	61.4	26.9	13.5	4.60	2.80	2.70	5.88	5.90	4.60	6.05
30	3.60	3.30	5.44	71.3	30.6	16.3	5.91	2.80	3.30	6.71	5.90	4.60	7.70
25	4.00	3.80	6.07	82.2	35.2	20.9	6.82	3.30	4.00	8.01	7.07	5.20	9.50
20	4.50	3.80	9.15	98.0	40.7	27.8	7.58	3.80	5.60	9.51	8.06	5.90	14.0
15	4.50	4.40	21.3	113	47.4	35.7	8.87	4.50	7.34	11.9	10.2	7.70	21.0
10	6.10	5.00	34.7	138	63.0	46.9	14.0	7.13	11.2	15.5	14.7	10.5	34.6
5	8.56	6.60	52.0	173	97.0	64.5	28.0	12.3	24.0	28.4	20.2	13.2	65.4

05077700 RUFFY BROOK NEAR GONVICK, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	22.5	21.3	16.6	10.2
0.95	1.05	62.6	47.2	43.2	33.0	22.1
0.90	1.11	81.5	66.8	59.8	45.3	31.4
0.80	1.25	110	97.5	84.7	63.4	45.1
0.50	2	187	177	144	106	76.7
0.20	5	296	276	210	152	108
0.10	10	367	329	242	174	121
0.04	25	454	383	271	193	132
0.02	50	515	416	287	204	136
0.01	100	574	442	299	212	140
0.005	200	630	464	308	218	142
0.002	500	702	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0.279	0.553	0.742	0.983	1.13
0.10	10	0.310	0.348	0.389	0.394	0.447	0.773	0.987	1.26	1.46
0.20	5	0.476	0.528	0.623	0.662	0.729	1.10	1.35	1.66	1.98
0.50	2	0.830	0.900	1.09	1.24	1.46	1.92	2.24	2.66	3.48

05077700 RUFFY BROOK NEAR GONVICK, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	0	0	0	0.391	0	0	0.775	1.81		
0.10	10	0.109	0.408	0.414	0.585	0.720	0.720	1.06	2.26		
0.20	5	0.779	0.783	0.802	0.921	1.13	1.13	1.49	3.04		
0.50	2	1.83	1.85	1.91	1.99	2.13	2.15	2.62	5.74		
		June-July-August				September-October-November					
		0.05	20	0.453	0.730	0.848	1.03	0.297	0.438	0.697	0.764
		0.10	10	0.540	0.823	0.967	1.19	0.430	0.600	0.907	1.03
		0.20	5	0.671	0.960	1.14	1.42	0.647	0.856	1.23	1.45
		0.50	2	1.03	1.32	1.59	2.06	1.26	1.56	2.07	2.72

05077700 RUFFY BROOK NEAR GONVICK, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1960	April 17	4.45	74.0	1978	April 7	5.67	357
1961	April 20	3.74	66.0	1979	April 20	4.94	284
1962	July 7	6.70	364	1980	April 5	3.36	137
1963	May 28	5.48	225	1981	June 28	--	150
1964	April 16	4.45	134	1982	April 15	4.59	249
1965	April 13	6.38	412	1983	March 7	4.81	175
1966	April 2	5.53	265	1984	March 26	4.03	195
1967	March 30	6.35	453	1985	May 13	4.91	281
1968	June 10	2.70	76.0	1986	March 29	4.61	190
1969	April 9	6.62	232	1987	July 22	6.05	395
1970	April 29	5.28	279	1988	April 4	5.20	165
1971	April 8	5.40	176	1989	April 5	4.44	178
1972	April 17	4.87	237	1990	June 20	--	30.0
1973	September 2	3.94	156	1991	July 3	2.29	66.0
1974	April 12	5.80	268	1992	March 7	3.25	98.0
1975	April 17	5.74	364	1993	March 29	3.74	169
1976	March 29	5.25	147	1994	July 19	2.85	112
1977	September 24	2.05	47.0	1995	March 13	6.10	200
Annual peak discharge, from highest to lowest, and corresponding gage height							
1967	March 30	6.35	453	1989	April 5	4.44	178
1965	April 13	6.38	412	1971	April 8	5.40	176
1987	July 22	6.05	395	1983	March 7	4.81	175
1962	July 7	6.70	364	1993	March 29	3.74	169
1975	April 17	5.74	364	1988	April 4	5.20	165
1978	April 7	5.67	357	1973	September 2	3.94	156
1979	April 20	4.94	284	1981	June 28	--	150
1985	May 13	4.91	281	1976	March 29	5.25	147
1970	April 29	5.28	279	1980	April 5	3.36	137
1974	April 12	5.80	268	1964	April 16	4.45	134
1966	April 2	5.53	265	1994	July 19	2.85	112
1982	April 15	4.59	249	1992	March 7	3.25	98.0
1972	April 17	4.87	237	1968	June 10	2.70	76.0
1969	April 9	6.62	232	1960	April 17	4.45	74.0
1963	May 28	5.48	225	1961	April 20	3.74	66.0
1995	March 13	6.10	200	1991	July 3	2.29	66.0
1984	March 26	4.03	195	1977	September 24	2.05	47.0
1986	March 29	4.61	190	1990	June 20	--	30.0

05077700 RUFFY BROOK NEAR GONVICK, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1960	--	--	--	--	--	--	31.5	10.3	25.2	4.73	3.28	2.25	--
1961	1.60	2.47	1.75	0.932	0.889	6.44	26.3	26.8	2.29	2.10	1.17	4.10	6.43
1962	3.22	3.53	1.76	1.21	1.69	2.68	60.9	104.8	54.4	57.3	3.38	7.28	25.3
1963	4.26	5.53	3.89	1.87	1.02	10.9	31.9	38.2	53.2	7.98	6.89	2.17	14.0
1964	1.97	2.12	1.35	1.22	1.37	2.32	50.1	22.4	12.7	4.45	1.58	5.67	8.89
1965	5.92	3.61	2.91	2.50	1.72	2.56	92.9	51.6	49.2	5.26	2.45	4.75	18.7
1966	10.2	5.15	4.84	4.18	2.76	37.5	118.2	33.6	6.83	4.33	18.7	2.94	20.8
1967	5.08	5.11	2.49	2.09	2.33	30.3	71.3	28.7	29.4	6.19	1.94	0.623	15.4
1968	1.15	1.71	4.58	2.76	0.393	14.2	22.4	10.6	23.9	7.62	1.82	2.62	7.80
1969	5.09	3.41	3.00	2.06	3.64	3.10	74.1	34.1	16.1	3.55	5.04	2.53	12.9
1970	12.4	10.0	5.79	4.59	4.33	4.66	85.8	38.5	25.7	3.96	1.41	1.56	16.5
1971	4.48	6.38	4.06	1.44	1.22	2.07	54.2	16.8	7.71	4.85	2.14	3.18	9.01
1972	34.7	31.4	8.23	6.61	4.79	17.8	74.1	29.9	9.50	11.8	8.38	2.54	19.9
1973	5.54	8.31	3.71	4.09	4.83	33.9	12.8	8.74	2.52	3.22	3.12	59.3	12.5
1974	28.9	8.30	11.5	8.99	7.38	5.81	85.2	43.9	12.3	2.87	3.20	2.15	18.4
1975	3.19	5.01	3.66	3.32	4.08	5.73	89.6	27.2	13.8	38.2	2.93	6.44	16.9
1976	5.13	6.51	4.11	3.55	3.58	18.5	35.2	5.42	2.60	2.14	1.09	0.694	7.35
1977	1.21	1.45	0.314	0.396	0.998	3.79	6.91	4.61	3.39	3.88	1.89	13.9	3.56
1978	13.1	13.7	13.6	5.25	2.80	3.99	91.7	10.9	5.61	5.23	2.70	3.78	14.3
1986	--	--	--	--	--	28.8	48.8	35.0	7.89	6.62	2.73	2.99	--
1987	3.52	--	--	--	--	--	--	--	--	--	--	--	--

05078000 CLEARWATER RIVER AT PLUMMER, MN

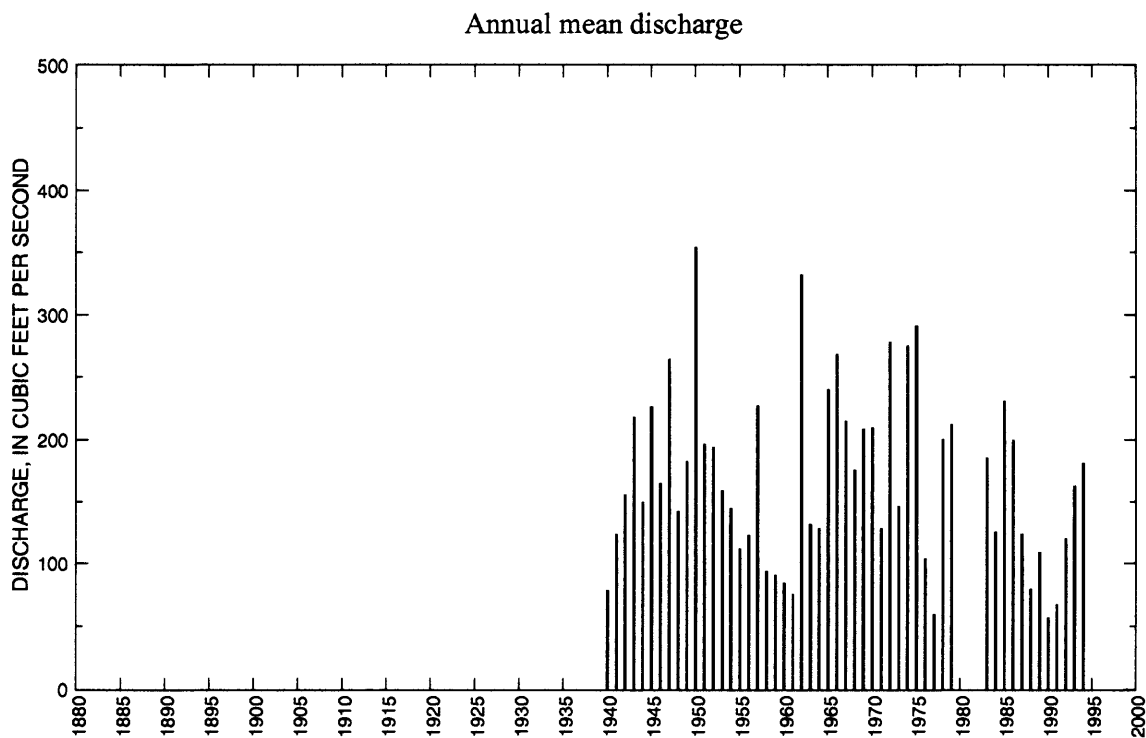
LOCATION.--Lat 47°55'24", long 96°02'46", in SE¹/₄SW¹/₄ sec.4, T.151 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, on right bank 200 ft downstream from Soo Line Railroad bridge, 300 ft downstream from bridge on U.S. Highway 59, 0.9 mi northwest of railroad depot in Plummer, and 8 mi upstream from Hill River.

DRAINAGE AREA.--512 mi².

PERIOD OF RECORD.--April 1939 to September 1979, March 1982 to current year. Annual maximums only, October 1979 to February 1982.

GAGE.--Water-stage recorder. Datum of gage is 1,098.57 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to Nov. 10, 1939, nonrecording gage at site 100 ft upstream at same datum.

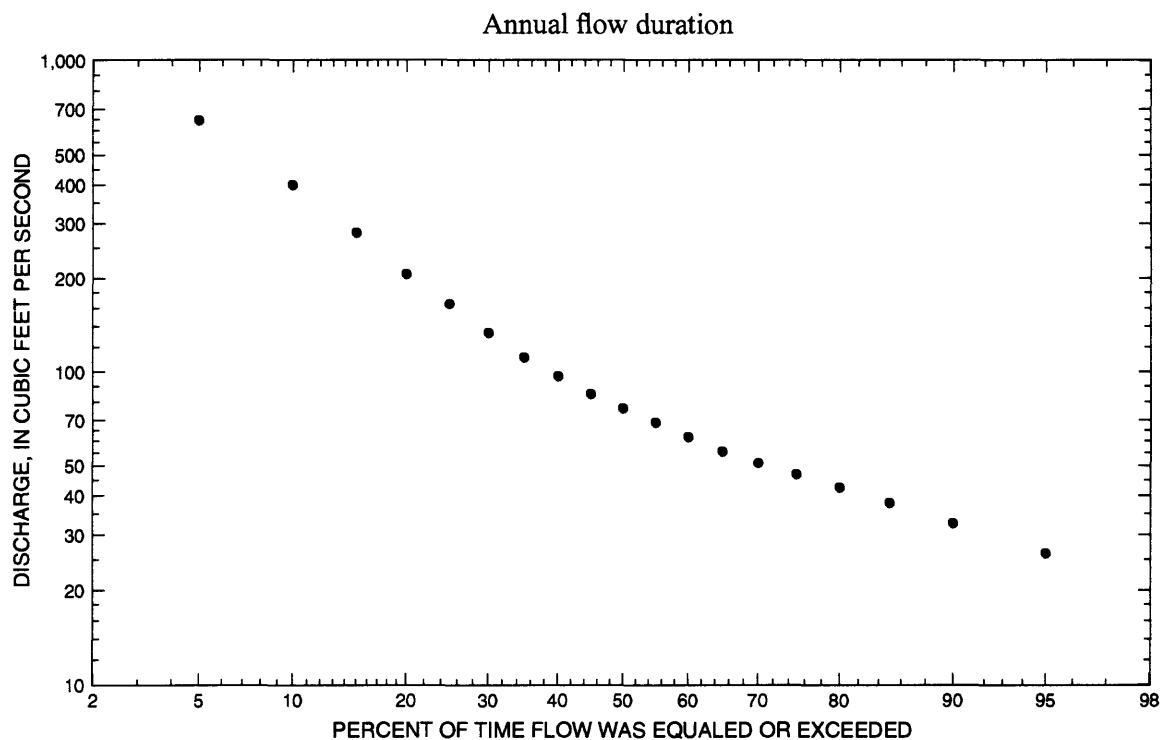
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,940 ft³/s, Apr. 25, 1979, gage height, 12.31 ft; maximum gage height, 12.37 ft, Apr. 18, 1979, backwater from ice; minimum daily discharge, 2.6 ft³/s, May 16, 1977, gage height, 1.71.



05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	483	1972	21.5	1941	113	95.8	0.85	5.59
November	503	1972	23.8	1991	91.0	71.2	0.78	4.49
December	140	1978	24.4	1990	63.3	25.6	0.40	3.12
January	90.1	1952	18.4	1940	50.7	17.2	0.34	2.50
February	98.4	1974	19.0	1940	47.0	16.9	0.36	2.32
March	351	1945	22.8	1940	109	89.6	0.82	5.39
April	1,390	1966	26.8	1977	516	347	0.67	25.5
May	1,970	1950	7.52	1977	347	321	0.93	17.1
June	1,140	1962	30.1	1991	254	228	0.90	12.5
July	844	1975	16.0	1940	206	182	0.88	10.2
August	507	1985	13.3	1940	123	107	0.87	6.05
September	666	1973	14.1	1940	106	101	0.95	5.25
Annual	354	1950	57.0	1990	170	70.7	0.42	100



05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	25.0	25.7	26.8	33.3	34.4	33.4	28.7	22.1	20.7	26.5	30.5	29.3	26.1
90	29.1	28.5	30.7	53.4	57.6	44.7	42.2	29.3	28.5	34.2	37.9	35.2	32.6
85	32.2	30.3	33.4	73.7	77.8	56.5	51.7	35.8	33.8	40.4	42.7	38.2	37.8
80	35.1	32.1	35.6	91.9	97.2	70.9	59.8	40.9	38.9	43.6	46.0	40.2	42.3
75	37.5	33.6	38.7	123	115	85.6	67.8	44.9	44.1	46.8	49.5	44.0	46.7
70	39.9	35.3	42.8	159	134	98.7	76.3	49.0	50.0	49.7	53.4	46.5	51.0
65	42.4	38.1	45.6	198	155	110	85.6	53.5	55.3	53.2	57.4	50.5	55.3
60	44.7	40.2	48.4	231	174	122	95.5	58.8	61.4	58.5	61.4	53.5	61.7
55	46.6	43.2	51.4	278	194	134	106	65.0	67.7	66.1	66.0	56.2	68.5
50	49.0	45.5	54.7	334	220	148	119	73.3	74.3	72.2	71.2	58.6	76.4
45	52.3	47.4	58.0	393	249	167	136	84.1	81.6	77.6	78.0	60.9	84.7
40	54.6	49.1	63.2	453	284	189	158	98.5	88.9	92.7	85.0	66.4	96.6
35	56.5	50.9	69.7	531	330	216	181	112	96.1	109	92.0	70.6	111
30	59.1	53.8	80.1	626	380	257	208	128	104	127	99.7	74.6	134
25	62.3	57.5	92.9	727	435	309	245	144	115	147	108	78.6	165
20	66.8	62.9	104	828	512	369	293	166	136	167	120	83.7	206
15	72.1	69.0	155	987	618	446	347	204	176	190	135	89.1	280
10	76.5	73.0	277	1,240	773	541	435	273	233	239	166	96.8	399
5	83.6	78.9	464	1,710	1,050	787	634	399	313	315	200	108	644

05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	311	313	286	227	169
0.95	1.05	484	461	410	328	251
0.90	1.11	611	567	498	400	309
0.80	1.25	806	731	634	510	397
0.50	2	1,360	1,200	1,020	817	637
0.20	5	2,250	1,980	1,660	1,320	1,010
0.10	10	2,920	2,580	2,160	1,700	1,290
0.04	25	3,840	3,440	2,880	2,240	1,660
0.02	50	4,570	4,140	3,470	2,670	1,950
0.01	100	5,340	4,900	4,120	3,140	2,250
0.005	200	6,140	5,720	4,820	3,640	2,570
0.002	500	7,280	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	7.08	8.03	9.19	11.0	13.7	19.5	23.1	26.0	29.8
0.10	10	10.0	11.4	13.2	15.3	18.3	23.4	27.3	30.6	35.4
0.20	5	14.6	16.6	19.2	21.4	24.8	28.7	32.9	36.8	43.5
0.50	2	26.3	29.0	32.7	34.9	38.6	40.7	45.3	50.7	63.7

05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	16.1	19.8	21.3	23.1	8.46	11.1	13.5	17.9		
0.10	10	19.8	23.1	24.6	26.6	12.7	16.6	19.2	24.4		
0.20	5	24.9	27.7	29.2	31.5	19.6	25.1	27.7	35.1		
0.50	2	37.3	38.7	40.1	42.7	37.1	44.9	47.8	67.7		
		June-July-August				September-October-November					
		0.05	20	10.9	14.5	17.6	22.0	12.3	15.8	17.6	20.9
		0.10	10	14.9	18.8	22.1	27.6	15.8	19.8	22.2	26.4
		0.20	5	21.3	25.5	29.0	36.8	21.2	26.0	29.2	34.8
		0.50	2	39.3	44.6	49.5	64.7	36.8	43.0	48.0	57.3

05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1939	April 27	--	380	1967	April 3	10.19	2,470
1940	April 16	6.98	840	1968	June 18	11.00	3,000
1941	June 8	6.57	756	1969	April 11	11.89	3,630
1942	April 3	6.12	722	1970	April 26	9.48	2,080
1943	April 21	6.43	800	1971	April 10	8.32	1,520
1944	August 10	8.12	1,160	1972	April 16	10.33	2,550
1945	March 28	6.76	952	1973	September 6	7.98	1,270
1946	March 23	8.09	1,030	1974	April 22	10.31	2,540
1947	June 11	8.34	1,420	1975	July 4	11.19	2,960
1948	April 25	6.80	929	1976	April 1	8.86	1,250
1949	June 1	9.08	1,870	1977	September 27	4.85	429
1950	May 6	11.33	3,630	1978	April 13	11.40	3,270
1951	May 3	7.22	1,110	1979	April 25	12.31	3,940
1952	April 15	8.10	1,440	1980	April 8	6.57	898
1953	July 5	6.23	834	1981	June 29	7.37	1,150
1954	April 13	8.52	1,640	1982	April 16	8.71	1,700
1955	April 6	9.64	1,800	1983	March 7	10.17	1,200
1956	April 21	9.58	2,240	1984	June 9	9.07	1,880
1957	June 27	11.84	3,570	1985	August 19	8.59	1,650
1958	July 6	6.08	822	1986	May 1	8.03	1,430
1959	April 6	6.37	702	1987	July 27	7.62	1,290
1960	April 7	8.18	710	1988	April 7	8.22	900
1961	April 25	4.88	461	1989	April 15	9.34	1,200
1962	June 9	11.90	3,640	1990	June 22	4.67	393
1963	April 4	7.54	966	1991	July 7	5.39	565
1964	April 17	8.57	1,640	1992	August 26	6.60	776
1965	April 12	11.88	3,620	1993	July 28	7.20	954
1966	April 3	10.73	2,000	1994	July 9	9.22	1,440
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 25	12.31	3,940	1966	April 3	10.73	2,000
1962	June 9	11.90	3,640	1984	June 9	9.07	1,880
1950	May 6	11.33	3,630	1949	June 1	9.08	1,870
1969	April 11	11.89	3,630	1955	April 6	9.64	1,800
1965	April 12	11.88	3,620	1982	April 16	8.71	1,700
1957	June 27	11.84	3,570	1985	August 19	8.59	1,650
1978	April 13	11.40	3,270	1954	April 13	8.52	1,640
1968	June 18	11.00	3,000	1964	April 17	8.57	1,640
1975	July 4	11.19	2,960	1971	April 10	8.32	1,520
1972	April 16	10.33	2,550	1952	April 15	8.10	1,440
1974	April 22	10.31	2,540	1994	July 9	9.22	1,440
1967	April 3	10.19	2,470	1986	May 1	8.03	1,430
1956	April 21	9.58	2,240	1947	June 11	8.34	1,420
1970	April 26	9.48	2,080	1987	July 27	7.62	1,290

05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1973	September 6	7.98	1,270	1940	April 16	6.98	840
1976	April 1	8.86	1,250	1953	July 5	6.23	834
1983	March 7	10.17	1,200	1958	July 6	6.08	822
1989	April 15	9.34	1,200	1943	April 21	6.43	800
1944	August 10	8.12	1,160	1992	August 26	6.60	776
1981	June 29	7.37	1,150	1941	June 8	6.57	756
1951	May 3	7.22	1,110	1942	April 3	6.12	722
1946	March 23	8.09	1,030	1960	April 7	8.18	710
1963	April 4	7.54	966	1959	April 6	6.37	702
1993	July 28	7.20	954	1991	July 7	5.39	565
1945	March 28	6.76	952	1961	April 25	4.88	461
1948	April 25	6.80	929	1977	September 27	4.85	429
1988	April 7	8.22	900	1990	June 22	4.67	393
1980	April 8	6.57	898	1939	April 27	--	380

05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1939	--	--	--	--	--	--	--	108.7	46.6	30.7	18.5	38.2	--
1940	44.3	47.3	27.6	18.4	19.0	22.8	320.3	333.0	71.6	16.0	13.3	14.1	78.9
1941	21.5	37.3	28.5	28.2	30.3	30.2	388.6	178.5	378.7	161.7	67.6	141.9	123.9
1942	301.3	154.6	50.1	29.7	28.6	128.7	419.6	367.2	60.9	29.5	44.5	255.7	156.2
1943	245.1	85.8	52.9	36.6	26.1	32.3	652.1	512.1	530.1	234.4	115.6	95.8	218.5
1944	72.8	75.3	42.2	28.3	29.8	33.9	150.6	245.0	273.3	218.0	381.6	252.4	150.5
1945	223.0	205.9	136.8	46.9	48.2	350.7	832.7	462.4	133.4	88.3	65.0	121.5	226.6
1946	183.9	100.4	69.0	55.2	41.7	318.0	633.2	226.5	129.2	130.8	44.0	51.8	165.6
1947	150.4	108.3	49.9	44.3	43.6	74.0	630.3	835.3	778.4	269.4	83.6	105.5	264.7
1948	127.0	84.3	69.0	50.9	33.9	38.9	637.8	451.8	55.0	77.4	48.7	34.7	142.4
1949	29.2	42.9	38.8	32.6	28.1	33.5	240.2	209.5	615.3	269.6	412.8	245.0	183.3
1950	122.6	118.7	74.7	59.0	50.2	53.9	525.4	1,974	568.3	433.8	145.2	95.1	354.5
1951	159.5	126.6	80.0	76.0	68.0	72.1	607.4	715.2	157.5	56.2	59.4	181.9	196.9
1952	152.1	106.7	100.9	90.1	76.9	121.8	724.0	273.5	113.3	413.7	104.2	55.5	194.4
1953	45.2	59.3	54.9	47.5	48.0	156.5	312.6	332.3	344.4	344.4	103.4	60.6	159.6
1954	54.8	66.6	80.0	69.6	78.4	103.0	639.3	288.5	186.0	65.2	54.8	60.1	145.1
1955	63.5	62.3	54.5	44.0	37.4	44.1	578.5	158.6	182.3	71.4	30.9	23.6	112.1
1956	47.9	44.8	46.3	47.1	45.4	46.2	533.3	328.5	129.7	55.2	60.1	98.4	123.1
1957	43.7	90.2	39.9	37.2	40.5	111.7	704.2	213.4	916.6	356.2	48.0	138.8	227.3
1958	114.8	135.9	60.2	45.6	42.4	69.7	81.5	74.7	168.9	259.2	37.3	33.3	93.9
1959	49.9	49.8	38.5	35.5	31.0	63.1	223.7	200.9	215.8	97.4	46.3	39.1	91.0
1960	49.0	40.1	41.1	39.2	33.8	37.4	317.1	122.2	174.6	75.5	36.9	54.5	84.7
1961	38.5	52.7	46.6	31.9	26.3	83.7	210.1	218.7	47.1	41.1	29.1	76.5	75.4
1962	65.7	54.6	37.5	30.5	28.9	33.2	502.7	1,151	1,140	671.0	133.2	126.8	332.3
1963	69.7	85.5	70.6	31.2	25.5	133.3	363.2	217.2	382.1	103.7	59.1	45.4	132.1
1964	44.3	45.5	38.6	30.8	31.9	35.1	489.8	314.5	297.3	97.9	37.8	85.6	128.5
1965	106.0	67.0	51.9	42.2	39.8	43.7	1,152	510.0	629.6	109.5	47.0	100.4	240.5
1966	234.7	91.3	74.5	65.6	56.1	272.2	1,391	514.1	127.4	64.0	220.6	113.2	268.7
1967	83.0	80.2	61.8	62.0	58.9	110.7	1,050	558.5	332.7	122.6	37.6	29.9	215.2
1968	48.1	50.6	58.0	44.3	45.3	233.5	243.7	149.7	270.7	613.1	247.4	101.2	176.3
1969	104.3	83.4	69.5	56.0	56.2	80.6	1,086	411.6	275.3	117.2	100.6	75.4	209.1
1970	196.0	139.9	85.6	85.3	68.0	46.7	759.5	638.2	324.4	92.0	44.1	42.2	210.2
1971	80.2	154.4	103.5	76.8	43.0	57.9	463.1	176.4	138.3	89.6	78.0	81.9	128.4
1972	483.1	503.4	101.9	68.3	74.6	212.5	933.4	427.5	140.8	119.1	195.7	85.8	278.5
1973	96.5	103.6	79.5	49.0	43.9	332.5	74.1	54.5	38.5	34.2	187.5	666.4	146.7

05078000 CLEARWATER RIVER AT PLUMMER, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1974	407.1	143.4	98.6	78.3	98.4	99.5	1,027	695.5	254.3	57.6	267.6	75.5	275.6
1975	78.8	110.5	86.4	76.7	66.2	70.7	1,094	585.7	218.9	843.7	158.1	98.6	291.5
1976	97.9	121.5	88.8	74.2	71.5	131.8	378.7	31.6	57.6	86.5	100.5	14.4	104.3
1977	25.4	39.7	36.4	34.2	34.0	33.4	26.8	7.52	51.8	164.4	67.9	197.4	59.9
1978	192.6	156.9	139.9	75.6	54.1	58.2	1,169	106.8	95.4	167.1	100.6	100.6	200.7
1979	56.9	46.8	44.0	48.8	68.3	41.6	1,110	392.8	179.6	268.4	229.7	70.8	212.8
1980	50.5	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	127.7	783.1	546.5	156.4	293.1	115.5	45.6	--
1983	228.1	66.3	58.6	55.8	46.1	347.5	297.5	156.1	347.1	265.8	223.0	127.1	185.8
1984	142.5	75.6	68.5	55.3	64.2	170.7	155.9	107.5	464.9	110.2	71.9	26.3	125.8
1985	191.9	156.2	85.2	57.8	44.9	199.1	213.7	498.5	278.0	341.2	506.8	180.6	231.2
1986	201.4	94.8	88.5	66.2	70.4	273.0	599.6	514.6	132.8	182.7	93.6	75.8	200.2
1987	55.7	63.3	69.4	55.0	50.0	127.3	56.7	249.0	115.1	337.4	204.8	92.0	124.0
1988	59.5	51.4	51.8	48.1	47.5	98.7	292.9	66.5	42.0	75.9	74.4	51.8	79.9
1989	48.5	37.9	44.9	68.6	48.8	48.5	513.6	147.8	131.8	99.3	62.8	63.1	109.3
1990	39.0	30.6	24.4	33.4	35.0	40.8	43.6	72.1	172.3	95.7	70.2	26.0	57.0
1991	23.5	23.8	31.8	29.7	29.4	35.7	30.5	31.7	30.1	347.2	95.4	95.8	67.6
1992	37.1	43.9	44.2	35.1	33.4	64.1	155.1	129.3	73.8	301.0	227.5	296.3	120.3
1993	57.6	59.9	57.6	55.5	51.5	108.5	330.1	139.8	203.9	406.3	352.5	124.3	163.0
1994	55.7	51.8	57.6	54.0	53.4	88.6	209.5	293.9	341.4	646.6	159.7	154.6	181.5

05078230 LOST RIVER AT OKLEE, MN

LOCATION.--Lat 47°50'35", long 95°51'30", in SE¹/₄NE¹/₄ sec.2, T.150 N., R.41 W., Red Lake County, Hydrologic Unit 09020305, on downstream side of bridge on State Highway 222 at northwest edge of Oklee, 12 mi upstream from mouth.

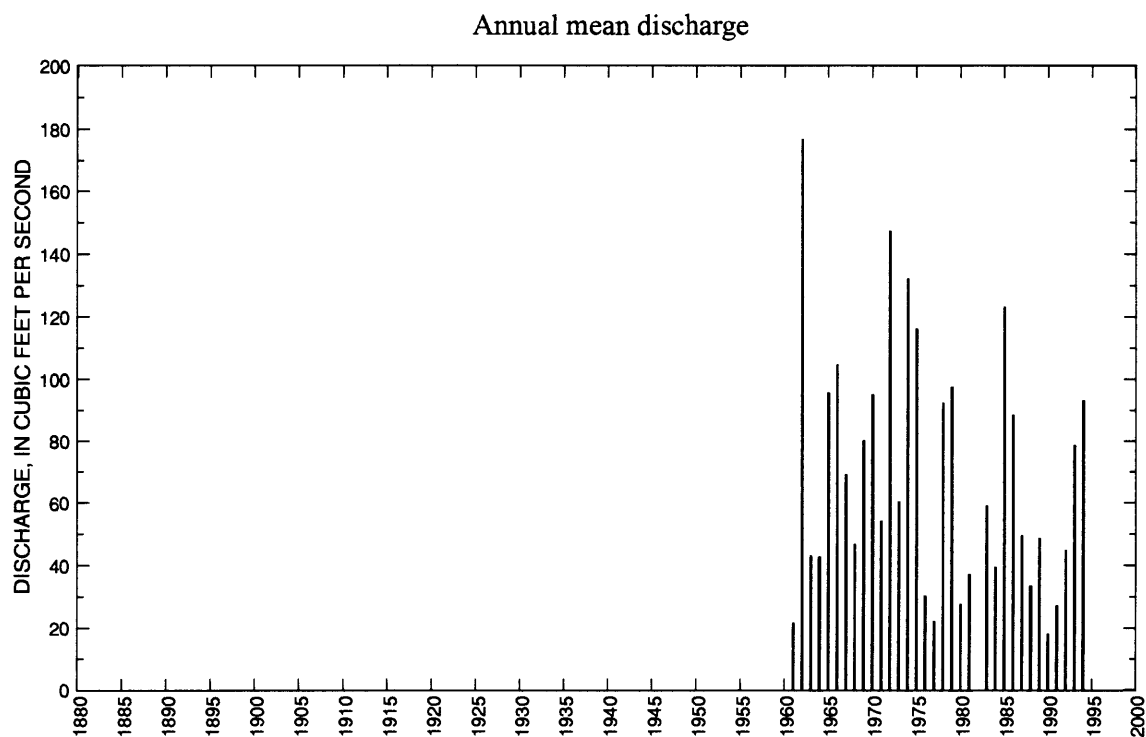
DRAINAGE AREA.--266 mi².

PERIOD OF RECORD.--April 1960 to September 1981, February 1982 to current year. Monthly and daily figures for April 1960, to June 1960, published in WSP 2113.

GAGE.--Water-stage recorder. Datum of gage is 1,126.94 ft above sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Sept. 9, 1960, reference points at same site at datum 8.00 ft higher. Sept. 9, 1960, to Sept. 30, 1964, nonrecording gage at same site at datum 8.00 ft higher. Oct. 1, 1964, to Sept. 30, 1981, and Feb. 24, 1982, to Sept. 6, 1989, nonrecording gage at same site and datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,210 ft³/s, Apr. 11, 1969, gage height, 14.91 ft; maximum gage height, 16.72 ft, May 24, 1962; no flow at times.

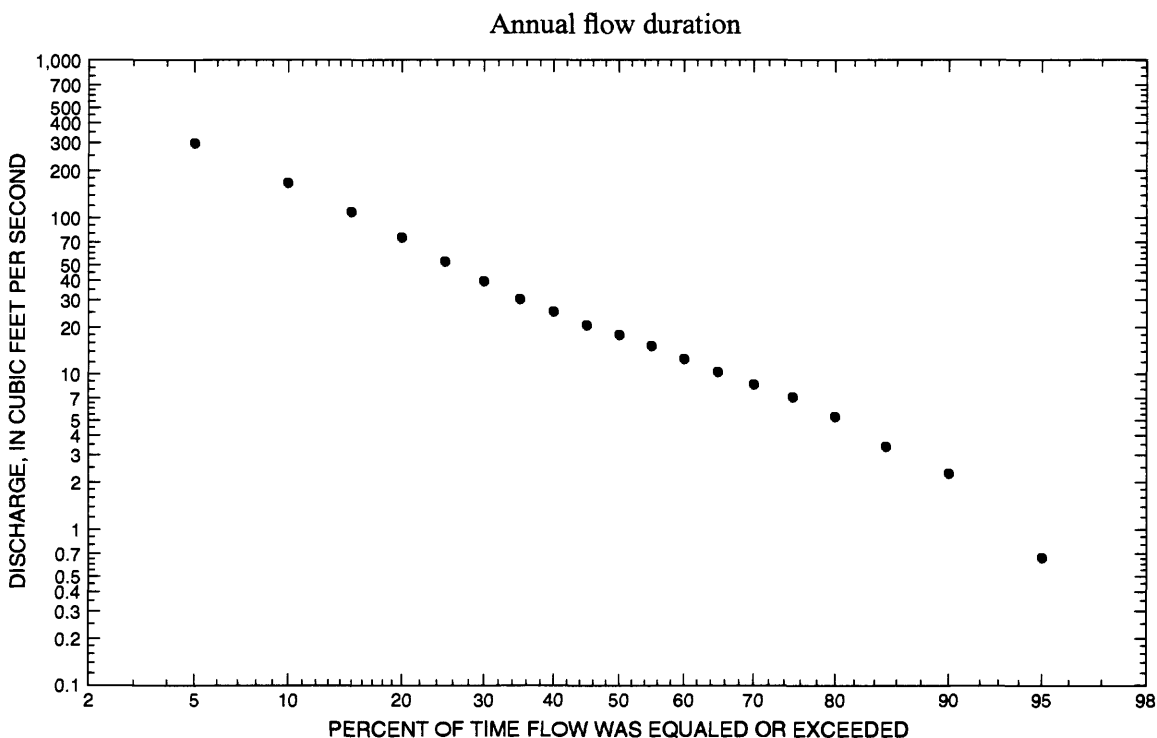
EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1897, 18.39 ft, present datum, Apr. 21, 1950, from floodmarks.



05078230 LOST RIVER AT OKLEE, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	470	1972	1.02	1991	45.1	83.8	1.86	5.37
November	232	1972	1.11	1977	29.9	40.2	1.35	3.56
December	56.6	1978	0.050	1977	13.4	11.3	0.85	1.59
January	19.8	1986	0.002	1977	7.94	5.72	0.72	0.95
February	25.8	1984	0	1977	7.65	5.92	0.77	0.91
March	242	1986	0.190	1964	71.0	66.5	0.94	8.46
April	745	1966	29.5	1991	293	234	0.80	34.9
May	622	1962	10.5	1980	127	120	0.94	15.1
June	657	1962	8.20	1980	87.8	115	1.31	10.5
July	442	1962	1.99	1961	78.4	104	1.33	9.34
August	351	1985	1.17	1961	40.9	75.6	1.85	4.87
September	330	1973	0	1990	37.4	62.1	1.66	4.45
Annual	177	1962	18.2	1990	69.7	39.9	0.57	100



05078230 LOST RIVER AT OKLEE, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0.19	0	0.09	22.6	10.6	5.64	2.30	0.40	0.23	1.30	1.50	0.74	0.66
90	0.50	0.18	1.60	29.1	17.4	7.70	3.96	0.83	0.71	1.80	2.50	2.20	2.27
85	1.70	0.46	3.23	37.0	22.0	11.4	5.10	1.20	1.60	3.36	5.75	2.80	3.40
80	2.20	1.70	6.14	47.1	27.7	14.0	6.24	1.70	2.90	4.28	7.37	3.92	5.28
75	2.20	2.60	7.81	58.0	32.9	16.6	8.89	3.60	4.16	6.62	9.41	4.65	7.09
70	2.80	2.60	8.82	75.0	38.4	19.6	11.7	4.17	5.36	7.95	11.1	5.32	8.59
65	4.10	3.70	9.83	92.0	45.4	23.6	14.6	5.48	7.04	10.0	13.2	6.37	10.3
60	4.98	5.89	11.3	106	54.5	28.1	17.4	6.67	8.85	11.9	15.6	6.91	12.5
55	6.04	6.93	13.0	122	65.4	32.9	20.2	8.79	10.9	15.5	18.2	8.69	15.2
50	7.56	8.02	15.2	141	76.1	37.2	23.1	11.4	13.3	18.1	20.6	10.1	17.9
45	8.53	8.29	18.4	166	85.5	42.8	27.7	13.8	15.6	20.3	23.0	12.9	20.6
40	9.47	8.55	22.2	199	95.0	51.8	32.8	16.4	18.3	22.5	25.6	14.9	25.2
35	10.3	8.82	28.8	236	110	64.2	39.1	19.9	21.5	25.9	28.4	16.6	30.3
30	11.1	9.94	41.6	285	129	78.5	48.5	23.7	25.5	32.1	31.4	18.4	39.2
25	12.6	10.7	62.3	353	153	98.1	62.0	29.1	30.8	40.0	34.6	20.0	52.5
20	13.6	11.5	94.1	435	181	118	84.6	36.3	38.8	50.5	37.8	21.7	74.6
15	14.6	14.6	134	514	220	148	127	50.7	57.1	65.9	44.2	23.3	109
10	16.5	15.9	200	705	280	201	200	84.1	93.7	95.7	55.0	26.9	166
5	18.9	17.8	318	1,200	441	355	370	150	158	166	81.6	32.0	298

05078230 LOST RIVER AT OKLEE, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	124	103	90.4	63.8	48.8
0.95	1.05	258	207	170	120	88.4
0.90	1.11	371	293	234	165	120
0.80	1.25	562	436	339	238	170
0.50	2	1,150	878	656	460	321
0.20	5	2,120	1,630	1,200	835	576
0.10	10	2,810	2,180	1,600	1,110	765
0.04	25	3,710	2,920	2,150	1,490	1,020
0.02	50	4,370	3,470	2,580	1,780	1,220
0.01	100	5,020	4,030	3,020	2,070	1,430
0.005	200	5,650	4,590	3,470	2,370	1,640
0.002	500	6,470	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0.102	0.278	0.592	1.27
0.10	10	0	0	0	0	0.032	0.385	0.855	1.35	2.32
0.20	5	0.171	0.206	0.282	0.408	0.558	1.12	2.10	3.11	4.51
0.50	2	1.31	1.51	1.85	2.44	3.48	4.59	6.68	9.70	13.1

05078230 LOST RIVER AT OKLEE, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	0	0	0	0.063	0	0	0.047	2.01		
0.10	10	0.080	0.078	0.082	0.303	0.155	0.435	¹ 1.00	4.44		
0.20	5	1.00	1.04	1.07	¹ 1.10	1.25	1.63	¹ 3.00	10.0		
0.50	2	4.91	5.18	5.27	¹ 5.40	5.53	7.32	¹ 15.0	31.4		
		June-July-August				September-October-November					
		0.05	20	0.052	0.238	0.483	1.51	0.054	0.082	0.226	0.517
		0.10	10	0.164	0.442	0.800	2.14	0.200	0.307	0.678	1.28
		0.20	5	0.466	0.910	1.46	3.33	0.615	0.940	1.72	2.83
		0.50	2	2.33	3.31	4.47	8.28	3.22	4.64	6.56	9.29

¹Graphical interpretation.

05078230 LOST RIVER AT OKLEE, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1950	April 21	18.39	2,790	1978	April 9	16.64	3,140
1961	April 23	¹ 4.34	279	1979	April 20	14.63	2,140
1962	May 24	¹ 8.72	1,490	1980	April 3	9.95	670
1963	June 4	¹ 5.13	355	1981	September 8	12.98	1,560
1964	April 16	¹ 6.07	472	1982	April 16	12.04	1,320
1965	April 12	11.12	1,780	1983	March 7	13.29	520
1966	April 2	12.60	2,240	1984	June 9	9.13	626
1967	March 31	14.17	2,880	1985	August 18	15.03	2,320
1968	July 17	7.35	551	1986	March 30	13.50	1,720
1969	April 11	14.91	3,210	1987	July 24	9.00	661
1970	April 25	12.76	2,300	1988	April 4	9.68	620
1971	April 8	12.34	1,430	1989	April 6	13.57	940
1972	April 15	13.98	2,070	1990	June 21	5.89	134
1973	September 4	11.27	1,030	1991	September 10	6.60	247
1974	August 15	12.91	2,270	1992	March 9	12.33	500
1975	April 19	14.66	2,120	1993	March 30	12.47	1,000
1976	March 31	11.70	920	1994	July 8	--	1,270
1977	July 3	9.40	855				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1969	April 11	14.91	3,210	1973	September 4	11.27	1,030
1978	April 9	16.64	3,140	1993	March 30	12.47	1,000
1967	March 31	14.17	2,880	1989	April 6	13.57	940
1950	April 21	18.39	2,790	1976	March 31	11.70	920
1985	August 18	15.03	2,320	1977	July 3	9.40	855
1970	April 25	12.76	2,300	1980	April 3	9.95	670
1974	August 15	12.91	2,270	1987	July 24	9.00	661
1966	April 2	12.60	2,240	1984	June 9	9.13	626
1979	April 20	14.63	2,140	1988	April 4	9.68	620
1975	April 19	14.66	2,120	1968	July 17	7.35	551
1972	April 15	13.98	2,070	1983	March 7	13.29	520
1965	April 12	11.12	1,780	1992	March 9	12.33	500
1986	March 30	13.50	1,720	1964	April 16	¹ 6.07	472
1981	September 8	12.98	1,560	1963	June 4	¹ 5.13	355
1962	May 24	¹ 8.72	1,490	1961	April 23	¹ 4.34	279
1971	April 8	12.34	1,430	1991	September 10	6.60	247
1982	April 16	12.04	1,320	1990	June 21	5.89	134
1994	July 8	--	1,270				

¹Gage height recorded using datum 8 feet higher.

05078230 LOST RIVER AT OKLEE, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1960	--	--	--	--	--	--	172.2	65.6	198.0	79.2	1.85	1.52	--
1961	2.93	8.82	7.31	1.81	0.389	32.5	109.6	68.3	10.6	1.17	1.17	16.6	21.8
1962	14.6	13.5	4.64	2.70	1.99	8.03	265.3	622.0	656.9	442.3	39.3	45.4	177.1
1963	18.8	24.0	12.7	2.37	0.104	32.0	147.7	87.2	141.2	41.8	4.44	7.08	43.2
1964	2.71	1.81	1.25	0.203	0.048	0.190	223.5	127.6	94.2	22.3	4.48	39.7	42.9
1965	30.1	18.3	5.28	5.11	3.34	2.88	537.9	237.1	249.9	40.1	8.43	18.2	95.9
1966	65.8	35.8	22.6	6.50	2.70	80.6	744.8	210.5	39.9	9.46	31.3	11.4	104.8
1967	9.29	9.87	6.16	6.72	8.95	142.1	345.9	175.0	98.7	23.2	2.99	1.27	69.2
1968	2.50	2.94	4.39	1.35	0.276	133.8	120.1	57.5	91.8	124.5	6.92	13.4	46.8
1969	22.1	14.3	10.9	8.91	10.8	9.34	590.5	153.2	66.8	26.3	36.0	19.0	80.3
1970	77.2	55.7	21.2	12.2	9.57	11.6	571.1	235.0	134.2	8.78	3.14	7.46	95.2
1971	21.2	44.3	14.4	7.47	7.76	28.0	342.6	62.0	25.4	22.5	21.2	57.1	54.2
1972	470.0	231.8	31.2	12.2	9.28	165.0	502.5	217.1	45.7	32.8	30.4	18.7	147.4
1973	20.4	22.3	5.21	4.11	7.63	179.3	66.4	42.5	9.82	7.55	31.2	330.3	60.5
1974	146.5	43.6	20.9	16.1	16.9	20.4	677.2	270.7	66.3	8.68	281.4	17.4	132.4
1975	24.5	34.8	18.1	14.4	15.0	20.4	677.4	217.8	80.2	275.3	14.1	5.22	116.4
1976	7.71	12.7	2.49	2.69	5.70	77.3	186.5	21.9	19.6	20.0	8.42	0.826	30.4
1977	2.22	1.11	0.050	0.002	0	15.5	48.9	16.7	17.0	75.4	6.93	83.5	22.3
1978	73.7	74.3	56.6	16.6	7.54	21.9	726.3	64.7	25.3	22.9	10.9	15.4	92.4
1979	7.71	6.40	4.11	2.09	2.87	19.5	677.9	132.5	94.0	148.1	72.5	8.54	97.7
1980	16.8	22.2	13.4	11.2	10.0	12.4	213.7	10.5	8.20	3.49	7.34	8.43	27.8
1981	12.9	19.7	3.26	2.75	8.70	26.4	29.6	16.9	23.3	60.0	72.9	171.1	37.3
1982	--	--	--	--	--	45.8	512.5	272.0	36.8	98.0	10.3	3.16	--
1983	82.9	22.5	15.4	11.1	11.7	164.4	97.2	71.6	113.6	66.9	28.9	19.2	59.1
1984	51.1	32.2	17.8	14.0	25.8	78.2	103.4	22.0	113.0	14.6	2.30	1.74	39.5
1985	86.4	55.9	11.8	5.44	5.55	164.8	148.0	239.0	130.6	204.8	350.5	61.9	123.3
1986	100.8	33.9	27.6	19.8	16.0	241.6	370.4	190.0	22.5	16.0	7.10	14.6	88.7
1987	12.4	9.27	8.34	7.51	8.77	175.2	45.8	137.4	26.8	105.9	32.9	17.3	49.6
1988	17.2	35.4	19.3	14.5	6.94	76.9	189.3	24.0	12.3	4.44	2.59	2.26	33.6
1989	3.86	8.45	8.74	8.69	8.00	13.7	369.0	66.9	60.0	33.7	2.12	6.65	48.8
1990	3.82	10.0	4.61	2.70	2.91	39.8	46.7	24.7	54.3	18.7	9.51	0	18.2
1991	1.02	1.77	1.05	0.246	0.684	20.0	29.5	73.2	27.9	85.1	17.9	67.5	27.3
1992	24.7	21.3	22.7	17.2	15.9	113.8	83.9	39.8	12.9	29.4	65.0	90.8	44.9
1993	20.4	33.1	18.9	11.3	9.32	116.9	160.0	52.5	101.7	204.7	154.7	57.1	78.8
1994	34.5	24.6	18.1	11.9	11.2	123.1	130.3	111.1	163.9	364.3	50.8	67.7	93.3

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN

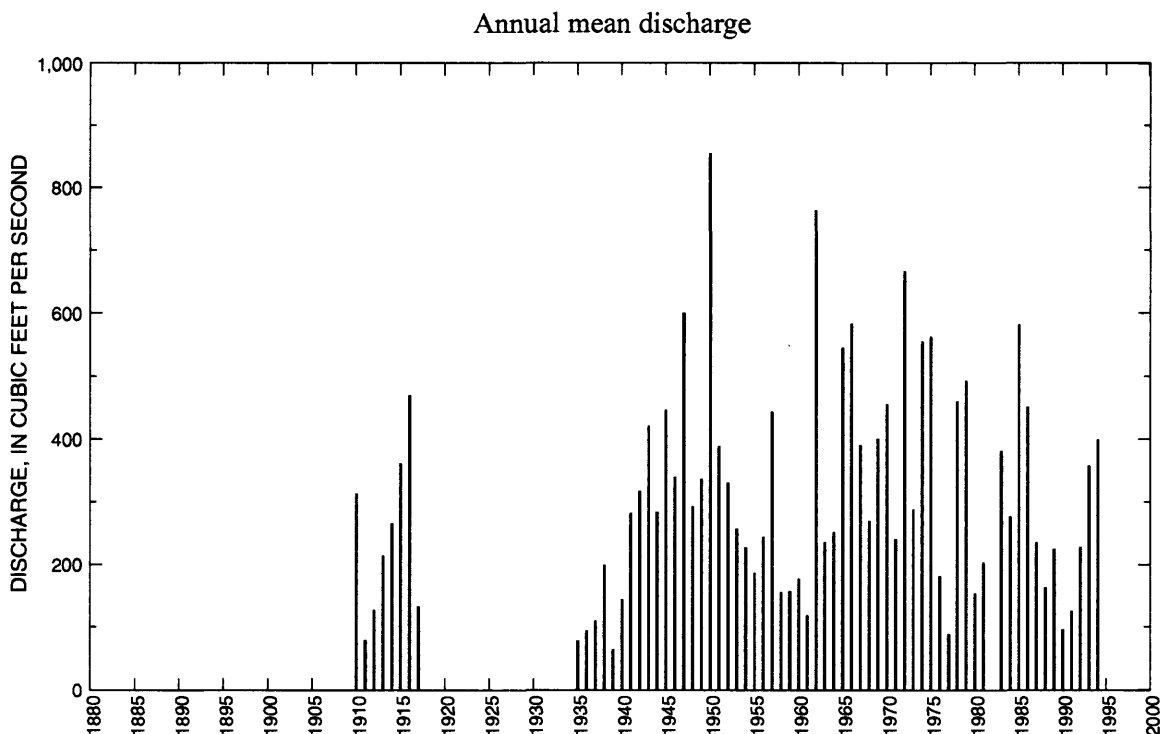
LOCATION.--Lat 47°53'15", long 96°16'25", in NW¹/₄NE¹/₄ sec.22, T.151 N., R.44 W., Red Lake County, Hydrologic Unit 09020305, on left bank 40 ft downstream from Great Northern Railroad bridge in Red Lake Falls, 1.4 mi upstream from mouth, and 3 mi downstream from Badger Creek.

DRAINAGE AREA.--1,370 mi², approximately.

PERIOD OF RECORD.--June 1909 to September 1917, October 1934 to September 1981, March 1982 to current year. Annual maximum only for October 1918 to September 1919. Monthly discharge only for October, November, 1934, published in WSP 1308. October 1981 to February 1982, operated as a high-flow partial-record station.

GAGE.--Water-stage recorder. Datum of gage is 948.94 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to Sept. 12, 1911, nonrecording gage at site 0.5 mi upstream, and Sept. 12, 1911, to Sept. 30, 1917, nonrecording gage at site 40 ft upstream at different datum.

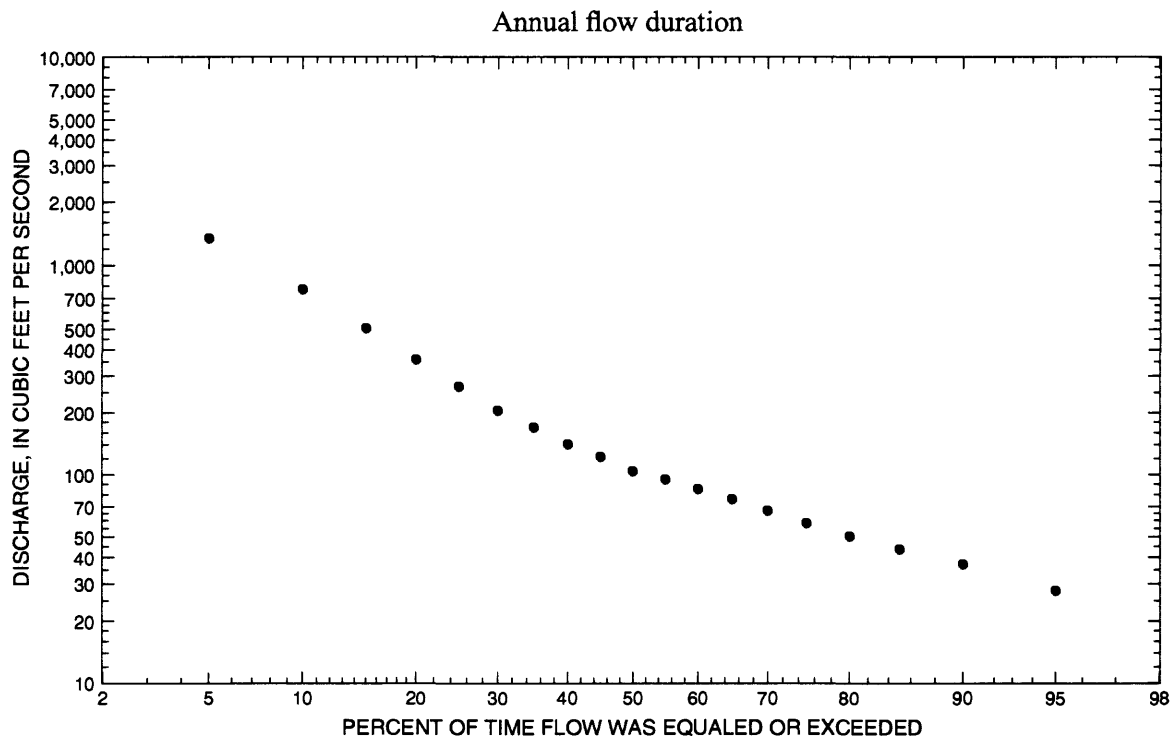
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,300 ft³/s, Apr. 25, 1979, gage height, 12.38 ft; maximum gage height, 15.85 ft, Mar. 6, 1983, highwater mark, backwater from ice; no flow at times.



05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	1,350	1972	10.0	1935	178	210	1.18	4.72
November	1,230	1972	19.0	1935	134	155	1.15	3.56
December	260	1910	21.4	1937	85.6	49.1	0.57	2.27
January	220	1910	21.4	1940	68.0	34.7	0.51	1.80
February	150	1984	19.1	1937	62.8	29.3	0.47	1.67
March	993	1946	13.6	1937	225	252	1.12	5.97
April	3,460	1966	61.0	1981	1,120	870	0.78	29.8
May	5,060	1950	32.2	1977	663	723	1.09	17.6
June	3,040	1962	26.5	1980	481	508	1.06	12.8
July	1,670	1994	8.34	1936	367	386	1.05	9.74
August	1,690	1985	1.49	1936	204	279	1.36	5.42
September	1,270	1973	2.92	1936	179	195	1.09	4.75
Annual	855	1950	64.4	1939	311	174	0.56	100



05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	27.8	25.0	24.9	75.0	75.9	46.8	27.4	21.9	18.8	25.0	30.6	25.4	27.6
90	31.8	31.0	33.0	119	116	64.1	44.7	32.8	29.4	36.0	39.7	37.4	37.1
85	36.9	34.5	38.6	156	142	80.2	58.5	40.7	37.3	44.5	46.7	42.7	43.6
80	39.9	36.8	43.4	191	169	96.1	71.4	49.5	44.4	51.5	52.2	46.7	50.2
75	42.4	39.2	48.0	239	196	115	84.2	58.2	53.8	57.6	59.4	50.5	58.2
70	45.8	42.6	52.8	310	225	138	97.1	66.5	63.4	65.3	67.0	54.2	66.9
65	49.0	45.8	57.8	382	259	161	112	74.7	73.0	74.9	73.9	57.6	75.8
60	51.4	48.9	62.9	449	300	184	128	83.6	82.7	83.2	80.9	61.2	85.1
55	56.4	53.0	70.0	529	337	216	149	93.0	93.3	91.2	88.2	67.5	94.5
50	62.5	58.0	77.2	640	382	249	170	102	104	102	95.5	74.6	104
45	67.5	64.1	86.3	765	438	287	206	114	115	113	106	82.0	122
40	73.5	68.3	95.5	907	497	333	245	130	130	127	116	87.3	140
35	78.0	72.4	106	1,090	583	391	285	147	144	141	129	92.7	170
30	82.3	77.0	118	1,310	688	475	339	169	164	166	142	101	204
25	86.5	81.7	144	1,530	814	572	410	195	192	201	159	109	266
20	90.6	89.6	184	1,790	982	688	512	231	236	244	177	118	358
15	97.5	97.4	298	2,140	1,170	841	661	298	309	303	202	127	506
10	107	104	587	2,720	1,450	1,080	898	448	437	393	243	141	770
5	126	121	1,190	3,820	2,080	1,660	1,380	835	630	576	321	187	1,340

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	480	416	363	270	197
0.95	1.05	860	714	615	472	347
0.90	1.11	1,160	947	810	629	466
0.80	1.25	1,640	1,330	1,130	882	657
0.50	2	3,070	2,480	2,080	1,640	1,230
0.20	5	5,510	4,540	3,770	2,960	2,230
0.10	10	7,340	6,170	5,100	3,970	3,000
0.04	25	9,830	8,510	7,010	5,380	4,060
0.02	50	11,800	10,400	8,570	6,510	4,910
0.01	100	13,800	12,500	10,300	7,700	5,810
0.005	200	15,900	14,700	12,100	8,960	6,740
0.002	500	18,800	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	1.80	4.49	5.87	6.77	8.54	12.9	17.5	22.4	28.4
0.10	10	4.90	9.47	12.0	13.5	16.3	21.4	25.4	29.8	36.7
0.20	5	12.7	19.1	23.0	25.3	29.5	34.5	37.2	40.9	49.5
0.50	2	38.4	42.3	46.1	49.2	54.1	59.7	63.1	67.4	84.6

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	8.16	17.7	19.9	22.9	10.3	18.8	20.6	25.5
0.10	10	13.2	22.7	24.8	27.7	16.5	24.3	26.4	34.0
0.20	5	21.9	30.1	31.9	34.7	26.8	32.5	35.4	48.6
0.50	2	46.7	48.9	50.1	52.8	53.9	54.9	59.9	100
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	2.84	8.16	9.81	13.4	3.59	7.24	8.62	16.2
0.10	10	7.43	15.0	17.4	22.9	8.93	15.5	18.1	24.8
0.20	5	19.0	28.1	31.8	41.0	21.4	32.0	36.7	¹ 41.0
0.50	2	62.0	69.0	76.9	101	60.8	74.2	83.0	¹ 88.0

¹Graphical interpretation.

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1910	March 22	9.50	1,960	1961	April 26	3.97	884
1911	June 9	7.92	793	1962	June 10	10.96	8,600
1912	September 29	--	1,110	1963	July 13	6.15	2,300
1913	April 8	--	3,320	1964	April 17	6.58	3,050
1914	June 12	4.70	1,340	1965	April 13	10.86	8,680
1915	June 29	6.91	3,320	1966	April 3	11.02	8,920
1916	April 15	--	3,990	1967	March 31	9.32	5,820
1917	April 11	--	1,250	1968	July 18	7.30	3,550
1919	--	--	6,700	1969	April 12	11.82	9,740
1935	March 27	5.02	696	1970	April 26	9.32	5,630
1936	April 17	--	1,260	1971	April 10	7.58	3,500
1937	May 1	--	1,010	1972	April 16	9.95	6,720
1938	May 14	5.95	2,220	1973	March 15	7.42	2,900
1939	April 20	3.80	830	1974	April 22	10.08	6,920
1940	April 15	11.43	3,100	1975	April 19	10.34	7,310
1941	June 8	--	3,290	1976	April 3	6.84	3,120
1942	March 27	10.04	2,200	1977	July 5	4.13	866
1943	April 7	--	2,780	1978	April 9	11.56	9,890
1944	August 10	7.42	3,210	1979	April 25	12.38	10,300
1945	March 27	--	2,680	1980	April 8	5.59	1,910
1946	March 22	--	3,380	1981	September 8	6.97	3,160
1947	April 15	--	5,430	1982	April 15	7.76	4,160
1948	April 7	--	3,000	1983	June 13	7.05	3,190
1949	June 2	7.30	3,360	1984	June 9	8.85	5,450
1950	May 6	11.28	9,310	1985	August 19	9.86	7,120
1951	April 10	6.52	2,880	1986	April 30	7.39	3,720
1952	April 16	6.17	2,550	1987	May 27	5.93	2,170
1953	July 5	4.44	1,120	1988	April 7	6.05	2,270
1954	April 14	6.16	2,540	1989	April 7	7.62	2,550
1955	April 8	7.25	3,660	1990	June 22	3.77	652
1956	April 21	8.67	5,560	1991	September 16	4.45	1,040
1957	June 28	9.98	6,840	1992	August 25	--	1,640
1958	July 7	4.65	1,320	1993	March 30	9.88	3,200
1959	April 4	6.30	1,960	1994	July 8	8.99	5,350
1960	April 6	8.47	4,010				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 25	12.38	10,300	1975	April 19	10.34	7,310
1978	April 9	11.56	9,890	1985	August 19	9.86	7,120
1969	April 12	11.82	9,740	1974	April 22	10.08	6,920
1950	May 6	11.28	9,310	1957	June 28	9.98	6,840
1966	April 3	11.02	8,920	1919	--	--	6,700
1965	April 13	10.86	8,680	1967	March 31	9.32	5,820
1962	June 10	10.96	8,600	1970	April 26	9.32	5,630

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1956	April 21	8.67	5,560	1945	March 27	--	2,680
1984	June 9	8.85	5,450	1952	April 16	6.17	2,550
1947	April 15	--	5,430	1989	April 7	7.62	2,550
1994	July 8	8.99	5,350	1954	April 14	6.16	2,540
1982	April 15	7.76	4,160	1963	July 13	6.15	2,300
1960	April 6	8.47	4,010	1988	April 7	6.05	2,270
1916	April 15	--	3,990	1938	May 14	5.95	2,220
1986	April 30	7.39	3,720	1942	March 27	10.04	2,200
1955	April 8	7.25	3,660	1987	May 27	5.93	2,170
1968	July 18	7.30	3,550	1910	March 22	9.50	1,960
1971	April 10	7.58	3,500	1959	April 4	6.30	1,960
1946	March 22	--	3,380	1992	August 25	--	1,640
1949	June 2	7.30	3,360	1914	June 12	4.70	1,340
1913	April 8	--	3,320	1958	July 7	4.65	1,320
1915	June 29	6.91	3,320	1936	April 17	--	1,260
1941	June 8	--	3,290	1917	April 11	--	1,250
1944	August 10	7.42	3,210	1953	July 5	4.44	1,120
1993	March 30	9.88	3,200	1912	September 29	--	1,110
1983	June 13	7.05	3,190	1991	September 16	4.45	1,040
1981	September 8	6.97	3,160	1937	May 1	--	1,010
1976	April 3	6.84	3,120	1961	April 26	3.97	884
1940	April 15	11.43	3,100	1977	July 5	4.13	866
1964	April 17	6.58	3,050	1939	April 20	3.80	830
1948	April 7	--	3,000	1911	June 9	7.92	793
1973	March 15	7.42	2,900	1935	March 27	5.02	696
1951	April 10	6.52	2,880	1990	June 22	3.77	652
1943	April 7	--	2,780				

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1909	--	--	--	--	--	--	--	--	--	509.8	1,189	387.4	--
1910	382.0	280.2	260.0	220.0	115.0	646.6	1,304	323.7	118.1	31.9	33.5	38.5	313.1
1911	43.1	48.0	50.0	45.0	45.0	55.0	236.6	91.6	180.5	26.1	67.9	60.3	78.8
1912	80.0	75.5	65.0	30.0	35.0	38.0	317.0	240.7	108.5	135.9	69.4	337.1	127.3
1913	365.4	79.9	60.0	34.9	28.9	32.6	1,291	300.7	120.3	100.0	84.7	87.8	215.1
1914	125.4	97.0	64.5	55.2	71.7	75.5	306.9	540.5	862.7	613.4	177.5	198.3	266.2
1915	177.3	141.2	57.1	50.0	50.0	60.0	674.7	493.4	988.5	1,368	155.2	99.9	360.9
1916	120.0	91.5	78.5	68.4	76.0	64.0	2,099	1,395	785.1	607.0	133.4	137.1	470.1
1917	106.5	62.4	57.1	70.0	70.0	108.5	625.4	213.5	85.7	66.6	58.0	70.1	132.5
1935	10.0	19.0	22.8	31.7	33.6	160.4	255.0	191.4	89.2	51.6	26.7	45.0	78.1
1936	29.8	27.2	26.8	29.1	24.2	23.3	539.5	348.7	67.8	8.34	1.49	2.92	93.8
1937	18.0	24.5	21.4	24.5	19.1	13.6	249.2	344.9	207.0	97.9	116.8	180.1	109.9
1938	102.9	59.3	28.2	32.5	42.6	185.3	164.4	1,277	309.2	115.5	28.8	22.2	199.3
1939	24.9	32.6	30.9	34.8	24.4	20.0	274.9	172.6	59.9	39.2	17.4	42.3	64.4
1940	54.0	48.0	39.6	21.4	25.3	32.6	855.5	497.6	93.1	27.1	13.4	20.7	143.5
1941	29.8	50.4	57.2	51.8	38.7	29.7	1,029	313.5	1,038	231.6	111.3	430.8	282.5
1942	537.0	224.6	74.8	34.5	32.4	460.0	754.6	830.0	107.4	53.2	94.5	590.3	317.3
1943	310.6	108.8	59.9	48.6	45.9	79.4	1,561	868.3	1,293	355.7	210.6	125.4	421.5
1944	98.0	101.3	68.7	38.8	47.2	42.5	284.5	438.0	631.1	391.5	847.6	414.8	284.2
1945	332.5	350.1	213.1	65.3	51.6	979.1	1,737	850.0	268.0	133.1	101.8	266.7	446.7
1946	321.9	143.9	105.5	80.2	60.2	993.2	1,263	462.1	258.2	263.5	47.2	60.6	339.6
1947	187.2	154.7	92.7	71.8	52.2	94.2	2,346	1,609	1,850	499.2	130.0	132.1	600.5
1948	156.3	107.3	79.2	53.4	29.9	61.5	1,946	731.5	104.5	137.5	75.9	44.2	292.6
1949	39.5	50.6	42.1	41.4	38.1	46.6	563.2	377.5	1,154	608.5	778.1	293.4	336.6
1950	158.5	167.7	99.5	67.4	57.5	58.9	2,262	5,059	1,013	906.9	214.1	119.1	854.7
1951	238.6	167.9	103.4	89.7	82.9	98.2	1,891	1,339	241.4	75.6	78.9	259.4	388.6
1952	179.4	139.3	119.5	108.7	97.4	142.7	1,454	450.3	226.1	822.9	152.9	78.0	330.6
1953	66.4	51.1	56.5	63.6	65.8	251.4	551.6	563.5	550.0	626.3	147.2	92.3	258.1
1954	81.3	87.5	87.9	79.2	88.3	134.9	1,118	505.5	326.2	94.9	72.5	72.5	228.3
1955	72.2	69.8	58.1	46.8	39.3	48.0	1,108	257.6	367.2	114.7	41.8	25.5	186.4
1956	49.1	47.9	51.9	49.5	47.7	48.5	1,318	754.4	253.1	74.8	71.5	182.3	244.5
1957	56.1	148.4	57.5	42.6	39.9	253.5	1,271	430.1	1,584	1,015	88.0	353.5	444.0
1958	214.8	258.1	83.8	61.6	54.3	106.9	145.8	133.3	245.3	469.0	48.2	35.2	155.3
1959	63.4	72.2	44.3	41.7	35.5	132.1	462.9	340.3	372.1	174.6	86.8	55.2	156.8
1960	70.9	54.1	54.3	43.4	37.6	53.5	741.1	280.1	520.4	179.4	41.9	64.2	177.4

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1961	45.5	77.8	52.3	32.6	26.9	158.3	406.2	370.4	73.8	42.1	28.5	103.6	118.4
1962	100.4	72.7	47.7	43.9	41.8	46.7	1,112	2,459	3,042	1,613	316.4	245.1	763.8
1963	128.7	155.0	118.4	52.3	30.0	181.4	649.4	389.7	644.8	352.2	78.4	52.0	236.2
1964	45.9	53.0	50.7	42.0	45.5	60.3	1,028	666.7	631.5	211.5	50.9	155.2	252.2
1965	194.9	114.0	64.8	56.4	47.7	53.5	2,778	1,231	1,437	296.1	97.9	194.9	545.0
1966	538.2	185.6	143.7	102.0	75.1	411.1	3,458	1,247	280.3	112.0	288.0	171.1	583.7
1967	108.5	107.0	83.8	81.1	73.4	354.4	2,024	1,025	567.4	183.0	55.9	34.7	390.9
1968	57.8	65.0	69.8	63.0	64.8	526.8	420.4	262.3	485.8	819.8	265.5	126.0	270.0
1969	141.6	108.0	86.5	76.0	75.6	95.4	2,487	853.9	464.7	175.9	164.5	100.4	400.9
1970	291.1	224.0	136.0	134.8	97.7	76.0	2,115	1,352	786.0	159.1	54.3	56.1	456.1
1971	121.1	230.5	119.7	101.8	60.7	119.8	1,160	327.1	212.8	136.5	123.8	184.6	240.8
1972	1,350	1,233	185.1	103.5	103.3	818.5	2,336	995.0	269.8	169.6	292.0	141.5	666.0
1973	152.5	165.5	90.3	70.7	62.1	898.0	254.8	148.9	67.3	56.2	219.0	1,267	287.9
1974	804.0	235.2	128.1	97.6	120.0	118.8	2,542	1,601	475.7	84.2	341.9	103.1	554.8
1975	117.2	153.3	110.4	108.7	101.4	124.2	2,640	1,215	469.8	1,402	190.5	110.2	562.6
1976	112.3	135.1	96.9	89.8	97.2	253.0	974.6	102.6	81.5	121.1	113.0	15.5	181.9
1977	27.7	41.4	38.3	36.2	36.1	79.8	108.0	32.2	77.5	238.1	75.9	274.2	88.8
1978	325.3	275.2	246.5	165.5	125.5	113.4	3,233	302.0	200.0	256.7	175.8	136.2	460.2
1979	65.1	56.3	54.3	52.2	85.2	85.8	2,905	845.4	468.7	778.1	429.2	107.8	493.5
1980	72.6	200.1	116.4	94.5	103.4	110.5	730.0	68.4	26.5	104.7	116.8	108.9	153.4
1981	80.9	87.5	59.9	50.3	55.5	62.7	61.0	71.2	379.4	545.8	369.0	621.4	204.0
1982	--	--	--	--	--	351.0	2,089	1,178	288.6	455.6	159.0	47.3	--
1983	418.5	145.5	117.3	99.8	90.1	864.8	589.4	315.5	818.7	461.4	374.6	260.8	381.3
1984	285.9	175.6	126.3	91.1	149.7	447.7	555.3	212.1	1,007	167.9	92.4	23.7	276.8
1985	376.8	251.4	141.5	84.2	65.2	588.9	596.0	1,134	605.0	918.0	1,686	471.4	581.8
1986	454.3	208.9	164.3	125.7	125.2	591.5	1,747	1,252	254.2	241.3	138.1	102.8	451.7
1987	100.8	101.4	104.0	83.7	75.0	440.4	204.1	533.0	228.6	491.3	314.9	128.3	235.9
1988	89.8	89.7	77.9	89.9	94.0	330.5	727.8	137.5	75.5	89.5	95.6	63.1	163.0
1989	62.8	59.8	71.9	88.2	74.5	81.4	1,349	343.7	264.3	172.5	76.8	77.0	225.7
1990	44.8	35.4	25.5	35.4	41.9	105.6	217.1	133.9	297.8	116.9	70.2	25.5	95.8
1991	27.3	32.5	35.6	35.5	33.8	77.5	94.9	167.0	90.3	488.2	133.5	284.7	125.8
1992	82.1	92.1	89.5	73.6	69.1	445.9	361.6	243.2	90.6	322.1	363.5	507.6	228.9
1993	104.5	93.8	87.8	83.0	83.0	408.9	844.0	247.2	360.0	841.4	833.8	278.1	357.3
1994	100.5	99.4	121.7	86.2	72.6	196.9	497.7	564.1	711.8	1,673	299.8	339.4	399.4

05079000 RED LAKE RIVER AT CROOKSTON, MN

LOCATION.--Lat 47°46'32", long 96°36'33", in SW¹/₄SW¹/₄ sec.30, T.150 N., R.46 W., Polk County, Hydrologic Unit 09020303, on right bank 100 ft upstream from Sargent Street bridge in Crookston, 0.3 mi downstream from Interstate Power Co.'s dam, 0.6 mi downstream from bridge on U.S. Highway 75, and 53 mi upstream from mouth.

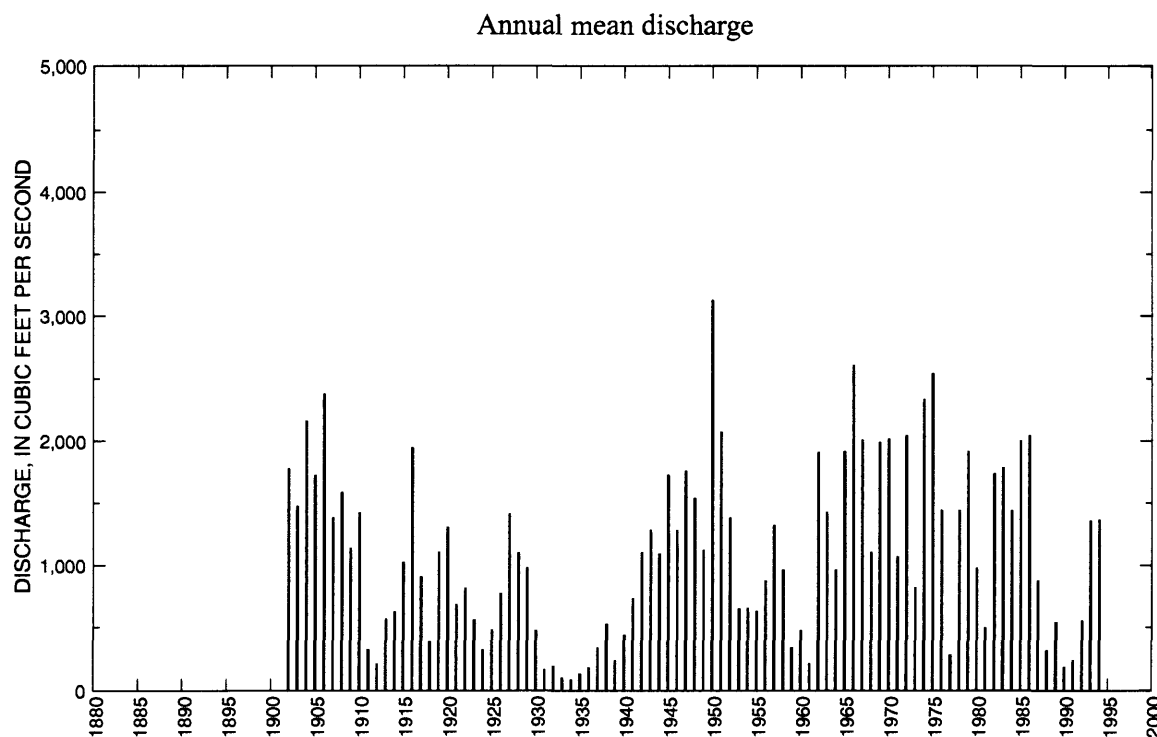
DRAINAGE AREA.--5,280 mi², approximately.

PERIOD OF RECORD.--May 1901 to current year. Monthly discharge only for some periods, published in WSP 1308. Figures of daily discharge for Apr. 3-30, 1904, published in WSP 130, have been found unreliable and should not be used.

GAGE.--Water-stage recorder. Datum of gage is 832.72 ft above sea level. May 18, 1901, to June 30, 1909, nonrecording gage at bridge 300 ft upstream at same datum. July 1, 1909, to Sept. 25, 1911, nonrecording gage, Sept. 26, 1911, to Sept. 30, 1919, water-stage recorder, Oct. 1, 1919, to Sept. 30, 1930, nonrecording gage, at present site and datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 28,400 ft³/s, Apr. 12, 1969, gage height, 27.33 ft; minimum daily discharge, 0.0 ft³/s, July 13, 1960, caused by regulation of powerplant upstream.

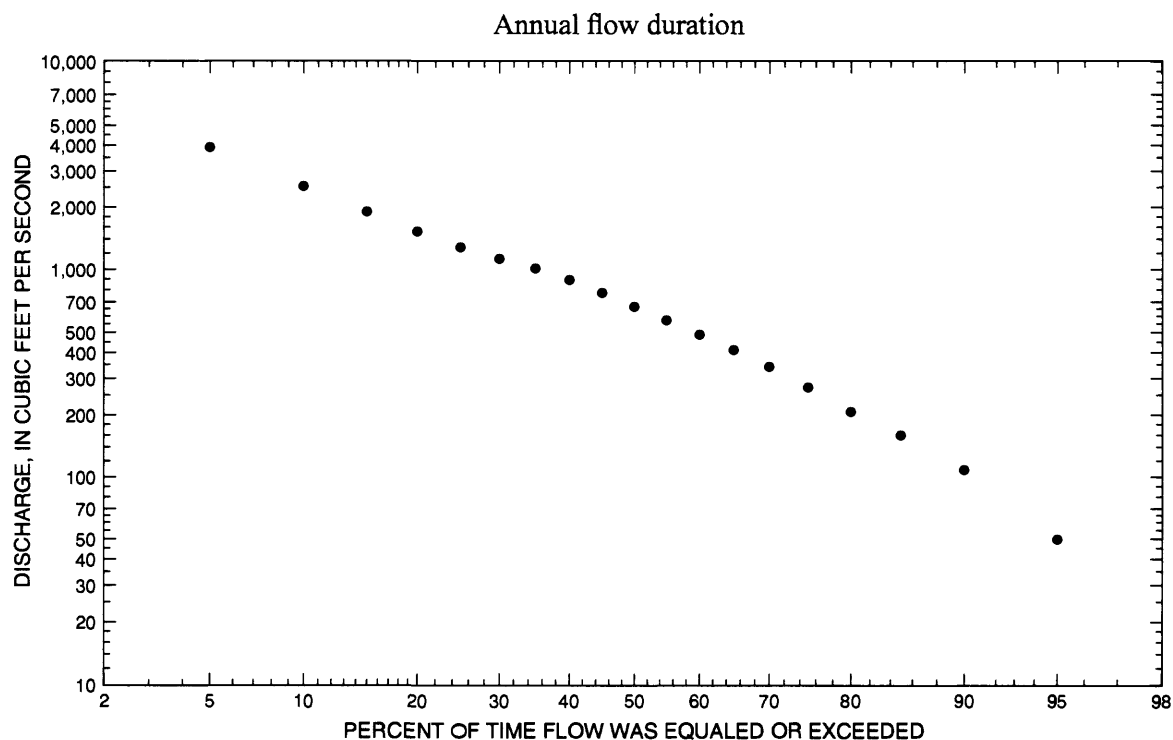
EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1897 reached a stage of 25.20 on April 11, discharge 18,900 ft³/s.



05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	2,840	1972	8.02	1937	805	689	0.86	6.00
November	3,170	1972	10.1	1937	660	548	0.83	4.92
December	1,900	1904	5.34	1937	547	425	0.78	4.08
January	1,500	1906	15.6	1934	494	385	0.78	3.68
February	1,460	1951	17.8	1937	470	357	0.76	3.50
March	3,630	1910	24.9	1936	938	854	0.91	6.99
April	10,300	1966	232	1981	2,920	2,270	0.78	21.8
May	15,300	1950	154	1934	2,030	2,050	1.01	15.1
June	7,200	1962	80.4	1934	1,640	1,300	0.79	12.2
July	6,850	1975	26.2	1936	1,290	1,240	0.96	9.58
August	3,870	1985	12.3	1934	815	743	0.91	6.07
September	3,010	1905	8.87	1934	810	649	0.80	6.03
Annual	3,130	1950	132	1935	1,110	695	0.62	100



05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	30.4	31.8	60.9	241	211	125	52.2	25.5	24.0	25.1	37.0	30.7	49.9
90	73.8	72.2	118	363	288	212	133	72.1	76.8	101	98.5	76.9	108
85	105	97.5	148	487	408	311	205	137	119	136	134	111	159
80	142	127	187	634	540	412	278	180	184	185	175	158	208
75	167	158	238	780	664	533	356	231	240	240	212	183	271
70	193	184	318	932	762	655	456	282	297	292	269	230	342
65	228	223	387	1,100	893	775	568	339	374	347	319	282	414
60	309	311	446	1,320	1,030	915	699	409	481	423	365	334	489
55	365	380	506	1,610	1,160	1,050	808	497	558	523	422	388	573
50	428	429	569	1,870	1,300	1,210	910	587	643	615	487	465	663
45	486	467	640	2,180	1,450	1,390	1,040	682	760	724	557	527	773
40	535	513	736	2,530	1,680	1,570	1,160	779	874	834	642	588	893
35	590	565	860	2,960	1,940	1,780	1,290	879	985	944	738	649	1,010
30	649	626	948	3,500	2,290	1,990	1,420	993	1,090	1,050	854	724	1,130
25	733	699	1,040	4,090	2,770	2,260	1,630	1,130	1,190	1,160	967	823	1,280
20	872	807	1,180	4,670	3,300	2,550	1,890	1,320	1,340	1,310	1,080	919	1,530
15	965	921	1,410	5,520	3,830	2,970	2,280	1,550	1,510	1,490	1,240	1,020	1,900
10	1,050	1,020	2,060	6,800	4,530	3,550	2,830	1,860	1,750	1,830	1,450	1,150	2,540
5	1,220	1,100	3,530	9,260	5,670	4,550	3,890	2,340	2,120	2,270	1,860	1,380	3,920

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s) ¹	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	870	647	528	395	319
0.95	1.05	1,770	1,380	1,150	878	690
0.90	1.11	2,510	2,000	1,670	1,290	1,010
0.80	1.25	3,730	3,030	2,550	2,000	1,540
0.50	2	7,360	6,140	5,210	4,140	3,190
0.20	5	13,100	11,100	9,430	7,560	5,890
0.10	10	17,100	14,500	12,300	9,870	7,780
0.04	25	22,100	18,700	15,800	12,700	10,200
0.02	50	25,700	21,700	18,300	14,700	11,900
0.01	100	29,100	24,600	20,700	16,600	13,500
0.005	200	32,400	27,300	22,900	18,300	15,100
0.002	500	36,700	ng	ng	ng	ng

¹Historic adjustment applied.

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	12.4	15.1	17.2	19.5	23.8	28.2	31.8	36.1	43.8
0.10	10	24.7	29.8	33.9	38.2	45.6	53.8	60.8	68.5	82.2
0.20	5	52.1	62.5	70.7	78.9	92.2	108	122	136	161
0.50	2	171	198	224	246	277	317	354	387	456

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	23.6	25.7	27.6	30.7	34.2	46.7	52.4	84.6
0.10	10	46.0	50.8	53.7	58.8	61.1	79.9	89.2	139
0.20	5	94.7	105	110	118	116	144	160	239
0.50	2	291	323	332	350	330	374	409	579
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	18.3	26.1	31.5	41.4	16.7	23.2	26.0	30.9
0.10	10	38.0	52.4	62.9	80.0	32.9	47.1	53.3	63.6
0.20	5	84.2	112	133	163	68.6	100	114	137
0.50	2	300	369	424	501	219	317	364	440

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
¹ 1897	April 11	25.20	18,900	1947	June 12	18.08	12,400
1902	May 21	10.00	5,170	1948	April 19	--	9,520
1904	April 24	20.42	13,700	1949	June 2	17.43	10,700
1905	May 13	14.50	8,730	1950	May 7	25.70	27,400
1906	April 15	21.00	14,600	1951	April 7	19.00	12,600
1907	April 4	12.04	6,330	1952	April 11	12.65	6,320
1908	April 10	17.00	10,700	1953	March 24	8.01	2,560
1909	July 21	8.77	3,680	1954	April 12	11.37	5,330
1910	March 20	14.20	7,920	1955	April 8	18.30	12,400
1911	June 10	8.45	3,620	1956	April 20	19.78	14,000
1912	September 29	--	2,120	1957	June 29	18.10	11,800
1913	April 8	--	7,170	1958	July 7	8.62	3,370
1914	June 12	7.40	2,630	1959	April 5	11.72	5,630
1915	June 29	14.25	7,860	1960	April 6	12.56	5,520
1916	April 17	21.80	15,900	1961	March 27	5.67	1,450
1917	April 11	--	5,480	1962	June 11	21.90	16,700
1918	April 2	6.50	1,950	1963	April 9	13.25	6,820
1919	July 5	21.10	14,900	1964	June 20	11.74	5,550
1920	March 25	23.30	9,520	1965	April 14	23.51	19,400
1922	May 13	13.00	6,910	1966	April 3	24.41	21,500
1923	April 20	--	5,820	1967	April 1	23.49	19,300
1924	April 23	5.20	1,140	1968	July 19	17.17	11,100
1925	June 9	13.50	7,300	1969	April 12	27.33	28,400
1926	March 24	12.30	6,500	1970	April 26	19.05	13,300
1927	April 13	14.00	7,700	1971	April 10	20.74	15,300
1928	April 8	--	3,910	1972	April 16	20.28	14,700
1929	March 19	14.90	7,620	1973	September 26	10.86	4,960
1930	May 13	10.30	4,770	1974	April 23	22.89	16,400
1931	March 26	4.93	1,030	1975	April 18	21.97	15,600
1932	April 9	9.78	4,390	1976	April 3	19.45	12,500
1933	April 2	5.92	1,440	1977	May 20	8.66	3,440
1934	April 8	6.89	1,490	1978	April 7	23.11	18,100
1935	March 27	8.38	2,490	1979	April 26	24.99	21,900
1936	April 18	11.33	4,540	1980	April 9	12.31	6,600
1937	August 4	10.25	3,750	1981	June 29	13.56	7,120
1938	May 10	12.62	5,910	1982	April 17	16.12	9,320
1939	April 24	8.92	3,050	1983	June 23	13.98	7,330
1940	April 16	14.73	6,000	1984	June 10	20.71	14,400
1941	June 9	--	6,190	1985	August 19	16.38	9,580
1942	March 28	--	7,090	1986	April 1	19.47	11,500
1943	April 8	16.88	9,420	1987	May 28	11.22	5,360
1944	August 11	12.20	5,770	1988	April 8	10.90	5,090
1945	March 28	15.96	9,130	1989	April 17	16.11	8,800
1946	March 24	--	9,020	1990	June 23	4.60	916

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height--Continued							
1991	June 13	6.99	2,200	1993	April 1	18.24	7,400
1992	April 28	--	2,460	1994	July 10	20.41	13,600
Annual peak discharge, from highest to lowest, and corresponding gage height							
1969	April 12	27.33	28,400	1927	April 13	14.00	7,700
1950	May 7	25.70	27,400	1929	March 19	14.90	7,620
1979	April 26	24.99	21,900	1993	April 1	18.24	7,400
1966	April 3	24.41	21,500	1983	June 23	13.98	7,330
1965	April 14	23.51	19,400	1925	June 9	13.50	7,300
1967	April 1	23.49	19,300	1913	April 8	--	7,170
¹ 1897	April 11	25.20	18,900	1981	June 29	13.56	7,120
1978	April 7	23.11	18,100	1942	March 28	--	7,090
1962	June 11	21.90	16,700	1922	May 13	13.00	6,910
1974	April 23	22.89	16,400	1963	April 9	13.25	6,820
1916	April 17	21.80	15,900	1980	April 9	12.31	6,600
1975	April 18	21.97	15,600	1926	March 24	12.30	6,500
1971	April 10	20.74	15,300	1907	April 4	12.04	6,330
1919	July 5	21.10	14,900	1952	April 11	12.65	6,320
1972	April 16	20.28	14,700	1941	June 9	--	6,190
1906	April 15	21.00	14,600	1940	April 16	14.73	6,000
1984	June 10	20.71	14,400	1938	May 10	12.62	5,910
1956	April 20	19.78	14,000	1923	April 20	--	5,820
1904	April 24	20.42	13,700	1944	August 11	12.20	5,770
1994	July 10	20.41	13,600	1959	April 5	11.72	5,630
1970	April 26	19.05	13,300	1964	June 20	11.74	5,550
1951	April 7	19.00	12,600	1960	April 6	12.56	5,520
1976	April 3	19.45	12,500	1917	April 11	--	5,480
1947	June 12	18.08	12,400	1987	May 28	11.22	5,360
1955	April 8	18.30	12,400	1954	April 12	11.37	5,330
1957	June 29	18.10	11,800	1902	May 21	10.00	5,170
1986	April 1	19.47	11,500	1988	April 8	10.90	5,090
1968	July 19	17.17	11,100	1973	September 26	10.86	4,960
1908	April 10	17.00	10,700	1930	May 13	10.30	4,770
1949	June 2	17.43	10,700	1936	April 18	11.33	4,540
1985	August 19	16.38	9,580	1932	April 9	9.78	4,390
1920	March 25	23.30	9,520	1928	April 8	--	3,910
1948	April 19	--	9,520	1937	August 4	10.25	3,750
1943	April 8	16.88	9,420	1909	July 21	8.77	3,680
1982	April 17	16.12	9,320	1911	June 10	8.45	3,620
1945	March 28	15.96	9,130	1977	May 20	8.66	3,440
1946	March 24	--	9,020	1958	July 7	8.62	3,370
1989	April 17	16.11	8,800	1939	April 24	8.92	3,050
1905	May 13	14.50	8,730	1914	June 12	7.40	2,630
1910	March 20	14.20	7,920	1953	March 24	8.01	2,560
1915	June 29	14.25	7,860	1935	March 27	8.38	2,490

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1992	April 28	--	2,460	1961	March 27	5.67	1,450
1991	June 13	6.99	2,200	1933	April 2	5.92	1,440
1912	September 29	--	2,120	1924	April 23	5.20	1,140
1918	April 2	6.50	1,950	1931	March 26	4.93	1,030
1934	April 8	6.89	1,490	1990	June 23	4.60	916

¹Reported by Professor E.F. Chandler.

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1901	--	--	--	--	--	--	--	--	2,911	3,789	1,775	1,349	--
1902	1,550	1,220	612.0	522.0	605.0	2,441	2,185	4,117	3,898	1,914	1,165	1,027	1,778
1903	1,181	1,346	969.0	880.0	795.0	1,010	4,360	2,318	1,815	995.5	671.0	1,388	1,475
1904	1,934	1,308	1,900	627.0	504.0	490.0	6,655	5,444	3,341	1,815	937.9	1,020	2,164
1905	1,021	892.7	638.0	495.0	504.0	828.0	1,988	3,196	2,077	2,947	3,031	3,009	1,726
1906	2,261	1,675	1,600	1,500	1,020	1,500	8,116	3,783	2,545	1,801	1,516	1,255	2,381
1907	983.2	835.7	700.0	650.0	460.0	1,264	4,372	2,078	2,183	1,225	854.4	994.5	1,383
1908	1,040	668.2	626.0	467.0	508.0	620.0	4,662	3,750	3,046	1,340	1,188	1,185	1,589
1909	860.1	803.1	437.0	479.8	385.0	657.7	2,243	1,517	977.0	1,677	2,282	1,341	1,142
1910	1,484	1,150	946.0	754.0	700.0	3,626	4,117	1,983	1,064	546.2	351.5	333.1	1,424
1911	293.2	216.8	219.0	150.0	120.0	434.0	657.6	450.0	977.1	142.3	109.4	81.4	320.8
1912	98.4	63.7	80.0	31.0	37.0	43.0	391.4	313.3	236.2	309.6	296.9	636.3	211.0
1913	697.0	362.1	165.0	137.3	125.4	117.6	3,350	725.1	365.5	276.9	255.7	266.1	568.3
1914	309.6	264.3	180.1	203.2	203.9	454.8	1,389	1,080	1,497	1,001	375.5	548.1	625.8
1915	546.1	603.8	465.5	383.9	452.9	542.9	1,335	1,340	2,354	2,962	712.4	599.7	1,027
1916	600.6	483.5	558.4	450.4	461.7	689.5	6,664	4,459	3,170	2,781	1,467	1,617	1,947
1917	1,087	871.1	621.5	386.5	430.5	736.5	3,400	1,437	879.5	643.9	273.7	160.4	910.0
1918	269.8	287.8	196.5	127.7	91.4	669.1	644.0	725.2	712.1	331.6	353.6	196.8	385.4
1919	191.4	320.0	268.0	223.0	217.0	538.8	1,466	914.6	912.9	5,581	2,044	505.6	1,109
1920	620.0	441.0	357.0	386.0	422.0	3,450	3,976	1,452	1,990	1,390	658.8	543.2	1,307
1921	548.9	486.0	486.0	472.0	455.0	441.0	1,598	959.2	1,193	551.2	516.6	547.2	686.8
1922	520.9	419.7	440.0	300.0	350.0	380.0	2,567	2,605	962.5	517.6	281.5	478.0	819.2
1923	327.6	468.7	239.8	190.0	170.0	160.0	2,136	1,292	693.2	534.4	236.1	273.8	559.7
1924	341.9	312.0	271.0	167.7	172.4	258.4	690.3	676.9	477.8	237.4	161.8	68.7	319.8
1925	163.4	116.8	97.4	89.4	57.1	452.6	580.7	725.0	2,673	579.5	68.2	195.2	482.2
1926	648.4	501.0	443.2	447.9	385.2	1,845	1,376	714.4	1,347	887.7	363.7	313.3	774.7
1927	410.6	440.0	320.0	240.0	180.0	628.7	3,981	5,201	2,710	1,094	847.1	897.5	1,416
1928	845.3	664.3	550.0	450.0	470.0	1,339	2,090	1,394	1,871	1,148	1,009	1,439	1,105
1929	938.5	782.3	719.6	669.4	474.6	3,234	1,933	1,210	764.7	468.5	301.9	237.8	982.5
1930	255.2	259.0	203.5	165.6	137.8	287.0	1,494	1,679	633.5	348.7	146.6	102.0	477.2
1931	125.9	175.2	178.5	118.1	148.7	263.5	361.7	231.2	225.0	77.6	30.5	21.1	162.8
1932	34.1	99.7	70.9	52.9	56.5	219.5	1,297	317.8	81.0	37.2	37.2	12.8	190.3
1933	12.2	30.9	27.2	23.0	29.4	108.2	609.0	162.5	122.7	36.7	15.4	13.3	98.7
1934	8.79	11.7	20.0	15.6	18.5	130.8	501.2	153.6	80.4	44.2	12.3	8.87	83.6
1935	10.5	23.6	20.9	16.1	21.2	341.3	519.9	283.6	159.0	90.3	32.1	56.7	131.5

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1936	31.3	31.3	28.9	31.8	25.0	24.9	1,366	470.2	91.3	26.2	13.2	10.4	177.9
1937	8.02	10.1	5.34	19.8	17.8	26.2	403.7	716.2	382.5	704.2	1,161	577.6	338.5
1938	167.3	92.2	35.9	59.0	80.7	619.6	293.2	3,328	1,041	347.7	108.8	142.3	531.4
1939	155.3	132.6	153.4	157.1	142.0	200.6	659.7	413.0	310.0	180.4	92.9	235.6	235.7
1940	287.9	266.3	241.3	156.9	173.8	186.0	2,016	1,005	481.8	216.5	149.6	143.1	442.0
1941	214.9	243.8	182.3	209.4	211.8	196.9	2,647	738.3	2,536	506.7	305.2	892.0	735.6
1942	1,087	711.0	539.9	448.1	477.9	1,561	2,911	2,829	816.4	287.3	341.5	1,276	1,109
1943	578.1	355.0	312.9	363.2	337.9	529.0	3,966	2,270	3,449	1,416	930.7	951.5	1,286
1944	865.1	683.4	499.8	413.5	448.6	493.9	1,329	1,229	2,283	1,484	1,907	1,533	1,097
1945	1,275	1,549	1,187	709.7	700.0	3,406	5,202	2,901	1,392	860.8	572.8	969.2	1,729
1946	1,088	737.3	600.3	569.4	542.1	3,620	3,867	1,745	1,013	764.1	350.3	464.5	1,284
1947	751.9	590.1	527.7	496.5	454.3	634.5	4,262	3,308	5,572	2,472	941.2	1,133	1,760
1948	1,232	892.3	979.0	912.9	637.9	675.8	6,552	3,409	1,071	954.7	659.3	566.9	1,542
1949	400.9	400.9	331.5	351.6	353.6	476.4	2,587	1,256	2,931	1,214	1,978	1,260	1,128
1950	854.8	866.3	600.0	664.5	655.4	793.5	5,760	15,290	4,702	3,602	1,670	1,872	3,129
1951	2,352	1,778	1,763	1,663	1,464	1,631	5,573	4,265	1,947	1,216	522.8	729.3	2,076
1952	682.4	685.4	1,049	1,140	1,210	1,178	3,236	1,942	1,707	2,326	858.8	599.6	1,384
1953	415.7	371.9	359.3	367.4	375.7	841.0	890.2	1,033	1,252	1,037	452.4	392.8	650.4
1954	356.1	342.7	328.4	293.7	302.8	412.5	1,860	1,305	1,209	673.8	433.8	358.5	656.2
1955	347.2	407.4	389.3	321.6	337.4	365.5	2,593	706.6	1,118	487.0	270.6	258.5	630.9
1956	261.6	178.5	189.2	226.1	230.7	230.1	3,408	2,489	847.6	874.5	301.2	1,292	874.9
1957	360.4	611.7	355.2	231.1	118.4	669.3	2,510	1,272	2,797	3,333	1,375	2,188	1,321
1958	2,295	1,806	782.7	827.0	776.0	1,001	981.0	485.3	603.6	1,532	364.2	103.8	965.7
1959	97.4	117.7	74.5	73.9	83.8	298.4	1,519	685.5	481.1	317.8	182.6	128.9	338.0
1960	219.8	211.4	200.9	184.6	176.6	191.0	2,280	755.9	942.7	420.7	70.5	85.1	475.5
1961	115.6	173.6	71.6	64.5	68.3	405.5	661.4	569.6	92.9	89.7	52.7	184.8	213.0
1962	217.0	142.6	69.5	79.0	82.0	103.0	2,849	4,720	7,205	3,796	1,905	1,733	1,912
1963	1,517	1,370	939.3	983.2	882.1	1,263	3,192	2,074	2,221	1,245	652.1	799.2	1,427
1964	1,077	598.6	455.9	544.2	513.1	361.6	1,841	1,307	2,505	1,157	754.5	464.5	963.2
1965	996.2	820.1	614.2	622.3	634.6	635.5	7,321	3,820	3,866	1,813	795.1	1,140	1,919
1966	2,406	1,369	1,219	1,086	1,040	1,685	10,260	5,254	2,398	1,389	1,755	1,488	2,611
1967	1,201	1,152	1,108	1,053	1,079	1,459	6,833	4,750	2,519	1,324	837.9	833.7	2,011
1968	540.7	390.4	344.0	312.6	260.5	1,212	841.3	399.1	2,151	3,616	1,857	1,316	1,107
1969	950.5	1,155	1,250	1,245	1,240	1,220	7,840	3,651	2,024	1,180	938.3	1,228	1,988
1970	1,787	1,333	1,065	1,114	1,036	1,039	5,595	3,890	4,061	1,535	813.3	965.4	2,017

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1971	932.5	943.1	790.0	772.4	860.5	983.2	2,995	1,428	1,169	792.3	656.7	563.1	1,072
1972	2,836	3,172	1,055	902.4	921.7	2,290	5,409	2,976	1,601	939.1	1,177	1,278	2,044
1973	1,114	680.9	658.2	603.7	606.8	1,695	554.7	615.9	407.4	244.1	496.0	2,191	822.6
1974	2,301	1,319	985.8	928.4	1,007	1,003	6,856	5,755	2,755	1,621	2,024	1,456	2,337
1975	1,580	1,429	915.1	994.2	906.8	934.2	6,064	4,697	2,509	6,851	1,788	1,747	2,544
1976	1,966	1,604	1,092	1,337	1,238	1,602	3,409	1,340	1,149	915.5	990.6	669.3	1,441
1977	279.6	183.8	194.8	176.6	181.0	276.6	429.1	366.0	224.6	384.1	191.3	450.9	278.5
1978	628.5	670.0	731.9	623.9	622.1	693.2	7,509	1,798	1,289	1,360	832.4	610.3	1,442
1979	613.1	520.3	503.9	490.0	506.2	556.6	7,678	4,489	2,613	2,322	1,571	1,166	1,919
1980	1,138	936.5	1,201	1,085	1,038	1,070	2,658	808.7	642.7	384.9	415.1	381.3	977.7
1981	186.2	179.9	138.2	125.8	150.2	237.3	231.8	236.8	887.5	1,349	873.1	1356	497.0
1982	1,768	1,131	965.5	982.6	914.3	992.9	4,540	3,456	1,712	2,007	1,355	992.3	1,737
1983	2,193	1,538	1,305	1,087	956.8	2,576	2,384	1,510	2,613	1,973	1,778	1,476	1,787
1984	1,385	1,256	1,022	967.1	1,039	1,787	2,463	1,166	3,498	1,346	821.7	572.0	1,440
1985	803.4	908.6	1,030	1,002	941.4	2,117	1,900	2,728	2,942	3,013	3,868	2,697	2,003
1986	2,416	1,405	1,048	992.9	953.9	2,345	5,623	4,336	1,777	1,301	1,085	1,181	2,043
1987	852.3	662.2	806.5	721.0	694.6	1,919	880.3	1,305	728.5	837.5	671.8	441.3	880.4
1988	226.6	199.6	170.8	160.0	160.0	506.7	1,416	235.4	187.7	147.9	168.1	193.2	313.1
1989	137.9	128.3	139.4	181.3	152.3	152.7	3,546	876.8	537.5	337.4	167.1	156.1	539.9
1990	115.7	96.6	78.0	96.0	103.3	248.9	415.5	221.3	448.9	179.8	138.6	82.9	185.3
1991	95.6	116.6	104.0	94.3	91.7	184.5	236.7	353.7	251.9	635.5	217.6	446.7	236.6
1992	170.6	145.1	146.4	145.8	145.7	1,002	1,381	919.2	242.6	521.7	559.2	1,253	552.7
1993	532.9	261.8	594.4	579.9	593.4	896.9	2,638	988.7	1,479	2,453	2,836	2,414	1,358
1994	1,226	723.2	729.4	661.5	600.2	1,298	1,141	1,234	1,815	4,375	1,168	1,325	1,366

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND

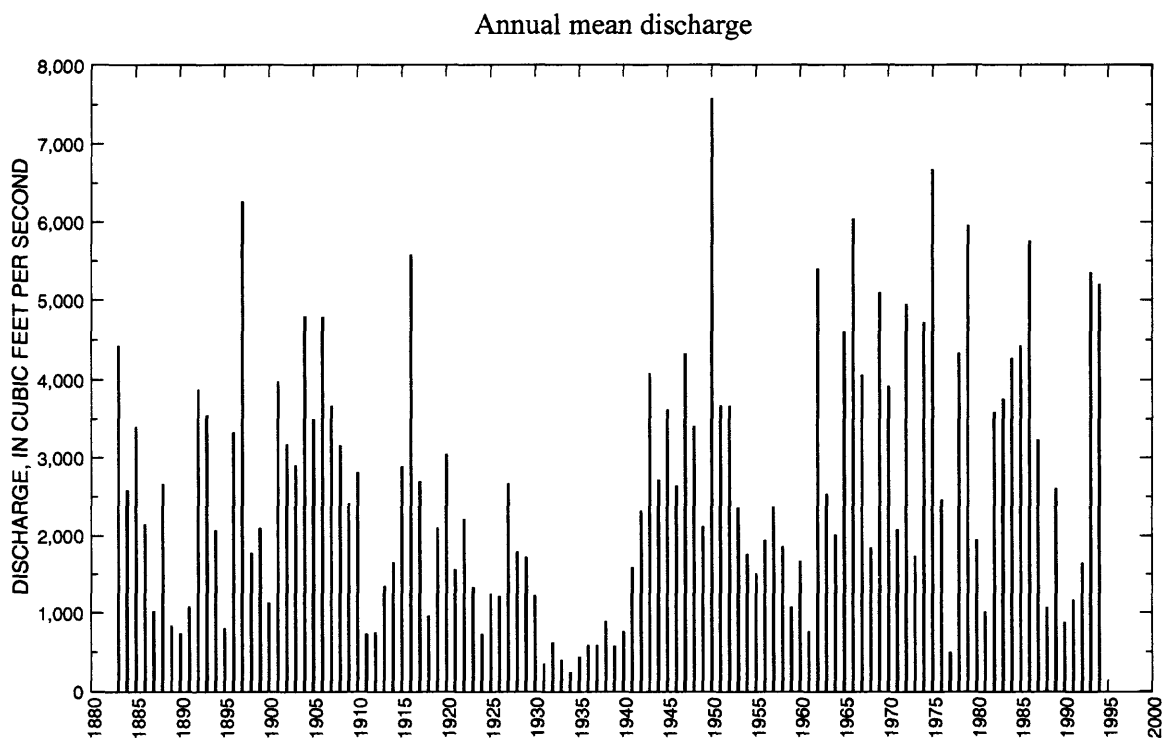
LOCATION.--Lat 47°55'38", long 97°01'34", in sec.2, T.151 N., R.50 W., Grand Forks County, Hydrologic Unit 09020301, on right bank 200 ft upstream from the DeMers Avenue bridge, 0.4 mi downstream from Red Lake River, and at mile 297.6.

DRAINAGE AREA.--30,100 mi², approximately, including 3,800 mi² in closed basins.

PERIOD OF RECORD.--April 1882 to current year. Prior to January 1904 monthly discharge only, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 779.00 ft above sea level. Oct. 1, 1983, to Sept. 30, 1986, datum of gage was 780.00 ft at same site. Apr. 14, 1965, to Sept. 30, 1983, water-stage recorder 1.9 mi downstream at a datum of 778.35 ft. Nov. 3, 1933, to Apr. 13, 1965, water-stage recorder 0.3 mi upstream at 778.35 ft datum. See WSP 1728 or 1913 for history of changes prior to Nov. 3, 1933.

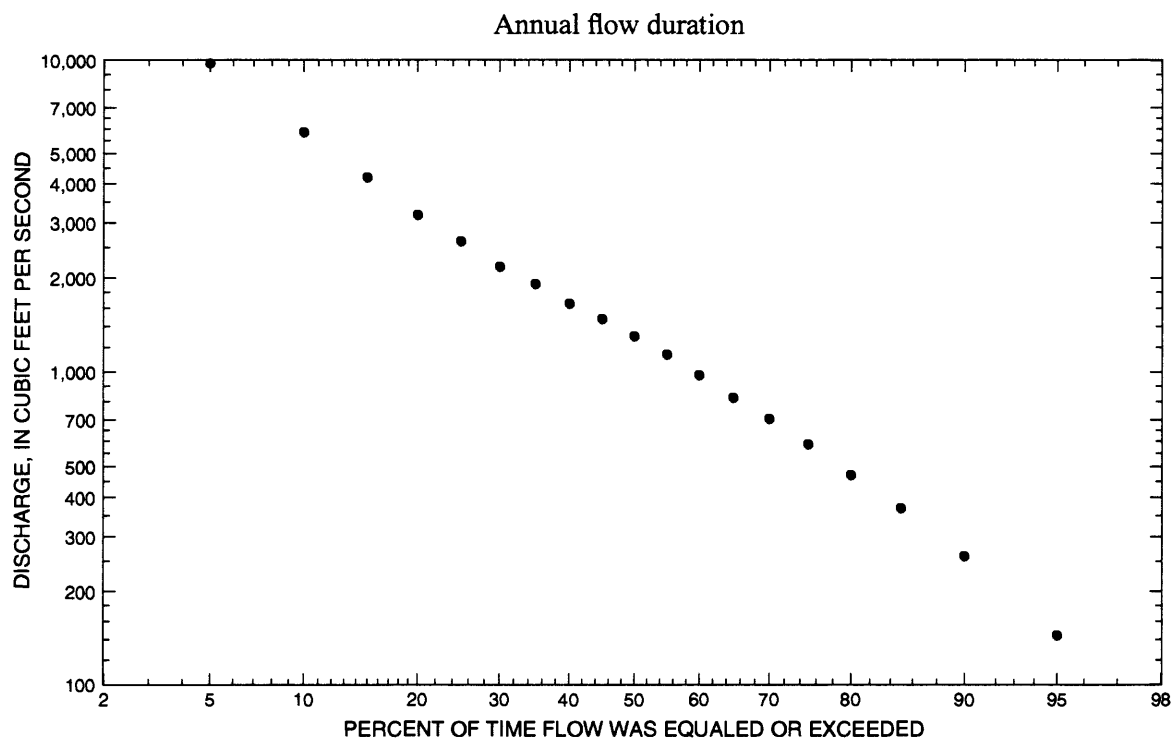
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 85,000 ft³/s, Apr. 10, 1897, gage height, 50.20 ft; minimum daily discharge, 1.8 ft³/s, Sept. 2, 1977, caused by unusual regulation during repair of dam at Grand Forks.



05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	5,690	1901	12.1	1937	1,380	1,080	0.78	4.33
November	5,220	1972	30.5	1937	1,210	877	0.73	3.79
December	3,070	1972	17.8	1937	967	665	0.69	3.04
January	1,930	1951	18.8	1937	795	542	0.68	2.50
February	1,870	1952	2.87	1937	758	514	0.68	2.38
March	10,200	1966	42.1	1937	2,120	2,220	1.05	6.66
April	39,800	1897	954	1938	9,270	7,980	0.86	29.1
May	36,500	1950	373	1934	5,080	4,910	0.96	16.0
June	19,300	1962	151	1934	3,890	3,070	0.79	12.2
July	25,300	1975	88.8	1936	3,190	3,450	1.08	10.0
August	17,000	1993	30.6	1934	1,760	2,070	1.18	5.53
September	6,250	1993	20.3	1936	1,410	1,130	0.81	4.42
Annual	7,580	1950	244	1934	2,630	1,650	0.63	100



05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Monthly and annual flow duration, in cubic feet per second¹

Percentage of days discharge equalled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	55.4	59.2	209	1,000	742	447	219	110	63.7	90.6	100	67.1	144
90	148	156	312	1,340	1,050	755	399	214	203	259	258	175	260
85	201	207	403	1,660	1,330	985	586	357	336	347	354	242	369
80	246	247	530	1,970	1,570	1,210	728	437	436	405	406	301	470
75	307	320	608	2,300	1,790	1,450	888	497	489	473	461	365	586
70	367	379	686	2,710	2,020	1,680	1,110	602	542	547	554	432	705
65	440	438	783	3,180	2,270	1,900	1,330	746	715	627	639	544	825
60	520	508	883	3,800	2,540	2,140	1,550	885	842	783	733	643	975
55	613	606	1,010	4,400	2,850	2,430	1,790	1,010	977	900	833	723	1,140
50	710	662	1,140	5,090	3,190	2,780	2,110	1,120	1,120	1,060	947	795	1,300
45	777	718	1,300	5,920	3,540	3,170	2,380	1,220	1,250	1,220	1,060	866	1,480
40	843	792	1,490	7,060	3,980	3,600	2,650	1,390	1,360	1,350	1,180	1,010	1,650
35	997	876	1,680	8,550	4,500	4,040	3,010	1,590	1,480	1,500	1,320	1,150	1,910
30	1,140	998	1,870	10,000	5,160	4,580	3,400	1,850	1,660	1,660	1,470	1,250	2,170
25	1,280	1,160	2,050	12,200	6,140	5,170	3,890	2,130	1,870	1,850	1,640	1,370	2,610
20	1,410	1,390	2,530	15,400	7,030	5,820	4,510	2,440	2,150	2,080	1,810	1,560	3,180
15	1,540	1,510	3,420	18,600	8,090	6,790	5,360	2,850	2,490	2,430	2,080	1,750	4,190
10	1,680	1,630	5,600	23,000	9,670	8,070	6,810	3,710	3,140	2,950	2,380	1,930	5,840
5	1,850	1,800	9,870	30,400	14,400	10,900	10,000	5,260	4,270	3,670	2,710	2,180	9,800

¹Statistics computed using period of daily value record 1904 to current year.

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s) ¹			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	1,640	1,600	1,450	1,220	1,010
0.95	1.05	3,260	3,240	2,940	2,430	1,950
0.90	1.11	4,640	4,620	4,190	3,450	2,730
0.80	1.25	6,990	6,960	6,340	5,200	4,060
0.50	2	14,700	14,300	13,200	11,000	8,400
0.20	5	29,200	27,400	25,800	21,900	16,700
0.10	10	41,000	37,400	35,600	30,800	23,400
0.04	25	58,000	51,000	49,300	43,700	33,200
0.02	50	71,900	61,500	60,300	54,400	41,400
0.01	100	86,700	72,400	71,600	65,700	50,200
0.005	200	102,000	83,500	83,500	77,900	59,700
0.002	500	125,000	ng	ng	ng	ng

¹Statistics computed using period of daily value record 1904 to current year.

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s) ¹								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	24.5	34.2	36.1	38.8	44.4	62.0	72.7	88.9	98.9
0.10	10	58.5	72.5	76.3	81.3	91.4	115	132	156	179
0.20	5	142	158	166	175	193	223	250	284	335
0.50	2	479	482	507	531	568	601	654	707	854

¹Statistics computed using period of daily value record 1904 to current year.

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s) ¹									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	39.8	43.0	46.1	51.5	81.1	106	143	229		
0.10	10	85.1	91.3	96.8	105	158	192	233	361		
0.20	5	187	199	208	221	312	354	393	598		
0.50	2	572	599	616	639	791	841	875	1,380		
		June-July-August				September-October-November					
		0.05	20	79.0	89.0	96.6	114	34.2	56.4	62.4	74.9
		0.10	10	146	162	176	206	79.9	114	126	150
		0.20	5	283	312	336	392	189	237	261	310
		0.50	2	804	871	936	1,090	620	685	755	874

¹Statistics computed using period of daily value record 1904 to current year.

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1882	April 18	48.00	75,000	1927	April 13	20.00	10,600
1883	April 26	42.20	38,600	1928	April 2	21.80	12,200
1884	April 16	31.10	20,600	1929	March 24	--	17,100
1885	April 17	23.10	13,000	1930	April 7	18.90	9,610
1886	May 3	20.60	10,800	1931	April 10	6.48	1,630
1887	April 15	16.30	7,300	1932	April 10	22.07	10,400
1888	April 19	29.50	19,000	1933	April 3	15.18	4,380
1889	April 1	12.00	3,000	1934	April 12	10.02	3,210
1890	April 15	10.60	3,470	1935	March 29	13.07	2,920
1891	April 13	17.70	6,000	1936	April 18	25.00	14,500
1892	April 17	33.40	23,000	1937	May 4	11.57	4,180
1893	April 24	45.50	53,300	1938	May 12	15.49	6,600
1894	April 24	26.90	16,400	1939	April 6	20.13	6,720
1895	April 6	9.90	2,000	1940	April 18	21.88	10,000
1896	May 30	32.00	21,600	1941	April 12	27.86	13,400
1897	April 10	50.20	85,000	1942	April 5	24.10	11,000
1898	April 14	15.00	4,500	1943	April 12	38.16	28,200
1899	April 17	20.90	9,000	1944	August 13	19.79	10,400
1900	April 10	13.20	4,000	1945	March 29	--	21,300
1901	April 7	26.30	14,000	1946	March 27	33.10	22,000
1902	March 30	26.00	15,000	1947	April 21	40.60	35,000
1903	April 11	28.00	18,800	1948	April 16	41.68	34,200
1904	April 27	40.65	33,000	1949	April 10	29.11	15,200
1905	May 16	26.11	16,800	1950	May 12	45.61	54,000
1906	April 18	36.00	27,600	1951	April 12	33.52	23,600
1907	April 7	39.95	30,400	1952	April 20	--	23,900
1908	April 11	32.80	20,500	1953	June 25	24.63	14,600
1909	July 30	18.80	9,260	1954	April 15	18.63	9,620
1910	March 22	30.70	18,500	1955	April 10	26.17	15,400
1911	June 12	10.70	3,520	1956	April 23	32.43	21,400
1912	April 8	12.73	4,730	1957	July 2	24.67	14,700
1913	April 8	26.70	17,200	1958	July 9	16.03	7,500
1914	June 16	17.50	8,240	1959	April 6	--	6,300
1915	July 3	30.80	21,500	1960	April 12	28.88	17,200
1916	April 23	37.70	29,000	1961	March 28	9.75	3,400
1917	April 8	33.90	21,600	1962	June 16	34.45	26,600
1918	March 28	11.30	4,480	1963	April 11	21.23	10,800
1919	July 8	23.20	13,600	1964	April 19	22.71	13,200
1920	March 31	--	30,300	1965	April 17	44.92	52,000
1921	April 10	20.90	11,500	1966	April 4	45.55	55,000
1922	April 11	28.72	19,000	1967	April 4	37.50	28,200
1923	April 22	26.15	16,200	1968	June 11	20.03	9,420
1924	May 2	8.20	2,530	1969	April 16	45.69	53,500
1925	June 12	19.00	9,690	1970	April 28	34.30	23,700
1926	March 28	18.10	7,720	1971	April 11	27.86	15,800

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Annual peak discharge and corresponding gage height—Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height—Continued							
1972	April 17	38.50	31,400	1984	April 2	37.06	32,300
1973	March 20	27.32	11,300	1985	May 19	25.90	17,800
1974	April 19	40.25	34,300	1986	April 2	37.00	31,900
1975	July 14	43.08	42,800	1987	March 29	33.19	17,500
1976	April 3	34.58	23,600	1988	April 5	21.16	8,500
1977	April 10	8.52	2,190	1989	April 13	43.21	39,600
1978	April 11	45.73	54,200	1990	April 5	17.56	5,040
1979	April 23	48.63	82,000	1991	July 8	17.63	4,870
1980	April 6	31.01	22,000	1992	March 12	23.30	8,000
1981	July 1	14.68	6,710	1993	August 3	36.39	26,200
1982	April 12	37.18	23,900	1994	July 12	34.30	26,800
1983	April 6	29.17	14,300				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1897	April 10	50.20	85,000	1951	April 12	33.52	23,600
1979	April 23	48.63	82,000	1976	April 3	34.58	23,600
1882	April 18	48.00	75,000	1892	April 17	33.40	23,000
1966	April 4	45.55	55,000	1946	March 27	33.10	22,000
1978	April 11	45.73	54,200	1980	April 6	31.01	22,000
1950	May 12	45.61	54,000	1896	May 30	32.00	21,600
1969	April 16	45.69	53,500	1917	April 8	33.90	21,600
1893	April 24	45.50	53,300	1915	July 3	30.80	21,500
1965	April 17	44.92	52,000	1956	April 23	32.43	21,400
1975	July 14	43.08	42,800	1945	March 29	--	21,300
1989	April 13	43.21	39,600	1884	April 16	31.10	20,600
1883	April 26	42.20	38,600	1908	April 11	32.80	20,500
1947	April 21	40.60	35,000	1888	April 19	29.50	19,000
1974	April 19	40.25	34,300	1922	April 11	28.72	19,000
1948	April 16	41.68	34,200	1903	April 11	28.00	18,800
1904	April 27	40.65	33,000	1910	March 22	30.70	18,500
1984	April 2	37.06	32,300	1985	May 19	25.90	17,800
1986	April 2	37.00	31,900	1987	March 29	33.19	17,500
1972	April 17	38.50	31,400	1913	April 8	26.70	17,200
1907	April 7	39.95	30,400	1960	April 12	28.88	17,200
1920	March 31	--	30,300	1929	March 24	--	17,100
1916	April 23	37.70	29,000	1905	May 16	26.11	16,800
1943	April 12	38.16	28,200	1894	April 24	26.90	16,400
1967	April 4	37.50	28,200	1923	April 22	26.15	16,200
1906	April 18	36.00	27,600	1971	April 11	27.86	15,800
1994	July 12	34.30	26,800	1955	April 10	26.17	15,400
1962	June 16	34.45	26,600	1949	April 10	29.11	15,200
1993	August 3	36.39	26,200	1902	March 30	26.00	15,000
1952	April 20	--	23,900	1957	July 2	24.67	14,700
1982	April 12	37.18	23,900	1953	June 25	24.63	14,600
1970	April 28	34.30	23,700	1936	April 18	25.00	14,500

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Annual peak discharge and corresponding gage height—Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height—Continued							
1983	April 6	29.17	14,300	1958	July 9	16.03	7,500
1901	April 7	26.30	14,000	1887	April 15	16.30	7,300
1919	July 8	23.20	13,600	1939	April 6	20.13	6,720
1941	April 12	27.86	13,400	1981	July 1	14.68	6,710
1964	April 19	22.71	13,200	1938	May 12	15.49	6,600
1885	April 17	23.10	13,000	1959	April 6	--	6,300
1928	April 2	21.80	12,200	1891	April 13	17.70	6,000
1921	April 10	20.90	11,500	1990	April 5	17.56	5,040
1973	March 20	27.32	11,300	1991	July 8	17.63	4,870
1942	April 5	24.10	11,000	1912	April 8	12.73	4,730
1886	May 3	20.60	10,800	1898	April 14	15.00	4,500
1963	April 11	21.23	10,800	1918	March 28	11.30	4,480
1927	April 13	20.00	10,600	1933	April 3	15.18	4,380
1932	April 10	22.07	10,400	1937	May 4	11.57	4,180
1944	August 13	19.79	10,400	1900	April 10	13.20	4,000
1940	April 18	21.88	10,000	1911	June 12	10.70	3,520
1925	June 12	19.00	9,690	1890	April 15	10.60	3,470
1954	April 15	18.63	9,620	1961	March 28	9.75	3,400
1930	April 7	18.90	9,610	1934	April 12	10.02	3,210
1968	June 11	20.03	9,420	1889	April 1	12.00	3,000
1909	July 30	18.80	9,260	1935	March 29	13.07	2,920
1899	April 17	20.90	9,000	1924	May 2	8.20	2,530
1988	April 5	21.16	8,500	1977	April 10	8.52	2,190
1914	June 16	17.50	8,240	1895	April 6	9.90	2,000
1992	March 12	23.30	8,000	1931	April 10	6.48	1,630
1926	March 28	18.10	7,720				

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1882	--	--	--	--	--	--	26,380	13,870	7,080	5,660	5,300	2,160	--
1883	2,180	2,290	2,130	1,500	1,630	1,520	16,820	14,420	5,020	2,660	1,730	1,310	4,430
1884	1,260	1,270	1,070	815.0	697.0	716.0	10,980	4,760	3,570	2,270	1,520	2,330	2,590
1885	2,990	2,600	2,080	1,580	1,270	1,150	6,730	4,320	4,790	5,670	4,950	2,560	3,400
1886	1,850	1,690	1,270	815.0	697.0	1,560	6,340	6,060	2,610	1,550	740.0	540.0	2,150
1887	610.0	600.0	587.0	410.0	326.0	342.0	3,010	1,770	1,240	1,200	1,240	880.0	1,020
1888	660.0	590.0	410.0	296.0	242.0	236.0	9,330	4,340	8,530	4,650	1,990	980.0	2,670
1889	900.0	960.0	698.0	538.0	515.0	974.0	2,020	1,180	710.0	600.0	490.0	490.0	840.0
1890	510.0	640.0	470.0	340.0	283.0	289.0	1,830	990.0	1,300	1,040	610.0	560.0	739.0
1891	700.0	800.0	641.0	493.0	429.0	450.0	3,410	1,440	1,280	1,330	1,160	800.0	1,080
1892	1,470	1,190	995.0	815.0	758.0	2,030	17,400	8,760	7,280	3,410	1,380	1,180	3,880
1893	1,020	855.0	665.0	493.0	429.0	441.0	16,000	15,240	3,250	2,110	1,120	820.0	3,550
1894	840.0	580.0	587.0	429.0	391.0	441.0	10,000	5,900	2,980	1,520	760.0	530.0	2,070
1895	730.0	790.0	587.0	429.0	391.0	454.0	1,110	920.0	1,460	1,440	760.0	550.0	803.0
1896	550.0	891.0	470.0	296.0	410.0	1,200	6,740	12,400	12,000	2,650	1,410	1,110	3,330
1897	1,060	1,230	960.0	758.0	697.0	826.0	39,850	8,640	3,220	9,080	6,640	2,500	6,270
1898	1,820	1,580	1,150	910.0	990.0	1,330	2,570	1,920	2,840	3,440	1,510	1,200	1,780
1899	1,330	1,120	800.0	590.0	550.0	650.0	4,270	3,540	4,910	3,850	2,010	1,500	2,100
1900	1,370	1,260	1,040	740.0	560.0	800.0	2,020	1,060	630.0	670.0	890.0	2,470	1,130
1901	5,690	4,590	2,740	1,830	1,500	1,620	10,700	4,590	3,470	6,810	2,510	1,520	3,980
1902	2,020	1,640	1,200	950.0	1,080	3,900	5,950	8,180	6,450	3,160	1,850	1,703	3,180
1903	1,637	2,544	1,900	1,600	1,420	2,100	10,626	5,388	3,342	1,443	1,050	1,891	2,906
1904	2,982	2,204	1,960	1,140	900.0	1,020	21,270	12,900	6,020	3,920	1,758	1,613	4,796
1905	1,854	1,686	1,250	900.0	900.0	1,724	3,760	8,137	4,824	5,677	6,564	4,506	3,501
1906	3,344	2,705	1,900	1,750	1,590	1,890	19,850	8,220	6,062	4,561	3,181	2,467	4,787
1907	2,202	2,153	1,630	1,400	1,090	3,070	14,800	4,553	5,999	3,293	1,995	1,951	3,671
1908	1,965	1,442	1,200	890.0	800.0	1,960	9,852	5,788	7,135	3,295	1,972	1,758	3,164
1909	1,443	1,252	830.0	703.0	564.0	925.1	4,340	3,094	3,200	3,780	5,592	3,177	2,417
1910	2,232	1,900	2,430	1,517	1,301	8,416	7,845	4,340	1,947	859.5	490.3	425.9	2,819
1911	413.3	394.6	310.6	210.0	185.0	760.0	1,875	1,504	1,759	578.0	392.3	391.3	731.5
1912	463.2	370.0	340.0	140.0	110.0	300.0	2,471	1,670	1,128	698.0	558.9	755.5	749.2
1913	1,297	802.0	422.0	318.0	233.0	282.0	7,062	1,816	1,194	1,032	759.8	1,029	1,350
1914	1,046	1,145	793.0	509.0	428.0	911.0	2,986	2,557	4,360	2,837	1,092	1,185	1,656
1915	1,265	1,345	1,170	780.0	740.0	1,167	4,154	3,218	5,748	11,040	2,411	1,552	2,897
1916	1,614	1,408	1,239	840.0	670.0	1,070	22,170	10,990	6,821	11,350	4,925	3,964	5,582

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1917	3,054	2,768	1,775	1,216	928.5	1,763	11,720	4,776	2,192	1,176	597.2	487.0	2,702
1918	588.2	797.4	446.7	265.5	200.2	1,490	1,811	1,850	1,965	843.1	722.8	567.6	965.0
1919	407.2	653.2	672.9	399.1	343.5	1,100	5,276	3,225	1,751	6,662	3,156	1,423	2,101
1920	1,171	900.0	700.0	690.0	670.0	7,054	11,360	3,714	4,635	3,315	1,426	1,035	3,053
1921	1,177	1,072	1,033	800.0	730.0	1,554	4,862	1,870	2,724	1,375	800.0	800.0	1,565
1922	649.9	607.4	655.2	384.5	418.2	3,141	9,607	6,200	2,777	1,148	508.3	512.7	2,220
1923	508.8	720.1	504.5	404.3	303.7	404.3	5,448	3,188	1,568	1,884	587.8	473.1	1,333
1924	478.2	501.3	433.7	235.9	213.1	545.7	1,783	2,008	1,054	750.4	423.0	335.6	730.9
1925	553.3	410.7	206.5	129.8	140.0	1,107	2,197	1,405	5,768	2,165	388.5	503.4	1,246
1926	844.8	702.1	622.7	480.0	480.0	2,431	3,870	1,090	1,900	1,300	460.0	420.0	1,217
1927	830.1	750.3	444.2	335.8	305.7	4,397	8,161	7,538	4,564	2,223	1,237	1,208	2,675
1928	1,106	959.6	730.0	580.0	600.0	2,489	4,869	2,232	2,330	2,131	1,307	2,233	1,795
1929	1,429	1,263	942.5	869.5	637.2	6,867	3,725	2,089	1,321	782.8	390.6	292.9	1,727
1930	398.1	395.5	308.7	194.1	293.6	3,937	3,918	3,111	1,152	591.3	202.4	150.6	1,227
1931	196.6	251.0	194.5	161.3	273.4	477.0	1,092	612.3	492.3	276.8	136.3	59.5	351.2
1932	110.9	198.6	132.6	159.7	207.3	1,173	3,933	919.5	401.1	177.6	58.6	43.4	622.9
1933	36.0	82.7	57.4	38.6	33.6	926.9	2,254	767.6	428.2	116.5	41.5	31.3	401.0
1934	31.7	79.0	52.5	39.0	40.7	419.2	1,540	373.3	150.9	153.3	30.6	20.7	243.7
1935	40.6	73.0	40.7	27.7	31.8	898.1	1,521	856.1	503.1	666.2	404.4	183.8	439.1
1936	103.1	83.3	70.6	58.6	54.3	63.7	4,829	1,482	274.3	88.8	32.1	20.3	592.0
1937	12.1	30.5	17.8	18.8	2.87	42.1	1,485	1,636	922.0	767.0	1,333	793.8	590.8
1938	316.2	213.5	55.9	61.3	89.5	1,309	954.1	4,560	1,992	697.3	189.7	208.2	894.3
1939	216.0	190.2	199.4	237.1	228.6	454.5	3,126	911.6	686.6	387.6	118.2	225.4	579.5
1940	323.6	335.5	282.3	161.3	170.0	229.0	4,088	1,955	960.8	296.7	212.1	170.7	761.8
1941	245.3	344.4	281.9	334.2	357.9	448.1	7,013	2,166	4,704	986.3	756.0	1,602	1,594
1942	1,725	1,104	879.7	545.5	573.2	1,623	5,343	6,695	3,599	1,650	1,032	3,062	2,323
1943	1,526	1,062	733.9	772.6	680.4	1,068	18,310	5,760	10,390	4,972	2,282	1,616	4,085
1944	1,341	1,172	921.0	696.8	651.7	633.9	3,311	3,351	5,425	5,899	5,030	4,167	2,719
1945	2,392	2,321	1,668	1,377	1,373	9,093	12,190	5,862	3,161	1,627	1,017	1,336	3,624
1946	1,696	1,213	951.9	863.2	767.3	6,452	9,541	3,466	2,046	2,239	1,227	1,188	2,643
1947	1,741	1,438	1,112	1,075	838.9	1,377	19,620	7,486	10,320	4,287	1,413	1,393	4,329
1948	1,599	1,330	1,255	1,106	913.1	1,041	19,800	7,817	2,502	1,694	1,157	891.6	3,409
1949	599.9	593.6	463.2	417.1	443.9	679.4	6,780	2,657	4,843	3,306	3,065	1,612	2,121
1950	1,072	1,172	1,038	781.0	731.4	1,057	24,100	36,510	11,080	7,761	3,029	2,226	7,580
1951	2,722	1,987	2,037	1,929	1,821	2,269	14,380	8,193	4,087	2,249	1,113	1,427	3,680

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1952	1,314	1,270	1,850	1,747	1,869	1,968	16,630	5,318	3,493	5,622	1,838	1,261	3,670
1953	871.9	763.9	672.3	575.5	606.8	1,906	3,152	3,071	8,945	4,526	2,036	1,220	2,364
1954	864.8	935.6	846.7	812.9	852.9	1,616	4,809	3,516	3,287	2,090	868.2	694.2	1,766
1955	639.5	697.4	680.6	725.2	666.4	683.5	5,598	1,708	2,237	2,153	1,576	779.1	1,510
1956	751.8	525.5	376.1	433.9	470.3	540.3	8,927	5,054	2,755	1,407	699.1	1,451	1,941
1957	494.7	786.5	515.5	416.1	428.9	1,552	4,416	3,084	4,251	5,760	2,471	4,266	2,374
1958	3,245	2,809	1,511	1,327	1,272	1,928	2,606	1,357	1,282	3,647	824.4	443.6	1,860
1959	397.6	464.2	324.5	375.8	374.6	923.2	2,995	1,605	2,432	1,850	645.9	474.5	1,072
1960	496.5	445.9	433.7	499.8	481.4	556.3	8,764	3,115	2,599	1,775	480.8	560.5	1,675
1961	343.2	471.8	317.1	297.1	325.7	1,677	1,700	2,141	894.0	400.9	218.1	334.6	762.6
1962	575.8	383.0	220.5	199.0	217.1	313.5	10,640	9,754	19,340	13,970	5,887	3,231	5,404
1963	2,334	2,113	1,583	1,305	1,104	1,962	5,767	3,343	6,245	2,459	1,114	1,195	2,541
1964	1,386	930.0	801.9	763.1	736.0	705.5	6,295	4,039	4,550	2,318	992.7	703.3	2,013
1965	1,533	1,262	872.4	945.6	909.8	930.2	24,480	8,110	8,261	4,315	1,955	1,879	4,604
1966	3,870	2,337	2,153	1,892	1,812	10,250	25,360	10,870	5,228	2,956	3,495	2,308	6,048
1967	1,906	1,798	1,789	1,703	1,602	2,708	16,910	9,270	5,987	3,153	1,178	861.7	4,067
1968	773.5	704.0	718.5	591.9	540.0	1,877	2,541	1,880	4,580	4,193	2,155	1,550	1,844
1969	1,465	1,657	1,608	1,495	1,512	2,111	28,690	12,070	4,518	3,246	1,503	1,432	5,094
1970	1,953	1,816	1,479	1,411	1,536	1,676	14,150	8,235	9,791	2,897	1,091	1,159	3,922
1971	1,131	1,415	1,134	1,100	1,154	2,423	7,096	3,035	2,175	2,124	1,028	1,235	2,085
1972	4,290	5,218	3,073	1,827	1,480	8,595	15,700	7,597	5,197	2,276	2,267	1,905	4,949
1973	1,800	1,409	1,163	1,124	1,162	5,467	1,959	1,356	1,029	559.8	736.7	3,067	1,739
1974	3,737	2,421	1,945	1,701	1,658	2,048	16,670	13,150	5,928	2,860	2,699	1,793	4,721
1975	1,939	1,972	1,240	1,301	1,434	1,740	18,740	14,640	6,173	25,270	3,004	2,228	6,677
1976	2,345	2,315	1,772	1,705	1,699	3,704	9,237	2,515	1,556	1,106	976.3	700.2	2,463
1977	406.6	300.3	196.1	215.0	215.4	493.5	1,335	834.4	549.2	592.4	227.3	593.9	496.8
1978	1,223	1,084	1,360	1,285	1,113	2,504	30,180	4,977	3,151	3,065	1,405	972.6	4,337
1979	879.7	803.5	761.2	683.5	683.0	962.3	31,480	18,330	5,958	5,773	3,300	1,941	5,962
1980	1,652	1,832	1,522	1,341	1,404	1,853	8,707	1,848	1,451	669.4	456.1	767.4	1,948
1981	424.1	436.4	353.4	292.4	386.2	936.5	978.9	1,352	1,270	2,415	1,468	1,804	1,014
1982	2,473	1,820	1,129	1,136	1,071	2,380	17,400	6,015	3,353	3,200	1,898	1,268	3,590
1983	3,687	2,347	1,909	1,600	1,473	7,695	7,047	2,994	5,036	6,028	2,614	2,486	3,756
1984	2,153	2,021	1,935	1,679	1,813	5,607	15,460	3,846	11,530	3,062	1,482	954.8	4,274
1985	2,227	2,018	1,444	1,388	1,357	5,792	4,898	9,056	7,508	6,016	6,473	4,702	4,428
1986	3,966	2,427	2,026	1,889	1,828	6,540	19,580	14,630	6,191	4,369	2,407	3,175	5,762

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

Monthly and annual mean discharges, in cubic feet per second—Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1987	3,335	2,009	2,047	1,715	1,790	8,049	7,556	3,460	2,481	3,323	1,914	1,015	3,236
1988	644.8	658.6	619.6	452.7	520.0	2,939	4,320	1,096	641.8	295.7	312.7	373.1	1,071
1989	312.5	341.4	259.5	278.3	357.9	507.4	21,850	3,328	2,047	862.0	443.5	944.5	2,606
1990	500.4	442.6	248.2	189.9	258.2	1,067	2,476	1,502	2,078	946.1	452.5	356.7	876.4
1991	350.8	316.2	218.0	195.0	304.0	764.3	1,587	2,821	2,008	3,027	1,035	1,352	1,170
1992	672.2	494.5	468.7	519.0	524.2	4,219	2,692	1,975	1,982	2,691	1,441	2,118	1,654
1993	1,042	756.7	879.5	809.5	1,090	2,192	13,760	3,398	4,493	12,220	17,050	6,251	5,353
1994	3,537	1,930	2,016	1,570	1,519	6,458	12,460	6,496	5,752	12,930	3,590	3,910	5,202

05083000 TURTLE RIVER AT MANVEL, ND

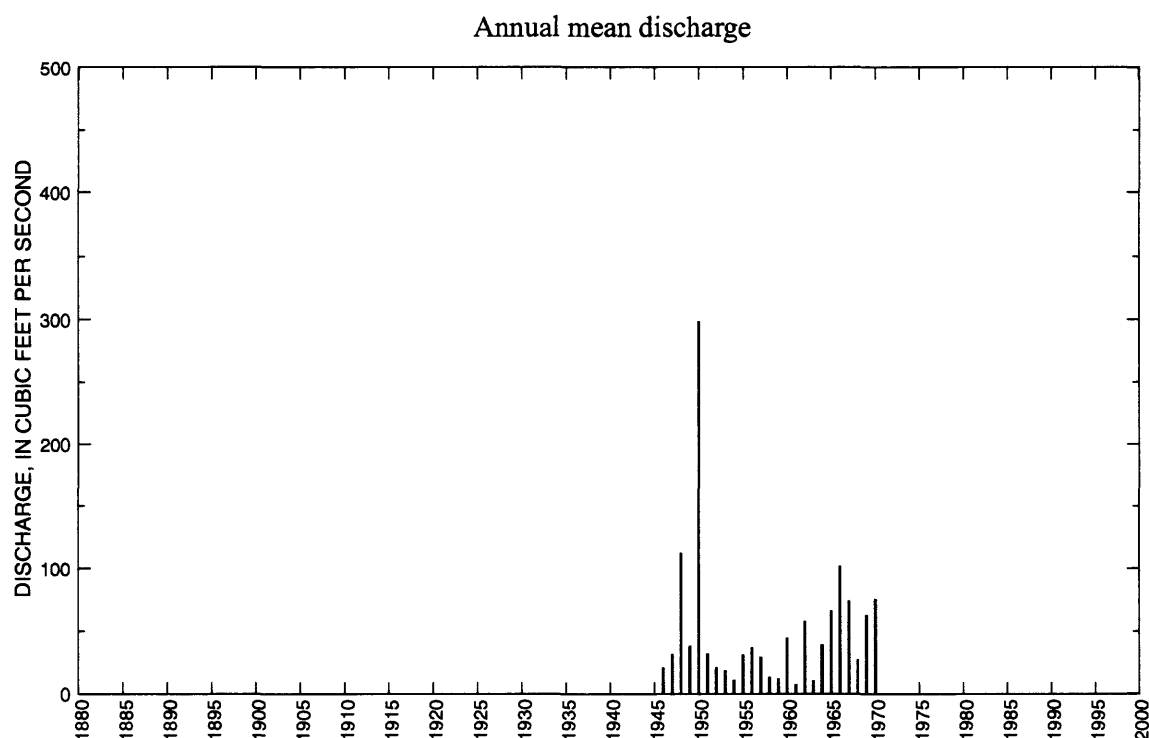
LOCATION.--Lat 48°04'43", long 97°11'03", in SE¹/₄ sec.10, T.153 N., R.51 W., Grand Forks County, Hydrologic Unit 09020307, on left bank 10 ft downstream from bridge on State Highway No. 33, 0.3 mi west of Manvel, and 10 mi upstream from mouth.

DRAINAGE AREA.--613 mi², of which 57 mi² is probably noncontributing.

PERIOD OF RECORD.--October 1945 to September 1970 (continuous record); water year 1972-73 and December 1979 to September 1982 (gage heights and annual maximum discharge only).

GAGE.--Water-stage recorder. Datum of gage is 799.28 ft above sea level. Prior to June 29, 1959, nonrecording gage at same site and datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 28,000 ft³/s, Apr. 19, 1950, from rating curve extended above 4,300 ft³/s on basis of contracted-opening measurement of peak flow, gage height, 21.5 ft from floodmark; no flow at times some years.



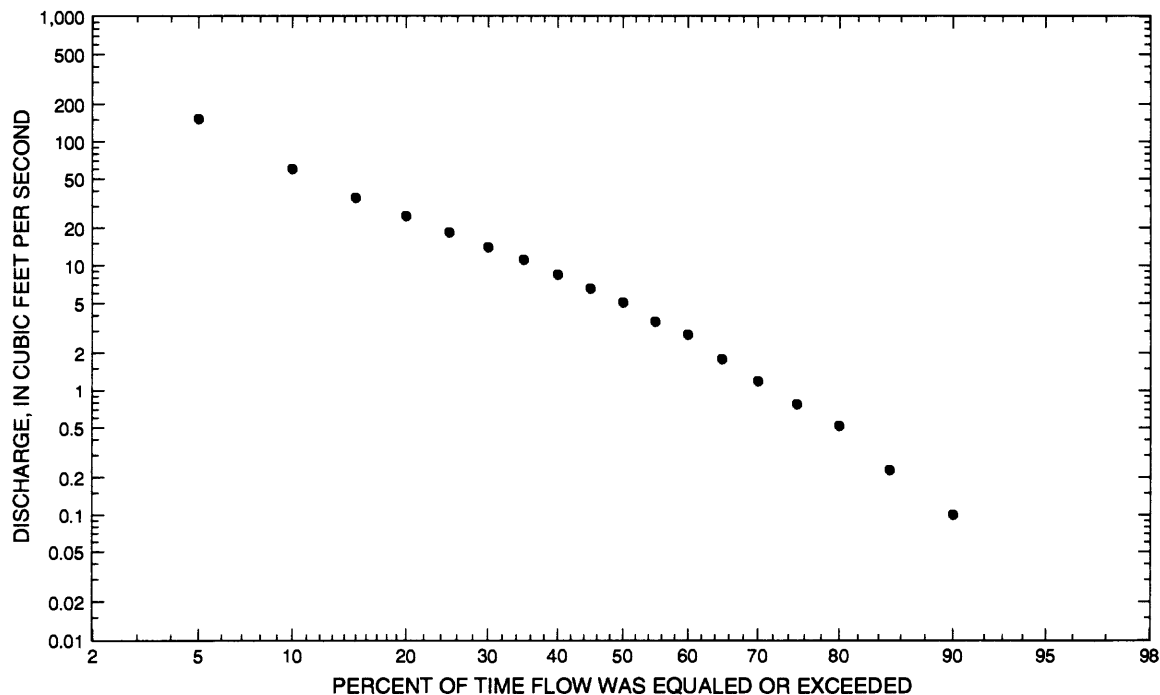
05083000 TURTLE RIVER AT MANVEL, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	49.1	1966	0.626	1961	8.86	11.4	1.29	1.44
November	24.9	1958	0.643	1964	7.75	5.21	0.67	1.26
December	10.2	1966	0.097	1964	3.66	2.76	0.75	0.59
January	5.10	1951	0	m	1.45	1.62	1.12	0.24
February	4.84	1967	0	m	0.940	1.27	1.34	0.15
March	479	1966	0	m	46.9	97.6	2.08	7.61
April	1990	1950	23.2	1958	348	437	1.26	56.4
May	1460	1950	7.87	1946	105	286	2.72	17.1
June	269	1964	3.43	1961	52.8	59.6	1.13	8.56
July	57.9	1968	1.15	1961	19.7	16.5	0.83	3.20
August	22.1	1966	0.287	1946	5.91	5.10	0.86	0.96
September	215	1957	0.180	1959	15.8	42.9	2.72	2.55
Annual	299	1950	7.51	1961	51.2	58.8	1.15	100

Annual flow duration



05083000 TURTLE RIVER AT MANVEL, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.42	7.62	3.20	0.67	0.10	0	0.10	0.82	0.10	0
90	0	0	0	7.20	9.94	5.34	1.40	0.26	0.17	0.36	1.80	0.29	0.10
85	0	0	0	17.8	12.0	6.68	2.80	0.69	0.17	0.70	2.40	0.45	0.23
80	0.10	0	0	22.3	13.9	9.23	3.82	1.00	0.40	1.10	3.30	0.70	0.52
75	0.10	0.10	0.08	26.0	15.3	12.0	4.84	1.20	0.40	1.60	3.90	0.95	0.78
70	0.10	0.10	0.08	29.8	16.7	13.6	5.94	1.50	0.52	2.00	3.90	1.50	1.20
65	0.19	0.10	0.08	35.4	18.2	15.2	7.33	1.80	0.69	2.00	4.60	2.00	1.80
60	0.29	0.10	0.08	41.9	19.7	17.2	8.88	2.20	0.90	2.50	5.32	2.30	2.82
55	0.55	0.28	0.44	50.1	21.2	19.9	10.0	2.70	1.20	3.90	6.03	2.30	3.59
50	0.72	0.47	0.87	60.0	23.2	23.0	11.1	2.70	1.60	4.81	6.55	2.70	5.11
45	0.93	0.56	1.20	76.9	25.6	26.3	13.2	3.20	2.10	5.60	6.96	3.10	6.57
40	1.40	0.56	1.70	102	29.7	30.1	14.6	3.90	2.70	6.48	7.38	3.10	8.46
35	1.60	0.80	1.70	136	36.5	34.5	16.3	5.28	4.34	7.64	7.91	3.60	11.1
30	2.00	0.95	1.70	190	44.4	41.3	18.2	6.24	5.61	8.47	8.77	4.20	14.0
25	2.30	1.30	3.94	309	54.6	49.2	21.5	7.44	8.78	10.2	9.39	4.90	18.3
20	2.30	1.60	12.3	448	74.9	64.8	26.5	8.97	12.9	12.7	11.2	5.70	24.9
15	3.00	1.90	40.4	659	102	87.6	32.8	11.6	17.5	15.1	13.4	7.49	35.3
10	3.90	1.90	73.4	931	156	137	43.2	14.5	26.1	20.5	15.7	8.55	60.4
5	5.10	2.20	265	1,370	318	216	71.8	21.4	50.9	32.6	20.7	10.3	153

05083000 TURTLE RIVER AT MANVEL, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	36.9	45.2	34.5	26.9	24.5
0.95	1.05	87.8	100	82.8	62.6	47.2
0.90	1.11	140	154	131	96.9	67.7
0.80	1.25	249	262	225	163	106
0.50	2	757	739	620	423	255
0.20	5	2,360	2,150	1,650	1,050	638
0.10	10	4,320	3,820	2,710	1,660	1,050
0.04	25	8,270	7,090	4,550	2,680	1,800
0.02	50	12,600	10,600	6,330	3,610	2,570
0.01	100	18,600	15,400	8,480	4,710	3,560
0.005	200	26,500	21,600	11,100	5,980	4,810
0.002	500	40,700	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0.144	0.701
0.10	10	0	0	0	0	0	0	0.013	0.288	1.00
0.20	5	0	0	0	0	0	0.024	0.112	0.598	1.52
0.50	2	0	0	0.035	0.086	0.152	0.425	0.730	1.77	3.23

05083000 TURTLE RIVER AT MANVEL, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0.009
0.20	5	0	0	0	0	0	0	0	0.186
0.50	2	0.203	0.223	0.267	0.339	0.321	¹ 0.375	0.423	3.53
		June-July-August				September-October-November			
		0	0.037	0.137	0.464	0	0	0.006	0.039
		0.047	0.138	0.255	0.759	0	0	0.039	0.145
		0.184	0.332	0.515	1.33	0	0.082	0.129	0.361
		0.788	1.20	1.68	3.45	0.334	0.590	0.838	1.61

¹Graphical interpretation.

05083000 TURTLE RIVER AT MANVEL, ND--Continued

Annual peak discharge and corresponding gage height

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1946	March 23	14.38	700	1961	March 24	9.53	110
1947	April 13	8.79	431	1962	April 14	16.22	970
1948	April 19	17.88	7,130	1963	April 6	7.97	150
1949	April 10	15.83	1,600	1964	June 23	11.40	661
1950	April 19	21.50	28,000	1965	April 13	16.92	3,150
1951	April 6	13.90	940	1966	March 22	17.95	1,680
1952	April 7	13.90	600	1967	March 31	16.64	2,000
1953	June 22	7.48	219	1968	March 29	12.45	450
1954	April 11	8.45	100	1969	April 13	17.38	3,470
1955	April 5	16.27	1,460	1970	April 11	17.37	2,430
1956	April 20	16.20	1,500	1972	March 19	16.75	2,000
1957	September 5	13.15	900	1973	March 12	8.69	150
1958	October 9	6.04	135	1980	April 3	13.08	500
1959	March 30	13.31	370	1981	June 17	6.39	84.0
1960	April 7	13.90	1,080	1982	April 2	15.74	578
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 19	21.50	28,000	1946	March 23	14.38	700
1948	April 19	17.88	7,130	1964	June 23	11.40	661
1969	April 13	17.38	3,470	1952	April 7	13.90	600
1965	April 13	16.92	3,150	1982	April 2	15.74	578
1970	April 11	17.37	2,430	1980	April 3	13.08	500
1967	March 31	16.64	2,000	1968	March 29	12.45	450
1972	March 19	16.75	2,000	1947	April 13	8.79	431
1966	March 22	17.95	1,680	1959	March 30	13.31	370
1949	April 10	15.83	1,600	1953	June 22	7.48	219
1956	April 20	16.20	1,500	1963	April 6	7.97	150
1955	April 5	16.27	1,460	1973	March 12	8.69	150
1960	April 7	13.90	1,080	1958	October 9	6.04	135
1962	April 14	16.22	970	1961	March 24	9.53	110
1957	September 5	13.15	900	1954	April 11	8.45	100
1951	April 6	13.90	940	1981	June 17	6.39	84.0

05083000 TURTLE RIVER AT MANVEL, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1946	2.07	1.81	0.368	0.100	0.100	140.5	35.4	7.87	5.08	48.0	0.287	5.72	20.9
1947	11.4	4.38	1.90	0.187	0.100	73.3	193.1	20.6	58.8	8.29	8.59	1.52	31.8
1948	6.40	7.05	2.50	0.116	0.100	0.100	1,164	68.4	88.2	21.1	10.0	2.19	112.6
1949	1.30	4.62	0.468	0.129	0.100	0.100	384.6	28.7	34.0	8.40	3.05	0.413	38.4
1950	6.66	6.73	6.87	0.100	0	0	1,987	1,456	48.9	42.3	8.92	19.6	298.7
1951	16.7	13.7	4.52	5.10	2.00	41.2	211.0	24.1	14.1	3.95	12.0	41.5	32.3
1952	7.47	8.20	5.52	0.742	0.100	1.79	167.1	14.8	7.00	41.0	3.70	0.697	21.4
1953	0.819	9.24	3.73	1.15	0.796	18.1	27.2	26.3	89.7	42.5	4.07	1.04	18.7
1954	2.61	3.11	2.35	0.284	1.22	26.6	45.3	16.5	20.4	11.3	2.06	1.56	11.1
1955	3.17	6.55	2.73	1.08	0.671	0.048	225.0	18.9	110.1	10.5	3.63	0.693	31.6
1956	3.63	3.73	0.658	0.348	0.472	0.668	323.1	62.6	42.8	7.00	2.16	4.50	37.2
1957	0.958	8.40	3.62	2.89	0.639	45.2	40.6	16.2	13.9	1.64	7.06	215.3	29.5
1958	37.4	24.9	7.39	2.26	4.21	12.2	23.2	14.2	13.9	19.6	1.09	0.307	13.4
1959	1.45	5.11	1.28	0.019	0	38.4	59.5	16.5	11.2	7.82	2.89	0.180	12.0
1960	9.67	5.81	3.30	2.43	1.83	37.3	429.5	24.4	17.7	7.10	2.02	1.22	44.7
1961	0.626	4.00	0.613	0.794	0.550	36.0	25.9	14.6	3.43	1.15	0.661	1.17	7.51
1962	5.92	3.19	1.29	0	0	0	359.3	133.1	169.8	20.6	3.47	4.68	58.1
1963	4.47	10.6	3.51	0.484	0	21.5	46.0	13.9	12.5	10.1	3.24	0.653	10.6
1964	1.11	0.643	0.097	0	0	0.074	148.3	20.1	269.1	20.8	7.61	14.1	39.6
1965	12.4	7.35	3.38	1.19	1.48	2.09	557.7	85.9	72.8	19.4	6.49	32.7	66.3
1966	49.1	16.7	10.2	4.84	1.66	479.2	395.1	148.1	34.7	45.5	22.1	8.06	102.0
1967	8.90	8.25	5.65	4.03	4.84	96.4	535.3	191.0	32.1	6.61	2.25	0.826	74.5
1968	4.46	6.09	3.71	1.95	1.73	100.8	50.2	20.2	54.1	57.9	13.2	13.5	27.4
1969	8.82	12.5	8.15	1.78	0.179	0.081	631.7	31.6	37.9	16.0	4.27	10.9	63.0
1970	14.0	11.1	7.76	4.24	0.837	1.91	622.5	157.6	56.8	15.0	12.9	10.8	75.8

05083500 RED RIVER OF THE NORTH AT OSLO, MN

LOCATION.--Lat 48°11'40", long 97°08'30", in SW¹/₄SW¹/₄ sec.36, T.155 N., R.51 W., Walsh County, Hydrologic Unit 09020306, on bridge crossing the Red River 0.5 mi west of Oslo, Minn.

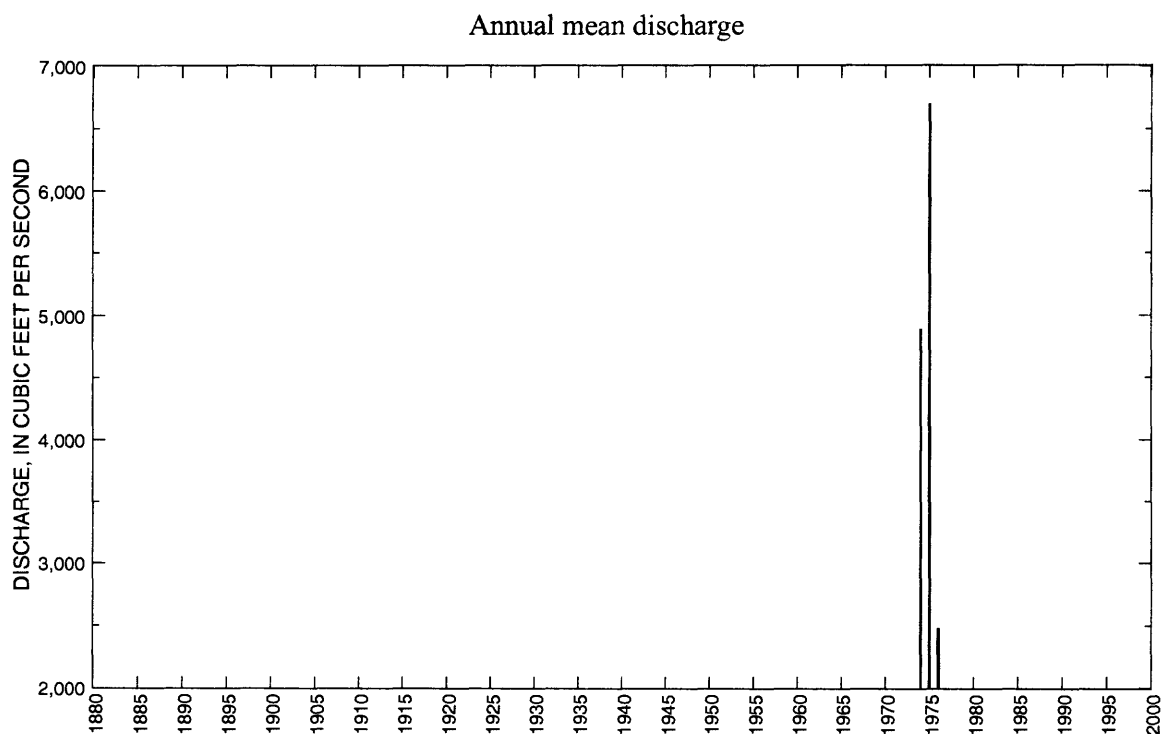
DRAINAGE AREA.--31,200 mi², approximately, including 3,800 mi² in closed basins.

PERIOD OF RECORD.--1936 to 1937, 1941 to 1943, 1945 to 1960, 1974 to 1976, operated as a continuous-record gaging station; 1985 to current, operated as a crest-stage station.

GAGE.--Wire-weight gage. Datum of gage is 772.65 ft above mean sea level, datum of 1929. Prior to Apr. 2, 1948, staff gage on railroad bridge 200 ft upstream and Apr. 3, 1948, to Sept. 8, 1959, wire-weight gage at bridge 620 ft downstream, both at datum 5.00 ft higher.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 63,000 ft³/s, May 10, 1950, gage height, 31.83 ft, site and datum then in use; maximum gage height, 36.72 ft, Apr. 14, 1989; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 37.5 ft in 1897, present datum.

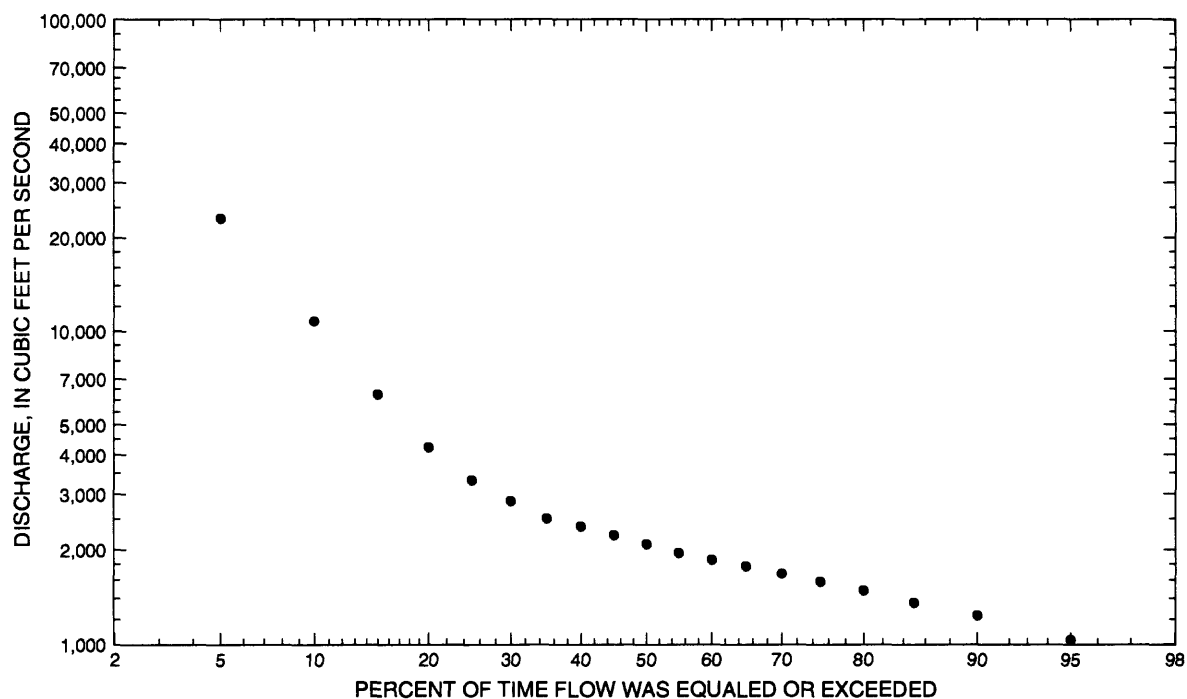


05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	3,770	1974	13.8	1937	2,020	1,550	0.77	5.14
November	2,440	1974	2,020	1975	2,270	222	0.10	5.79
December	1,940	1974	1,240	1975	1,650	368	0.22	4.22
January	1,740	1974	1,300	1975	1,580	244	0.15	4.03
February	1,680	1976	1,430	1975	1,590	139	0.09	4.06
March	3,310	1976	1,730	1975	2,350	837	0.36	6.00
April	27,000	1950	1,520	1937	9,710	6,700	0.69	24.8
May	40,900	1950	1,430	1958	6,780	8,540	1.26	17.3
June	11,800	1950	286	1936	4,150	3,090	0.74	10.6
July	25,600	1975	92.9	1936	4,560	5,790	1.27	11.6
August	3,170	1949	31.2	1936	1,630	1,040	0.64	4.16
September	2,240	1975	18.9	1936	904	808	0.89	2.31
Annual	6,700	1975	2,480	1976	4,690	2,120	0.45	100

Annual flow duration



05083500 RED RIVER OF THE NORTH AT OLSO, MN--Continued

Monthly and annual flow duration, in cubic feet per second

[ng, statistic not given]

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	1,250	1,420	1,450	1,090	1,160	528	141	33.6	15.5	12.7	1,290	1,180	1,030
90	1,290	1,420	1,500	1,720	1,490	1,130	1,060	473	21.5	13.4	1,600	1,200	1,230
85	1,310	1,430	1,550	2,160	1,730	1,530	1,280	558	270	14.2	1,690	1,210	1,360
80	1,320	1,440	1,600	2,460	2,070	1,770	1,450	648	358	15.0	1,790	1,230	1,480
75	1,360	1,460	1,660	2,880	2,370	1,950	1,580	730	387	21.0	1,880	1,310	1,580
70	1,380	1,470	1,730	3,290	2,620	2,130	1,710	842	417	1,720	2,000	1,370	1,670
65	1,610	1,500	1,800	3,650	2,910	2,340	1,910	926	450	1,960	2,120	1,610	1,760
60	1,680	1,510	1,870	4,450	3,200	2,560	2,130	994	483	2,040	2,220	1,740	1,860
55	1,690	1,510	1,940	5,100	3,490	2,780	2,440	1,140	530	2,100	2,280	1,760	1,950
50	1,690	1,620	2,000	5,780	3,810	3,040	2,750	1,490	586	2,160	2,330	1,780	2,090
45	1,700	1,660	2,080	6,930	4,250	3,270	3,050	1,740	686	2,230	2,390	1,780	2,220
40	1,700	1,680	2,150	8,590	4,760	3,460	3,390	1,970	798	2,290	2,450	1,790	2,360
35	1,700	1,680	2,230	10,300	5,390	3,650	3,790	2,120	852	2,350	2,500	1,800	2,500
30	1,710	1,690	2,300	11,400	6,250	3,960	4,290	2,260	905	2,510	2,560	1,800	2,840
25	1,710	1,690	2,370	12,800	7,160	4,430	4,930	2,410	1,670	2,890	2,610	1,810	3,310
20	1,720	1,700	2,430	15,400	8,370	5,230	5,680	2,560	1,860	3,180	2,730	1,910	4,220
15	1,740	1,730	2,490	19,200	9,980	7,660	6,610	2,760	2,040	3,470	2,860	1,970	6,120
10	1,760	ng	2,550	23,600	12,000	9,650	8,050	3,140	2,190	3,840	2,990	2,000	10,800
5	ng	ng	4,820	30,800	27,600	13,200	14,300	3,550	2,340	4,210	ng	2,070	23,100

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	2,990	ng	ng	ng	ng
0.95	1.05	5,440	ng	ng	ng	ng
0.90	1.11	7,320	ng	ng	ng	ng
0.80	1.25	10,300	ng	ng	ng	ng
0.50	2	18,600	ng	ng	ng	ng
0.20	5	31,400	ng	ng	ng	ng
0.10	10	40,100	ng	ng	ng	ng
0.04	25	51,000	ng	ng	ng	ng
0.02	50	59,000	ng	ng	ng	ng
0.01	100	66,700	ng	ng	ng	ng
0.005	200	74,300	ng	ng	ng	ng
0.002	500	84,000	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	ng	ng
0.10	10	ng	ng	ng	ng	ng	ng	ng	ng	ng
0.20	5	ng	ng	ng	ng	ng	ng	ng	ng	ng
0.50	2	ng	ng	ng	ng	ng	ng	ng	ng	ng

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	ng	ng	ng
0.10	10	ng	ng	ng	ng	ng	ng	ng	ng
0.20	5	ng	ng	ng	ng	ng	ng	ng	ng
0.50	2	ng	ng	ng	ng	ng	ng	ng	ng
		June-July-August				September-October-November			
		73.5	78.5	87.3	93.8	ng	ng	ng	ng
		171	185	205	229	ng	ng	ng	ng
		392	426	473	546	ng	ng	ng	ng
		1,130	1,220	1,340	1,630	ng	ng	ng	ng

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1936	April 18	--	15,000	1958	July 10	10.29	7,890
1937	May 4	6.47	4,070	1959	April 7	10.78	7,200
1942	April 4	--	12,500	1960	April 12	--	17,100
1943	April 13	29.16	31,500	1974	April 19	--	¹ 33,000
1945	March 26	--	24,000	1975	April 23	--	¹ 42,500
1946	March 30	25.11	--	1976	April 5	--	¹ 23,200
1947	April 22	--	33,800	1985	May 20	24.43	17,800
1948	April 17	--	41,400	1986	April 3	34.20	30,000
1949	April 10	24.08	18,700	1987	March 30	31.76	18,500
1950	May 10	31.83	63,000	1988	April 6	20.10	11,500
1951	April 12	25.46	24,800	1989	April 14	36.72	33,500
1952	April 21	--	24,800	1990	April 5	15.64	4,900
1953	June 25	17.55	14,900	1991	July 10	12.04	5,200
1954	April 15	12.39	9,790	1992	March 15	22.47	8,200
1955	April 10	19.46	16,400	1993	April 7	--	28,100
1956	April 24	25.50	22,500	1994	July 13	30.86	26,600
1957	July 2	17.42	14,900				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	May 10	31.83	63,000	1985	May 20	24.43	17,800
1975	April 23	--	¹ 42,500	1960	April 12	--	17,100
1948	April 17	--	41,400	1955	April 10	19.46	16,400
1947	April 22	--	33,800	1936	April 18	--	15,000
1989	April 14	36.72	33,500	1953	June 25	17.55	14,900
1974	April 19	--	¹ 33,000	1957	July 2	17.42	14,900
1943	April 13	29.16	31,500	1942	April 4	--	11,900
1986	April 3	34.20	30,000	1988	April 6	20.10	11,500
1993	April 7	--	28,100	1954	April 15	12.39	9,790
1994	July 13	30.86	26,600	1992	March 15	22.47	8,200
1951	April 12	25.46	24,800	1958	July 10	10.29	7,890
1952	April 21	--	24,800	1959	April 7	10.78	7,200
1945	March 26	--	24,000	1991	July 10	12.04	5,200
1976	April 5	--	¹ 23,200	1990	April 5	15.64	4,900
1956	April 24	25.50	22,500	1937	May 4	6.47	4,070
1949	April 10	24.08	18,700	1946	March 30	25.11	--
1987	March 30	31.76	18,500				

¹Daily mean.

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1936	--	--	--	--	--	--	5,111	1,634	286.4	92.9	31.2	18.9	--
1937	13.8	--	--	--	--	--	1,521	1,715	935.2	--	--	--	--
1941	--	--	--	--	--	--	--	--	--	--	--	--	--
1942	--	--	--	--	--	--	6,819	6,405	--	1,695	--	--	--
1943	--	--	--	--	--	--	--	--	--	--	--	--	--
1945	--	--	--	--	--	--	12,910	5,982	3,314	--	--	--	--
1946	--	--	--	--	--	--	10,230	3,471	2,074	--	--	--	--
1947	--	--	--	--	--	--	--	7,775	10,690	4,502	--	--	--
1948	--	--	--	--	--	--	--	8,278	2,508	--	--	--	--
1949	--	--	--	--	--	--	--	2,791	5,193	3,400	3,171	--	--
1950	--	--	--	--	--	--	27,050	40,940	11,750	7,936	--	--	--
1951	--	--	--	--	--	--	15,340	8,444	4,310	--	--	--	--
1952	--	--	--	--	--	--	17,260	5,556	3,604	5,762	2,033	--	--
1953	--	--	--	--	--	--	3,266	3,068	9,069	4,738	2,124	--	--
1954	--	--	--	--	--	--	4,967	3,583	3,336	2,167	--	--	--
1955	--	--	--	--	--	--	6,010	1,826	2,424	2,219	1,625	--	--
1956	--	--	--	--	--	--	9,280	5,602	2,979	1,479	763.1	--	--
1957	--	--	--	--	--	--	4,573	3,271	4,363	6,140	2,470	--	--
1958	--	--	--	--	--	--	2,686	1,433	1,359	3,739	915.4	427.8	--
1959	--	--	--	--	--	--	3,496	1,696	2,530	1,972	724.0	499.3	--
1960	--	--	--	--	--	--	9,289	3,328	2,699	1,954	541.1	607.0	--
1974	3,768	2,443	1,945	1,735	1,654	2,023	17,290	13,940	6,293	3,000	2,742	1,813	4,891
1975	1,944	2,020	1,240	1,299	1,431	1,732	17,610	15,830	5,887	25,590	3,087	2,243	6,699
1976	2,335	2,350	1,773	1,707	1,685	3,306	9,705	2,625	1,546	1,125	993.2	716.8	2,481

05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND

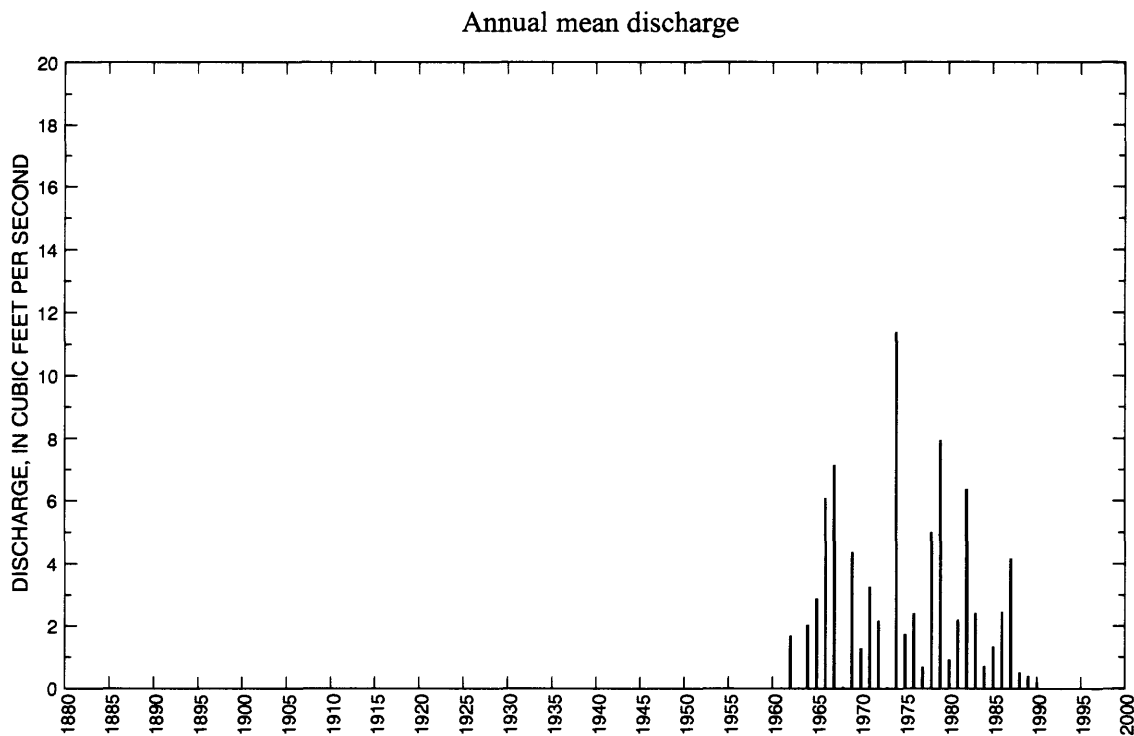
LOCATION.--Lat 48°14'50", long 98°07'00", in SE¹/₄NW¹/₄ sec.16, T.155 N., R.58 W., Walsh County, Hydrologic Unit 09020308, 150 ft downstream from bridge on State Highway 35, and 6 mi north of Whitman.

DRAINAGE AREA.--47.7 mi², of which about 9 mi² is probably noncontributing.

PERIOD OF RECORD.--October 1960 to September 1990.

GAGE.--Water-stage recorder. Datum of gage is 1,510 ft above sea level, from topographic map.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 984 ft³/s, May 19, 1974, gage height, 7.11 ft; maximum gage height, 7.96 ft, Apr. 4, 1987; no flow for many months each year.



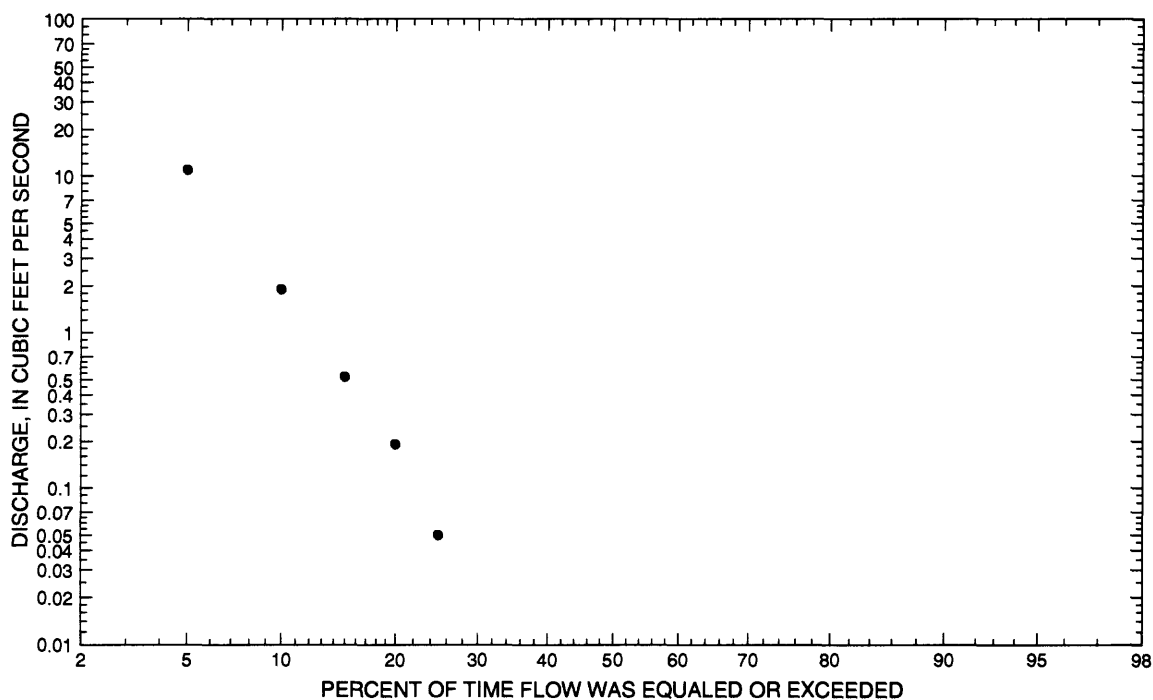
05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence; ng, statistic not given]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	3.45	1983	0	m	0.210	0.67	3.26	0.62
November	0.439	1983	0	m	0.040	0.10	2.63	0.11
December	0.029	1982	0	m	0	0.01	3.80	0
January	0	m	0	m	0	0	ng	0
February	7.10	1981	0	m	0.240	1.30	5.48	0.72
March	15.1	1966	0	m	3.09	4.68	1.51	9.40
April	87.9	1979	0	m	19.5	22.5	1.15	59.4
May	68.8	1974	0	m	5.22	14.2	2.73	15.9
June	19.5	1964	0	m	1.75	4.36	2.48	5.33
July	33.3	1982	0	m	2.13	6.23	2.93	6.48
August	7.02	1966	0	m	0.560	1.63	2.94	1.69
September	1.23	1981	0	m	0.110	0.30	2.66	0.34
Annual	11.4	1974	0.009	1963	2.73	2.77	1.01	100

Annual flow duration



05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0.09	0	0	0	0	0	0	0	0	0
70	0	0	0	0.32	0	0	0	0	0	0	0	0	0
65	0	0	0	0.80	0	0	0	0	0	0	0	0	0
60	0	0	0	1.50	0.03	0	0	0	0	0	0	0	0
55	0	0	0	2.00	0.07	0	0	0	0	0	0	0	0
50	0	0	0	2.80	0.12	0	0	0	0	0	0	0	0
45	0	0	0	4.46	0.17	0	0	0	0	0	0	0	0
40	0	0	0	5.72	0.31	0.03	0	0	0	0	0	0	0
35	0	0	0	8.02	0.58	0.08	0	0	0	0	0	0	0
30	0	0	0.02	11.3	0.80	0.14	0.03	0	0	0	0	0	0
25	0	0	0.34	16.1	1.10	0.24	0.19	0	0	0	0	0	0.05
20	0	0	1.00	23.1	1.50	0.33	0.46	0	0	0.05	0	0	0.19
15	0	0	3.00	35.8	3.02	0.78	1.50	0.09	0.07	0.14	0	0	0.52
10	0	0	9.53	57.6	6.02	1.90	3.69	0.37	0.18	0.27	0.10	0	1.90
5	0	0	21.9	93.4	22.6	7.40	10.4	2.60	0.46	0.91	0.24	0	10.9

05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	0.900	0.173	0.078	0.043	0.023
0.95	1.05	4.10	1.32	0.765	0.489	0.282
0.90	1.11	8.60	3.41	2.19	1.47	0.874
0.80	1.25	20.2	9.58	6.73	4.69	2.85
0.50	2	88.2	49.1	37.6	26.0	15.9
0.20	5	315	167	126	80.0	47.7
0.10	10	569	273	200	118	68.9
0.04	25	1,010	417	290	159	90.2
0.02	50	1,420	523	349	182	102
0.01	100	1,900	622	399	200	110
0.005	200	2,440	712	442	213	116
0.002	500	3,240	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	ng	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	ng	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	ng	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	ng	0

05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	ng	0	0
0.10	10	ng	ng	ng	ng	ng	ng	0	0
0.20	5	ng	ng	ng	ng	ng	ng	0	0
0.50	2	ng	ng	ng	ng	ng	ng	0	0
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	ng	ng	ng	0	ng	ng	ng	0
0.10	10	ng	ng	ng	0	ng	ng	ng	0
0.20	5	ng	ng	ng	0	ng	ng	ng	0
0.50	2	ng	ng	ng	0	ng	ng	ng	0

05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1961	March 23	3.11	1.60	1976	June 12	5.30	140
1962	April 21	4.62	100	1977	April 10	4.10	37.0
1963	June 25	3.44	7.00	1978	April 9	5.82	282
1964	June 19	5.23	192	1979	April 22	7.17	737
1965	April 11	5.76	240	1980	May 27	6.10	420
1966	April 5	4.91	134	1981	April 2	4.47	65.0
1967	May 10	5.33	192	1982	July 24	6.38	506
1968	March 8	4.27	5.00	1983	April 8	5.03	67.0
1969	April 11	6.82	425	1984	March 30	4.41	25.0
1970	April 7	4.84	74.0	1985	March 16	5.19	62.0
1971	April 8	6.54	235	1986	March 25	5.10	86.0
1972	April 16	4.12	53.0	1987	April 7	6.85	654
1973	March 12	--	4.00	1988	April 4	4.62	22.0
1974	May 19	7.11	984	1989	April 22	4.62	34.0
1975	July 1	4.55	71.0	1990	April 3	--	7.00
Annual peak discharge, from highest to lowest, and corresponding gage height							
1974	May 19	7.11	984	1970	April 7	4.84	74.0
1979	April 22	7.17	737	1975	July 1	4.55	71.0
1987	April 7	6.85	654	1983	April 8	5.03	67.0
1982	July 24	6.38	506	1981	April 2	4.47	65.0
1969	April 11	6.82	425	1985	March 16	5.19	62.0
1980	May 27	6.10	420	1972	April 16	4.12	53.0
1978	April 9	5.82	282	1977	April 10	4.10	37.0
1965	April 11	5.76	240	1989	April 22	4.62	34.0
1971	April 8	6.54	235	1984	March 30	4.41	25.0
1964	June 19	5.23	192	1988	April 4	4.62	22.0
1967	May 10	5.33	192	1963	June 25	3.44	7.00
1976	June 12	5.30	140	1990	April 3	--	7.00
1966	April 5	4.91	134	1968	March 8	4.27	5.00
1962	April 21	4.62	100	1973	March 12	--	4.00
1986	March 25	5.10	86.0	1961	March 23	3.11	1.60

05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1961	0	0	0	0	0	0.171	0	0	0	0	0	0	0.015
1962	0	0	0	0	0	0	19.5	0.168	0.757	0	0	0	1.68
1963	0	0	0	0	0	0.042	0.010	0	0.053	0	0	0	0.009
1964	0	0	0	0	0	0	4.36	0	19.5	0.942	0	0	2.03
1965	0	0	0	0	0	0	31.6	0.652	1.57	1.12	0	0.227	2.89
1966	0.190	0.003	0	0	0	15.1	26.3	19.1	0.745	3.81	7.02	0.213	6.08
1967	0	0	0	0	0	6.90	40.0	38.6	0	0	0	0	7.15
1968	0	0	0	0	0	0.379	0.004	0.001	0.021	0	0	0	0.034
1969	0	0	0	0	0	0	53.0	0.228	0	0	0	0	4.38
1970	0	0	0	0	0	0	12.2	3.24	0.086	0	0	0	1.28
1971	0	0	0	0	0	0	35.4	0.654	0.206	3.41	0.091	0	3.28
1972	0	0	0	0	0	9.47	15.2	1.51	0.008	0	0	0	2.17
1973	0	0	0	0	0	0.340	0	0	0	0	0	0	0.029
1974	0	0	0	0	0	0	63.7	68.8	4.31	0.019	0	0	11.4
1975	0	0	0	0	0	0	8.40	4.00	0.066	8.06	0.026	0.052	1.73
1976	0.060	0.034	0	0	0	6.56	18.0	0.022	4.35	0.017	0.149	0	2.41
1977	0	0	0	0	0	3.53	3.86	0.386	0.298	0	0	0.004	0.674
1978	0.061	0	0	0	0	2.77	49.0	3.21	1.40	3.97	0.152	0.098	5.01
1979	0	0	0	0	0	0	87.9	7.70	0.063	0.856	0	0	7.95
1980	0	0	0	0	0	0	3.26	3.28	2.70	0.550	0.192	1.05	0.916
1981	0.608	0.286	0.002	0	7.10	5.72	5.09	0.079	0.242	1.06	5.33	1.23	2.19
1982	0.319	0.170	0.029	0	0	0.219	24.0	0.787	14.5	33.3	2.92	0.014	6.37
1983	3.45	0.439	0	0	0	7.12	15.5	1.24	1.03	0.265	0	0	2.42
1984	0.054	0.034	0	0	0	4.66	3.43	0.131	0.126	0.002	0	0	0.705
1985	0	0	0	0	0	13.3	1.44	0.318	0.098	0	0.110	0.453	1.33
1986	1.34	0.145	0	0	0	14.4	4.59	1.29	0.252	6.36	0.655	0.013	2.46
1987	0.078	0.018	0.016	0	0	0	49.6	0.763	0.116	0.086	0.026	0	4.17
1988	0	0	0	0	0	2.04	3.94	0.022	0	0	0	0	0.498
1989	0	0	0	0	0	0	4.42	0.293	0	0	0	0	0.388
1990	0	0	0	0	0	0.032	2.23	0.159	0.090	0.032	0	0	0.210

05084000 FOREST RIVER NEAR FORDVILLE, ND

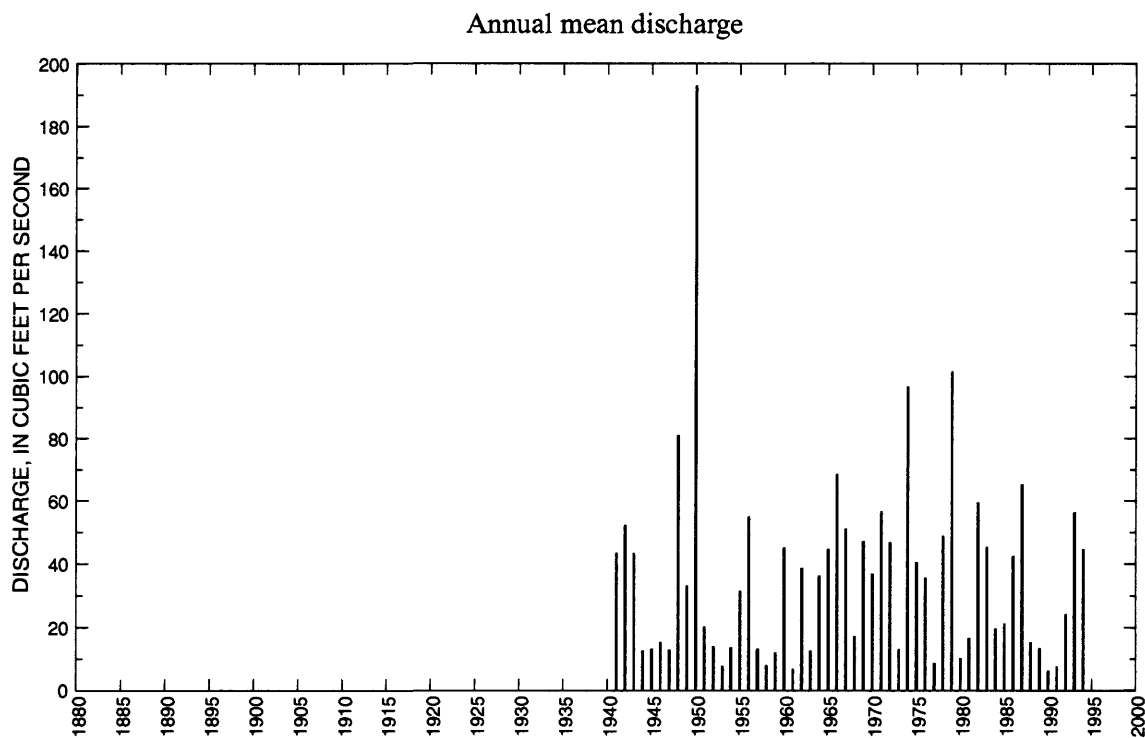
LOCATION.--Lat 48°11'50", long 97°43'49", on line between secs.32 and 33, T.155 N., R.55 W., Walsh County, Hydrologic Unit 09020308, on right bank 50 ft upstream from highway bridge, 0.5 mi downstream from South Branch, and 3 mi southeast of Fordville.

DRAINAGE AREA.--456 mi², of which about 120 mi² is probably noncontributing.

PERIOD OF RECORD.--April 1940 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,035 ft above sea level, from topographic map. Prior to July 21, 1951, nonrecording gage at site 50 ft downstream at same datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,400 ft³/s, Apr. 18, 1950, gage height, 14.48 ft; no flow at times.



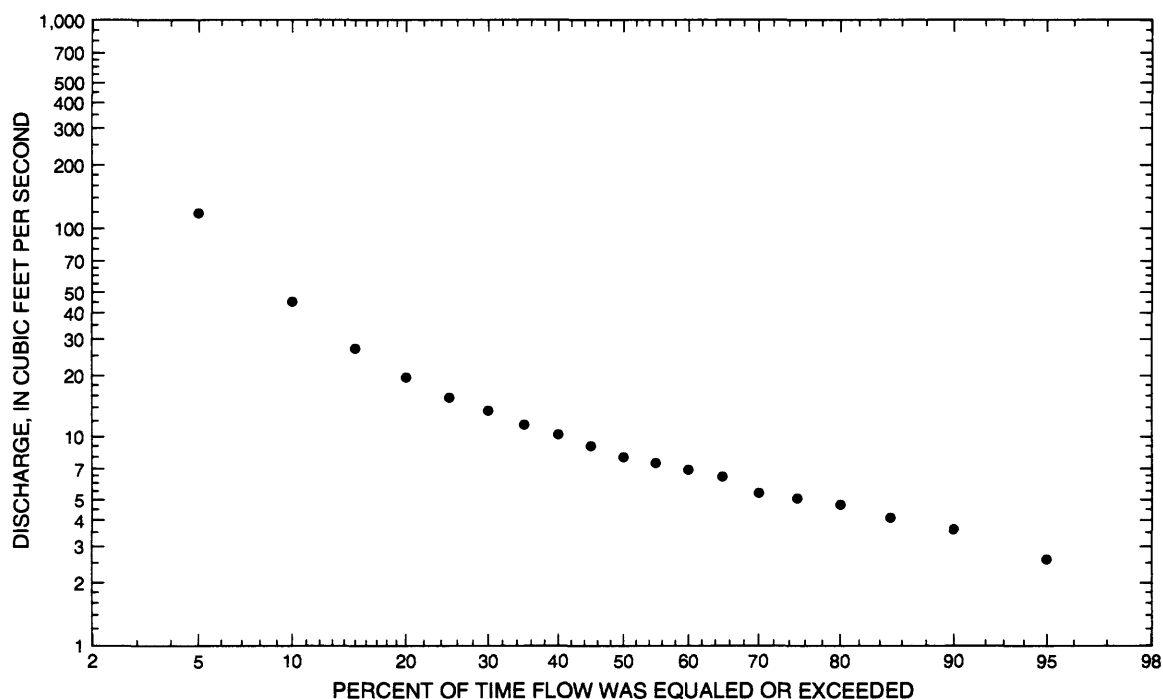
05084000 FOREST RIVER NEAR FORDVILLE, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	57.9	1983	1.52	1941	10.0	8.43	0.84	2.30
November	23.7	1983	2.03	1941	8.73	4.24	0.49	2.00
December	19.2	1983	2.06	1941	7.24	3.53	0.49	1.66
January	16.3	1986	2.70	1941	6.20	2.53	0.41	1.42
February	29.9	1981	1.21	1963	7.23	4.54	0.63	1.66
March	278	1966	4.07	1941	59.7	65.5	1.10	13.7
April	1,180	1950	9.46	1991	196	241	1.23	45.0
May	1,040	1950	7.07	1961	61.2	154	2.52	14.1
June	255	1964	2.74	1940	33.2	45.4	1.37	7.62
July	232	1982	3.34	m	24.9	42.8	1.72	5.72
August	280	1993	1.64	1945	12.5	37.4	2.98	2.88
September	53.3	1993	0.913	1940	8.81	7.62	0.87	2.02
Annual	193	1950	6.37	1990	36.7	31.6	0.86	100

Annual flow duration



05084000 FOREST RIVER NEAR FORDVILLE, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	2.70	2.00	3.70	8.01	6.73	4.10	2.40	1.40	2.10	2.30	3.20	3.00	2.60
90	3.00	2.70	4.71	10.4	8.59	5.51	3.00	2.20	2.90	3.20	3.90	3.30	3.60
85	3.50	3.10	5.20	12.8	9.84	6.36	3.70	2.80	2.90	3.80	4.30	3.70	4.09
80	3.80	3.60	5.78	14.4	11.0	7.03	3.70	2.80	3.40	4.50	4.70	4.20	4.75
75	4.10	4.10	6.27	16.4	12.5	8.00	4.75	3.50	4.00	4.50	5.20	4.70	5.08
70	4.50	4.70	6.90	18.9	13.4	9.31	5.39	3.50	4.00	5.49	5.80	4.70	5.40
65	4.90	4.70	7.20	21.9	14.3	11.3	6.05	4.43	4.80	5.93	6.30	5.20	6.45
60	4.90	5.40	7.51	26.8	15.4	12.6	6.57	4.87	4.80	6.38	6.30	5.80	6.96
55	5.30	5.40	8.42	33.0	16.9	13.9	7.41	5.40	5.90	6.93	7.00	5.80	7.47
50	5.80	5.40	8.94	41.5	18.4	15.2	7.82	5.74	6.31	7.67	7.70	6.50	7.98
45	5.80	6.30	10.2	53.4	20.4	16.6	9.26	6.09	6.75	8.12	8.50	6.50	9.03
40	6.80	6.30	11.9	71.0	22.8	18.5	10.7	6.83	7.24	8.56	8.50	7.30	10.3
35	6.80	7.37	13.9	92.2	26.6	20.5	12.3	7.18	7.92	9.58	9.30	7.30	11.5
30	6.80	7.65	18.0	118	30.8	23.0	13.7	7.52	8.38	11.0	10.1	7.30	13.5
25	7.40	7.92	29.3	157	35.5	26.4	15.9	8.62	9.26	12.0	10.8	8.77	15.6
20	7.40	8.20	50.0	210	43.3	31.5	19.9	9.70	10.0	13.1	12.1	9.20	19.6
15	8.10	8.99	91.6	296	58.5	39.6	29.9	12.0	12.7	14.9	13.2	9.20	27.0
10	8.70	11.1	178	447	86.0	54.9	45.6	15.3	17.6	17.5	14.6	11.8	45.3
5	11.3	13.2	321	811	169	103	74.6	23.0	25.5	24.3	17.7	14.0	119

05084000 FOREST RIVER NEAR FORDVILLE, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	15.3	11.2	9.91	7.79	7.30
0.95	1.05	58.6	41.4	33.6	25.5	20.0
0.90	1.11	114	78.6	61.1	45.4	33.3
0.80	1.25	244	162	121	87.3	59.7
0.50	2	908	559	387	265	168
0.20	5	2,850	1,590	1,040	675	424
0.10	10	4,850	2,570	1,650	1,030	660
0.04	25	8,160	4,060	2,550	1,540	1,030
0.02	50	11,100	5,320	3,310	1,960	1,340
0.01	100	14,500	6,660	4,110	2,380	1,690
0.005	200	18,200	8,080	4,950	2,820	2,070
0.002	500	23,600	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0.524	0.657	0.930	1.08	1.46	1.99	2.43	2.78	3.18
0.10	10	0.848	0.994	1.28	1.45	1.88	2.44	2.92	3.33	3.76
0.20	5	1.36	1.50	1.78	2.01	2.48	3.08	3.61	4.09	4.61
0.50	2	2.73	2.85	3.06	3.43	3.96	4.63	5.28	5.94	6.74

05084000 FOREST RIVER NEAR FORDVILLE, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	1.58	1.65	1.77	2.12	2.75	3.28	3.57	5.12
0.10	10	1.99	2.09	2.22	2.61	3.26	3.79	4.12	5.85
0.20	5	2.58	2.72	2.87	3.31	4.01	4.54	4.96	7.15
0.50	2	4.01	4.22	4.42	4.93	5.92	6.54	7.38	12.0
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0.687	1.12	1.49	1.96	1.30	1.42	1.74	2.12
0.10	10	1.04	1.50	1.87	2.33	1.70	1.91	2.30	2.80
0.20	5	1.63	2.11	2.46	2.95	2.25	2.64	3.14	3.78
0.50	2	3.38	3.86	4.24	4.96	3.67	4.49	5.14	6.13

05084000 FOREST RIVER NEAR FORDVILLE, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1940	April 17	3.60	130	1968	March 8	4.48	500
1941	April 8	8.03	2,250	1969	April 11	8.80	3,290
1942	April 4	9.73	3,650	1970	April 8	7.68	2,380
1943	June 9	6.72	1,620	1971	April 8	8.39	2,800
1944	April 5	5.89	400	1972	April 14	6.43	1,500
1945	March 27	3.15	243	1973	June 17	3.56	384
1946	March 20	6.14	950	1974	May 20	9.86	5,050
1947	March 23	7.40	700	1975	April 12	5.68	1,270
1948	April 18	14.15	14,600	1976	March 29	5.46	1,100
1949	April 7	5.64	1,470	1977	July 14	2.43	100
1950	April 18	14.48	16,400	1978	April 6	5.50	1,200
1951	March 29	--	500	1979	April 20	9.98	5,200
1952	July 2	3.94	825	1980	April 2	2.55	105
1953	May 30	2.04	130	1981	April 2	2.73	180
1954	June 15	4.29	1,020	1982	July 25	6.49	1,760
1955	March 31	8.46	3,000	1983	March 7	5.23	995
1956	June 6	8.14	3,370	1984	March 24	3.92	386
1957	March 22	3.53	356	1985	March 13	5.45	625
1958	July 4	1.87	17.0	1986	March 17	5.79	1,380
1959	April 4	2.91	321	1987	April 5	6.00	1,410
1960	April 7	7.55	2,810	1988	March 24	3.23	229
1961	March 19	2.69	65.0	1989	April 16	2.79	158
1962	April 6	7.69	2,600	1990	June 3	1.67	17.0
1963	July 8	3.67	590	1991	September 18	--	77.0
1964	June 19	9.03	3,960	1992	March 7	--	530
1965	April 11	10.22	4,730	1993	July 26	5.72	1,090
1966	March 21	7.14	1,580	1994	March 21	4.66	721
1967	March 30	7.40	2,030				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 18	14.48	16,400	1967	March 30	7.40	2,030
1948	April 18	14.15	14,600	1982	July 25	6.49	1,760
1979	April 20	9.98	5,200	1943	June 9	6.72	1,620
1974	May 20	9.86	5,050	1966	March 21	7.14	1,580
1965	April 11	10.22	4,730	1972	April 14	6.43	1,500
1964	June 19	9.03	3,960	1949	April 7	5.64	1,470
1942	April 4	9.73	3,650	1987	April 5	6.00	1,410
1956	June 6	8.14	3,370	1986	March 17	5.79	1,380
1969	April 11	8.80	3,290	1975	April 12	5.68	1,270
1955	March 31	8.46	3,000	1978	April 6	5.50	1,200
1960	April 7	7.55	2,810	1976	March 29	5.46	1,100
1971	April 8	8.39	2,800	1993	July 26	5.72	1,090
1962	April 6	7.69	2,600	1973	June 17	3.56	384
1970	April 8	7.68	2,380	1983	March 7	5.23	995
1941	April 8	8.03	2,250	1946	March 20	6.14	950

05084000 FOREST RIVER NEAR FORDVILLE, ND--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1952	July 2	3.94	825	1945	March 27	3.15	243
1994	March 21	4.66	721	1988	March 24	3.23	229
1947	March 23	7.40	700	1981	April 2	2.73	180
1985	March 13	5.45	625	1989	April 16	2.79	158
1963	July 8	3.67	590	1940	April 17	3.60	130
1992	March 7	--	530	1953	May 30	2.04	130
1951	March 29	--	500	1980	April 2	2.55	105
1968	March 8	4.48	500	1977	July 14	2.43	100
1944	April 5	5.89	400	1991	September 18	--	77.0
1984	March 24	3.92	386	1961	March 19	2.69	65.0
1973	June 17	3.56	384	1958	July 4	1.87	17.0
1957	March 22	3.53	356	1990	June 3	1.67	17.0
1959	April 4	2.91	321				

05084000 FOREST RIVER NEAR FORDVILLE, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1940	--	--	--	--	--	--	21.6	7.28	2.74	8.08	6.97	0.913	--
1941	1.52	2.03	2.06	2.70	2.91	4.07	462.8	9.71	22.6	3.34	2.55	12.0	43.5
1942	24.9	8.92	4.92	3.13	3.60	156.7	368.3	25.9	9.56	6.65	11.9	3.65	52.3
1943	2.70	2.91	3.05	3.26	3.78	133.7	41.0	14.1	154.2	144.9	10.4	5.33	43.5
1944	4.46	4.89	4.86	3.94	2.81	5.69	83.0	13.5	17.2	5.27	4.41	4.78	12.8
1945	2.83	8.53	6.50	3.71	4.92	82.6	20.3	11.5	8.79	3.91	1.64	2.82	13.3
1946	2.96	3.71	3.80	4.59	4.22	121.7	20.0	7.21	7.02	3.97	2.30	4.30	15.6
1947	4.59	4.25	4.24	3.21	2.17	65.5	41.6	9.00	7.45	5.89	3.41	3.52	13.0
1948	4.87	4.65	5.62	5.00	5.00	5.21	869.0	45.7	21.3	8.91	8.45	3.94	81.2
1949	4.30	5.17	3.79	3.00	3.00	4.81	334.0	17.8	7.61	11.0	5.13	3.58	33.3
1950	8.48	7.39	6.51	4.61	5.64	11.6	1,182	1,037	23.2	11.3	6.83	8.78	193.1
1951	8.29	8.67	8.35	7.77	7.29	57.0	104.0	13.8	10.5	5.23	6.74	5.80	20.3
1952	6.52	8.37	5.74	6.32	7.62	19.2	61.0	9.23	6.13	30.5	4.28	4.45	14.1
1953	4.67	5.74	5.17	4.92	6.00	7.59	9.59	17.4	17.8	6.26	3.67	4.49	7.77
1954	5.76	6.18	4.37	3.46	8.18	27.5	26.8	12.0	46.0	5.87	11.4	7.33	13.7
1955	5.78	6.75	6.48	4.93	5.11	92.8	166.1	14.7	64.1	5.59	3.88	3.98	31.6
1956	6.03	5.04	3.16	4.97	5.34	6.32	393.3	59.2	144.5	22.5	6.49	11.0	55.0
1957	11.4	12.5	7.13	5.29	6.43	50.3	14.0	14.5	11.9	5.91	6.48	13.5	13.3
1958	10.3	9.42	7.70	7.26	7.03	9.12	10.2	10.2	9.92	8.33	3.82	3.68	8.08
1959	6.31	5.72	4.79	4.40	5.37	20.5	66.9	14.4	7.29	3.76	2.40	3.39	12.1
1960	6.02	5.51	5.46	5.33	4.77	34.5	447.4	17.7	8.24	5.99	4.82	4.40	45.3
1961	3.92	6.59	6.15	4.01	3.64	24.1	12.3	7.07	4.26	3.81	2.69	3.51	6.87
1962	5.53	5.09	3.85	4.61	6.01	9.20	258.4	30.1	117.1	11.5	9.61	9.55	38.8
1963	11.0	11.3	8.03	4.01	1.21	21.8	14.9	12.6	27.8	29.2	4.74	3.38	12.6
1964	4.81	6.83	5.18	5.57	7.15	6.99	91.9	14.7	254.9	24.0	9.86	9.95	36.4
1965	9.83	8.42	5.88	6.05	7.57	8.87	369.6	39.3	41.5	15.7	8.52	21.4	44.8
1966	22.5	11.2	10.2	7.07	8.42	278.4	200.7	172.7	48.9	34.2	12.8	10.2	68.6
1967	11.9	13.5	17.8	12.8	10.9	132.3	184.4	180.3	24.1	11.0	6.27	6.38	51.2
1968	9.90	8.95	8.41	8.17	10.5	78.6	20.1	16.1	12.5	17.3	8.68	7.97	17.3
1969	8.91	9.86	7.07	6.86	8.31	10.0	434.1	40.9	22.6	10.5	5.72	6.67	47.2
1970	8.04	9.85	10.8	7.57	8.41	7.90	276.8	65.3	20.1	15.8	7.30	7.62	36.9
1971	14.2	11.6	8.76	7.25	9.02	16.1	460.0	38.3	21.7	71.5	14.4	10.7	56.6
1972	14.2	17.6	11.1	7.20	6.93	204.4	214.3	47.4	17.4	7.84	6.58	7.26	46.9
1973	7.97	8.89	5.57	9.15	10.0	46.2	14.4	15.7	25.0	4.93	4.24	6.01	13.2
1974	11.6	9.99	9.18	8.00	7.50	8.02	489.5	453.7	118.3	20.9	14.4	9.03	96.8

05084000 FOREST RIVER NEAR FORDVILLE, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1975	12.4	13.7	10.6	8.11	7.58	16.4	250.7	69.0	16.8	70.8	6.12	6.61	40.7
1976	8.02	9.25	9.47	9.12	8.47	143.5	187.3	22.3	13.1	7.23	5.36	5.60	35.7
1977	4.04	4.62	7.36	8.04	6.11	14.3	14.0	14.2	6.66	9.17	3.22	11.5	8.62
1978	13.5	7.95	6.04	2.99	2.40	76.2	349.3	43.6	53.3	20.2	8.83	6.22	49.0
1979	7.91	6.68	5.49	5.85	7.28	9.61	776.9	321.3	32.5	22.4	7.88	21.5	101.7
1980	9.04	5.46	3.57	7.12	7.58	15.4	43.9	9.34	4.48	3.34	6.25	9.15	10.3
1981	9.84	13.5	6.21	4.98	29.9	37.5	33.5	15.9	14.8	9.85	9.78	16.2	16.7
1982	14.5	9.92	8.01	3.94	3.72	79.9	198.7	37.5	60.8	232.2	52.6	7.56	59.5
1983	57.9	23.7	19.2	10.1	18.5	168.2	143.4	31.1	20.4	20.6	11.8	18.5	45.4
1984	10.6	9.86	4.69	7.32	16.4	63.2	58.5	24.6	19.2	9.00	5.22	8.62	19.7
1985	6.25	6.27	5.99	6.59	4.47	119.0	38.0	24.6	20.1	4.85	5.70	12.9	21.4
1986	19.9	21.9	18.4	16.3	9.03	197.1	58.9	43.0	23.5	70.5	15.4	12.6	42.6
1987	16.0	11.2	8.79	9.61	12.1	114.5	489.4	50.8	24.0	31.5	9.44	10.7	65.4
1988	9.74	9.50	8.91	7.48	11.9	41.3	43.0	21.6	15.3	3.58	1.99	10.8	15.4
1989	17.9	5.77	6.72	6.99	4.64	5.78	56.7	27.0	12.7	7.72	4.30	5.54	13.5
1990	8.88	8.23	6.80	4.90	4.44	4.90	12.6	8.79	7.87	4.72	1.82	2.50	6.37
1991	3.15	4.11	4.90	4.28	5.55	7.29	9.46	10.9	6.74	18.5	3.93	14.1	7.74
1992	9.45	13.3	8.53	6.99	10.5	156.3	42.6	16.1	8.30	8.55	4.74	4.99	24.3
1993	4.89	7.10	7.46	6.29	4.91	17.4	65.2	18.4	28.0	176.7	279.9	53.3	56.4
1994	20.9	13.4	12.1	7.83	8.44	164.4	120.6	42.7	74.7	47.8	11.5	10.4	44.8

05085000 FOREST RIVER AT MINTO, ND

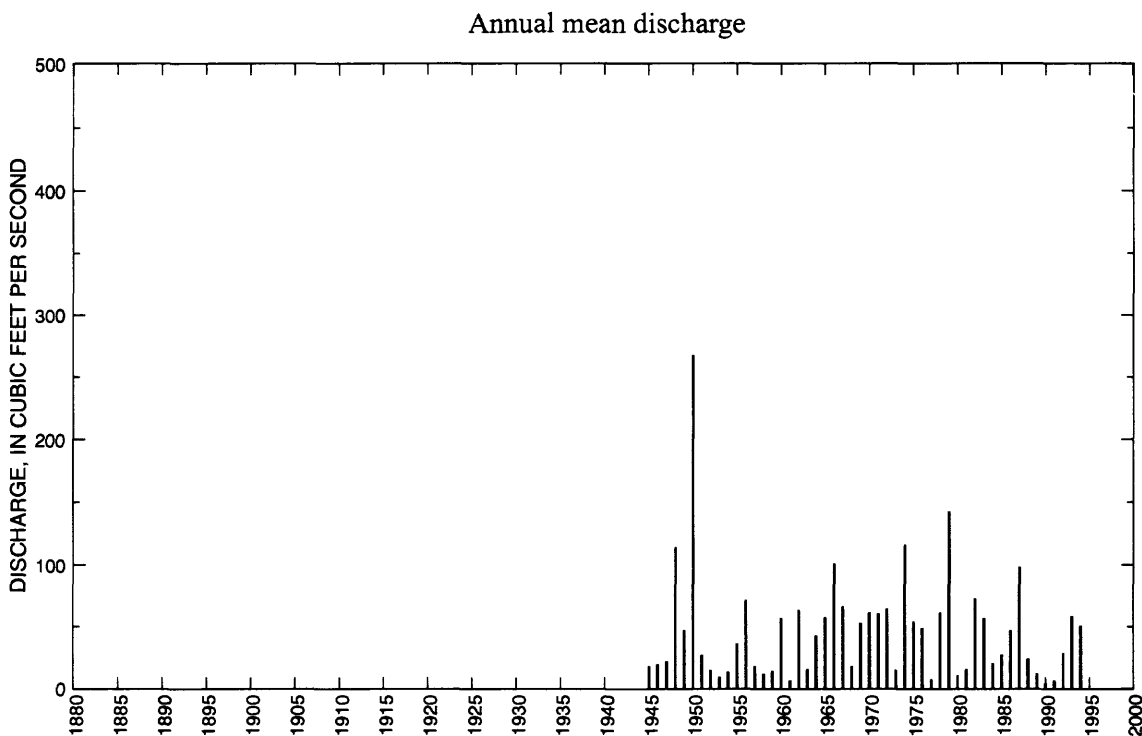
LOCATION.--Lat 48°16'10", long 97°22'10", in SE¹/₄ sec.51, T.156 N., R.52 W., Walsh County, Hydrologic Unit 09020308, on right bank 30 ft upstream from dam in Minto, 150 ft upstream from Burlington Northern Railway bridge, and 900 ft east of U.S. Highway 81.

DRAINAGE AREA.--740 mi², of which about 120 mi² is probably noncontributing.

PERIOD OF RECORD.--April 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 806.95 ft above sea level. Prior to July 15, 1954, nonrecording gage at site 400 ft upstream at same datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,600 ft³/s, Apr. 18, 1950; maximum gage height, 11.80 ft, Apr. 19, 1948, and Apr. 18, 1950; no flow at times.

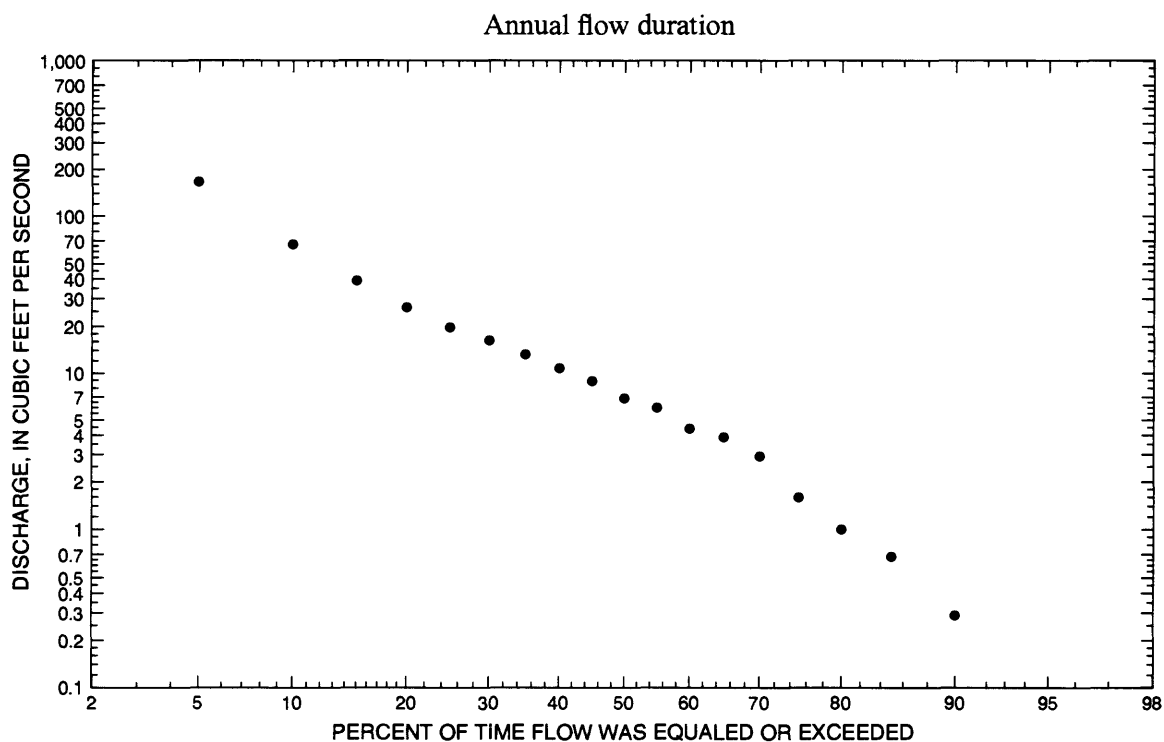


05085000 FOREST RIVER AT MINTO, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	59.1	1983	0	1991	9.20	9.20	1.00	1.64
November	23.6	1983	0.971	1991	8.85	5.16	0.58	1.58
December	13.4	1983	0.291	1990	4.81	3.40	0.71	0.86
January	9.66	1983	0	m	2.41	2.49	1.03	0.43
February	17.3	1981	0	m	2.01	3.23	1.61	0.36
March	438	1966	0	1962	59.4	88.0	1.48	10.6
April	1,570	1950	21.9	1953	285	335	1.17	50.9
May	1,520	1950	10.6	1946	92.3	222	2.40	16.5
June	267	1964	4.21	1991	45.6	59.0	1.29	8.13
July	236	1982	1.87	1980	27.3	39.6	1.45	4.87
August	328	1993	0	1946	15.2	46.7	3.08	2.70
September	69.0	1993	0	m	8.65	12.2	1.41	1.54
Annual	268	1950	4.36	1990	47.2	45.4	0.96	100



05085000 FOREST RIVER AT MINTO, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	3.54	11.2	5.61	1.40	0	0	0	1.80	0.34	0
90	0.13	0	0	14.7	13.6	7.45	2.90	0.51	0.09	0.78	2.50	0.54	0.29
85	0.25	0	0.08	21.7	15.6	9.67	4.29	0.99	0.39	1.70	3.00	0.86	0.68
80	0.39	0.08	0.24	25.5	17.4	11.9	5.08	1.90	0.54	2.70	3.50	1.10	1.00
75	0.48	0.11	0.34	29.9	18.8	13.6	5.94	1.90	1.30	3.86	4.10	1.70	1.60
70	0.59	0.24	0.48	35.5	20.1	15.0	6.55	2.93	1.80	4.69	4.80	1.70	2.92
65	0.59	0.31	0.68	41.5	21.3	16.4	7.82	3.52	2.50	5.14	5.70	2.20	3.88
60	0.73	0.41	0.96	49.5	22.6	17.8	9.55	4.08	3.76	5.86	5.70	2.80	4.40
55	0.91	0.41	0.96	58.4	24.7	19.3	10.8	4.62	4.71	6.19	6.77	3.50	5.99
50	1.10	0.70	1.90	72.2	27.2	21.4	14.0	5.87	5.17	6.51	7.37	3.50	6.90
45	1.40	0.91	1.90	89.3	31.7	24.0	14.4	6.77	6.24	7.61	8.19	4.49	8.93
40	1.70	0.91	3.87	111	37.8	27.3	16.2	7.57	6.95	8.52	8.80	4.96	10.8
35	2.10	1.20	4.71	145	44.6	30.8	18.1	8.31	7.67	9.44	9.58	5.62	13.2
30	2.70	1.50	8.93	188	52.2	35.0	20.7	9.05	8.65	10.7	10.1	6.13	16.4
25	3.30	2.00	17.2	240	62.4	40.3	23.7	11.3	9.67	12.4	12.0	7.14	19.7
20	4.44	2.60	35.6	310	80.5	47.3	29.5	12.9	11.8	13.8	13.0	7.64	26.6
15	5.44	3.40	84.9	435	101	59.1	37.4	15.3	14.4	15.3	14.9	9.13	39.1
10	6.37	4.70	164	671	143	77.8	51.8	19.2	18.1	17.8	16.5	10.7	66.5
5	7.84	6.27	359	1,230	282	151	84.3	29.2	26.6	23.5	19.6	12.8	166

05085000 FOREST RIVER AT MINTO, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	39.5	26.9	23.5	17.7	14.2
0.95	1.05	104	71.6	58.9	44.1	32.6
0.90	1.11	172	119	94.9	70.5	50.3
0.80	1.25	313	217	167	123	84.3
0.50	2	939	657	479	337	222
0.20	5	2,680	1,880	1,310	870	564
0.10	10	4,530	3,200	2,190	1,390	909
0.04	25	7,830	5,550	3,730	2,270	1,500
0.02	50	11,000	7,840	5,220	3,070	2,060
0.01	100	15,000	10,700	7,030	4,010	2,730
0.005	200	19,700	14,000	9,210	5,090	3,520
0.002	500	27,300	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0.058	0.314	0.823
0.10	10	0	0	0	0	0	0.039	0.179	0.521	1.23
0.20	5	0	0	0	0	0	0.157	0.389	0.915	1.94
0.50	2	0.242	0.264	0.286	0.337	0.465	0.728	1.27	2.32	4.14

05085000 FOREST RIVER AT MINTO, ND--Continued

Probability of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0.080
0.10	10	0	0	0	0	0	0	0	0.434
0.20	5	0	0	0	0.116	0	0.059	0.153	1.37
0.50	2	0.451	0.471	0.546	0.709	0.470	0.597	1.05	7.64
		June-July-August				September-October-November			
		0	0	0	0.140	0	0	0	0
		0.026	0.097	0.315	0.529	0	0	0	0.234
		0.544	0.940	1.12	1.68	0	0	0.237	0.886
		2.44	3.18	3.97	6.59	1.81	2.98	¹ 3.50	4.03

¹Graphical interpretation.

05085000 FOREST RIVER AT MINTO, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
¹ 1882	April	--	2,200	1968	March 27	2.31	315
¹ 1897	April	--	1,850	1969	April 12	7.67	3,960
¹ 1907	April	--	1,750	1970	April 9	7.04	2,220
¹ 1916	April	--	1,600	1971	April 10	5.84	2,460
1944	April 10	5.00	650	1972	March 17	5.96	2,120
1945	March 27	2.11	250	1973	June 19	1.93	208
1946	March 22	--	1,000	1974	April 16	7.79	4,580
1947	March 25	4.12	1,100	1975	April 15	6.73	1,600
1948	April 19	11.80	11,500	1976	March 31	7.03	1,500
1949	April 7	8.19	2,020	1977	April 10	1.58	77.0
1950	April 18	11.80	16,600	1978	March 31	6.52	1,600
1951	April 5	3.60	900	1979	April 20	8.93	6,730
1952	April 2	2.78	370	1980	April 1	2.01	167
1953	June 4	3.53	910	1981	June 28	2.04	176
1954	June 16	2.61	391	1982	July 26	4.07	1,140
1955	April 2	8.56	4,200	1983	March 15	3.52	820
1956	April 21	6.63	2,930	1984	March 26	2.77	394
1957	March 23	2.72	461	1985	March 14	3.39	640
1958	June 10	2.72	463	1986	March 19	3.40	690
1959	April 2	2.45	338	1987	April 4	6.91	2,360
1960	April 6	5.60	2,050	1988	May 29	3.71	945
1961	March 22	1.90	147	1989	April 18	2.49	371
1962	April 19	6.68	2,400	1990	April 15	1.56	58.0
1963	March 24	2.54	250	1991	April 4	1.54	60.0
1964	June 21	4.31	1,460	1992	March 8	3.34	640
1965	April 12	7.48	3,710	1993	July 28	3.70	705
1966	March 21	7.82	3,100	1994	March 26	--	533
1967	March 31	7.22	3,070				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 18	11.80	16,600	1972	March 17	5.96	2,120
1948	April 19	11.80	11,500	1960	April 6	5.60	2,050
1979	April 20	8.93	6,730	1949	April 7	8.19	2,020
1974	April 16	7.79	4,580	¹ 1897	April	--	1,850
1955	April 2	8.56	4,200	¹ 1907	April	--	1,750
1969	April 12	7.67	3,960	¹ 1916	April	--	1,600
1965	April 12	7.48	3,710	1975	April 15	6.73	1,600
1966	March 21	7.82	3,100	1978	March 31	6.52	1,600
1967	March 31	7.22	3,070	1976	March 31	7.03	1,500
1956	April 21	6.63	2,930	1964	June 21	4.31	1,460
1971	April 10	5.84	2,460	1982	July 26	4.07	1,140
1962	April 19	6.68	2,400	1947	March 25	4.12	1,100
1987	April 4	6.91	2,360	1946	March 22	--	1,000
1970	April 9	7.04	2,220	1988	May 29	3.71	945
¹ 1882	April	--	2,200	1953	June 4	3.53	910

05085000 FOREST RIVER AT MINTO, ND--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1951	April 5	3.60	900	1952	April 2	2.78	370
1983	March 15	3.52	820	1959	April 2	2.45	338
1993	July 28	3.70	705	1968	March 27	2.31	315
1986	March 19	3.40	690	1945	March 27	2.11	250
1944	April 10	5.00	650	1963	March 24	2.54	250
1985	March 14	3.39	640	1973	June 19	1.93	208
1992	March 8	3.34	640	1981	June 28	2.04	176
1994	March 26	--	533	1980	April 1	2.01	167
1958	June 10	2.72	463	1961	March 22	1.90	147
1957	March 23	2.72	461	1977	April 10	1.58	77.0
1984	March 26	2.77	394	1991	April 4	1.54	60.0
1954	June 16	2.61	391	1990	April 15	1.56	58.0
1989	April 18	2.49	371				

¹Determined by U.S. Army Corps of Engineers; not used in statistics.

05085000 FOREST RIVER AT MINTO, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1944	--	--	--	--	--	--	90.0	24.1	20.8	7.42	1.76	7.22	--
1945	2.44	14.7	11.2	2.55	1.64	89.6	47.3	20.1	15.2	5.59	2.90	0.987	18.0
1946	2.12	2.76	1.05	0.500	0.196	154.9	42.2	10.6	8.90	5.36	0	2.98	19.5
1947	5.07	5.83	2.74	0.497	0.021	90.0	96.7	17.2	15.5	19.6	5.37	3.65	21.9
1948	3.91	6.10	5.23	3.45	0.755	0.177	1,189	106.3	40.5	18.7	9.51	4.74	114.2
1949	4.05	7.01	3.68	1.14	0.500	0.594	482.5	37.5	17.4	11.2	3.30	0.653	47.0
1950	5.61	6.97	5.00	0.700	0.700	0.797	1,573	1,515	54.1	28.3	8.05	8.93	267.9
1951	8.41	9.24	4.58	3.65	4.50	31.2	198.7	27.4	15.5	6.48	9.32	8.42	27.1
1952	6.38	6.71	4.10	1.10	0.686	3.57	96.0	16.4	7.57	29.1	5.35	3.01	14.9
1953	2.21	4.19	1.97	0.574	0.079	2.98	21.9	16.5	51.4	10.1	2.14	0.270	9.50
1954	1.80	4.57	2.42	0.281	0.232	24.7	39.8	18.3	43.8	10.0	11.1	6.43	13.6
1955	7.01	6.57	4.00	1.31	0.514	0.032	291.1	22.1	92.4	11.2	2.85	1.69	36.3
1956	5.16	5.31	1.96	0.526	0.476	0.584	511.3	87.9	208.8	26.7	11.0	14.0	72.0
1957	9.96	15.8	6.44	4.47	1.53	47.1	25.8	20.4	14.9	6.45	7.78	56.6	18.1
1958	12.8	14.2	6.85	2.62	0.843	6.00	24.9	16.3	40.9	12.8	3.80	2.07	12.0
1959	7.73	6.53	0.710	0.268	0.100	10.8	107.2	18.4	11.0	5.71	2.15	0.440	14.2
1960	5.57	4.57	3.71	1.87	0.986	20.6	605.9	30.7	15.2	4.63	1.90	0.937	57.3
1961	1.62	4.11	0.742	0.635	0	23.4	24.4	11.6	5.18	5.64	0.513	0	6.51
1962	2.48	3.35	1.06	0.190	0	0	398.4	63.2	266.5	20.2	11.8	8.21	64.0
1963	13.2	15.8	4.87	0.945	0	42.2	34.5	18.9	22.7	26.5	3.73	0.797	15.4
1964	3.15	5.35	1.13	0.152	0.093	0.261	138.7	28.0	266.6	50.5	12.1	10.4	42.6
1965	12.6	10.1	4.99	3.79	2.77	2.84	481.4	63.0	71.9	23.4	11.5	16.0	58.2
1966	25.8	15.8	11.6	4.96	2.14	438.2	355.8	228.5	57.3	36.5	17.6	9.88	101.1
1967	10.9	10.8	8.15	3.54	2.48	123.9	358.8	210.7	39.4	17.4	8.90	5.71	66.8
1968	4.76	10.3	5.57	2.02	1.55	66.5	46.0	21.3	18.7	16.6	11.8	10.5	18.0
1969	8.91	10.9	5.61	0.822	0.407	0.456	521.5	53.3	20.2	12.3	4.70	5.14	53.2
1970	6.50	7.93	5.99	5.38	2.26	0.794	479.5	139.5	41.9	39.8	11.4	6.53	62.0
1971	9.14	10.8	4.40	0.896	0.947	7.45	512.3	59.5	30.4	67.1	21.0	11.6	60.9
1972	12.3	14.6	5.64	0.801	0.259	269.8	356.3	71.9	31.2	10.0	4.51	4.42	65.1
1973	8.08	7.82	2.04	0.400	0.526	59.5	39.9	18.9	28.4	6.15	1.47	4.46	14.9
1974	11.7	4.40	3.09	2.55	0.587	0.913	660.7	485.7	176.3	27.5	19.6	7.60	116.6
1975	13.3	14.8	8.46	5.86	3.68	5.45	285.2	162.4	28.9	108.5	9.28	6.54	54.5
1976	11.1	9.54	3.75	3.60	4.14	108.1	387.6	34.6	17.5	8.50	2.90	1.53	49.1
1977	1.40	2.19	0.489	0	0	11.0	32.9	17.7	10.9	6.79	3.14	4.16	7.57
1978	9.04	5.10	1.29	0.958	0.168	74.5	495.4	56.4	61.2	26.4	8.17	8.64	61.9

05085000 FOREST RIVER AT MINTO, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1979	5.48	3.07	2.12	2.00	1.35	1.00	1,189	363.0	63.6	63.4	12.1	17.2	142.9
1980	8.14	8.25	4.35	1.04	1.33	8.16	70.2	12.6	7.33	1.87	1.32	2.98	10.6
1981	5.34	10.4	8.19	4.10	17.3	33.3	38.8	15.2	21.5	12.3	4.83	15.3	15.5
1982	20.5	11.7	8.35	1.54	0.301	33.6	329.2	63.0	60.0	235.8	96.4	13.9	73.1
1983	59.1	23.6	13.4	9.66	12.5	236.9	197.3	52.5	32.6	18.7	7.92	17.1	57.0
1984	9.15	15.0	3.53	0.784	4.48	53.3	89.0	26.7	26.0	9.92	3.13	3.77	20.3
1985	3.94	3.60	1.56	0.121	0.001	175.4	63.7	31.2	26.5	5.25	6.08	8.53	27.4
1986	18.5	21.3	8.60	6.37	5.09	190.0	113.1	86.2	16.2	60.1	21.0	12.5	47.0
1987	20.1	10.9	8.71	9.65	7.31	122.3	848.6	81.9	28.6	27.3	15.0	7.68	98.4
1988	12.1	11.1	11.4	6.32	0.674	40.0	98.7	70.7	30.0	4.73	2.11	0.253	24.0
1989	5.20	3.20	1.10	1.14	1.10	1.00	90.6	30.9	8.74	2.32	0.150	0.011	12.1
1990	1.18	1.73	0.291	0	0	0.600	26.4	11.2	8.28	2.75	0.019	0	4.36
1991	0	0.971	0.831	0	0	2.87	23.0	14.0	4.21	14.5	6.44	12.3	6.61
1992	11.5	10.3	8.67	7.14	5.98	186.7	60.7	24.0	15.0	6.80	3.49	0.635	28.6
1993	2.71	5.38	3.61	1.58	2.74	13.1	97.6	23.7	21.8	132.6	327.6	69.0	59.0
1994	20.7	17.2	11.1	6.19	4.56	153.1	164.7	52.5	86.3	64.8	13.7	14.9	51.0

05087500 MIDDLE RIVER AT ARGYLE, MN

LOCATION.--Lat 48°20'25", long 96°48'58", in NE¹/₄NW¹/₄ sec.15, T.156 N., R.48 W., Marshall County, Hydrologic Unit 09020309, on left bank 30 ft upstream of bridge on County Highway 4 in Argyle and 14 mi upstream from mouth.

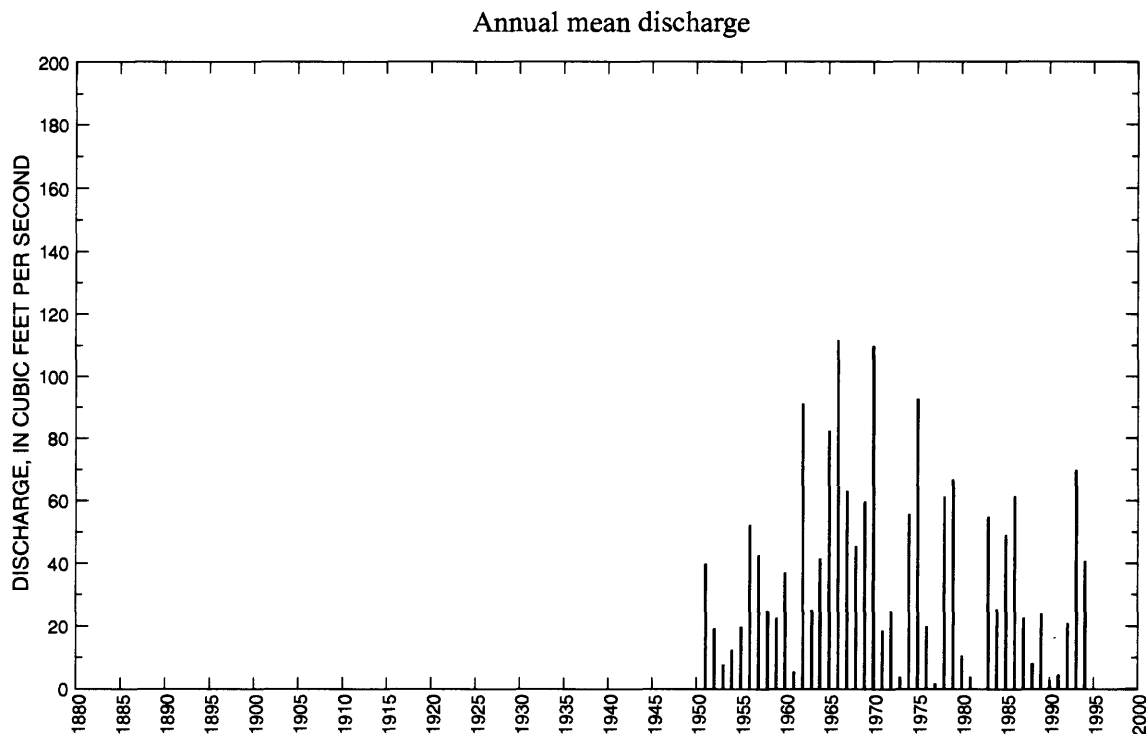
DRAINAGE AREA.--265 mi².

PERIOD OF RECORD.--March to September 1945, October 1950 to September 1981, February 1982 to current year. Monthly discharge only for some periods, published in WSP 1728. October 1981 to January 1982, operated as a high-flow partial-record station.

GAGE.--Water-stage recorder. Datum of gage is 828.53 ft above mean sea level. Prior to Nov. 8, 1951, nonrecording gage and Nov. 8, 1951, to Sept. 18, 1952, water-stage recorder at site 800 ft downstream at datum 1.0 ft higher. Sept. 19, 1952, to June 28, 1982, recording gage at site 800 ft downstream at present datum. June 29, 1982, to Sept. 20, 1983, nonrecording gage at present site and datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,260 ft³/s, July 3, 1975, gage height, 16.59 ft, present datum; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1950 reached a stage of 15.25 ft present datum, site then in use, from floodmarks.



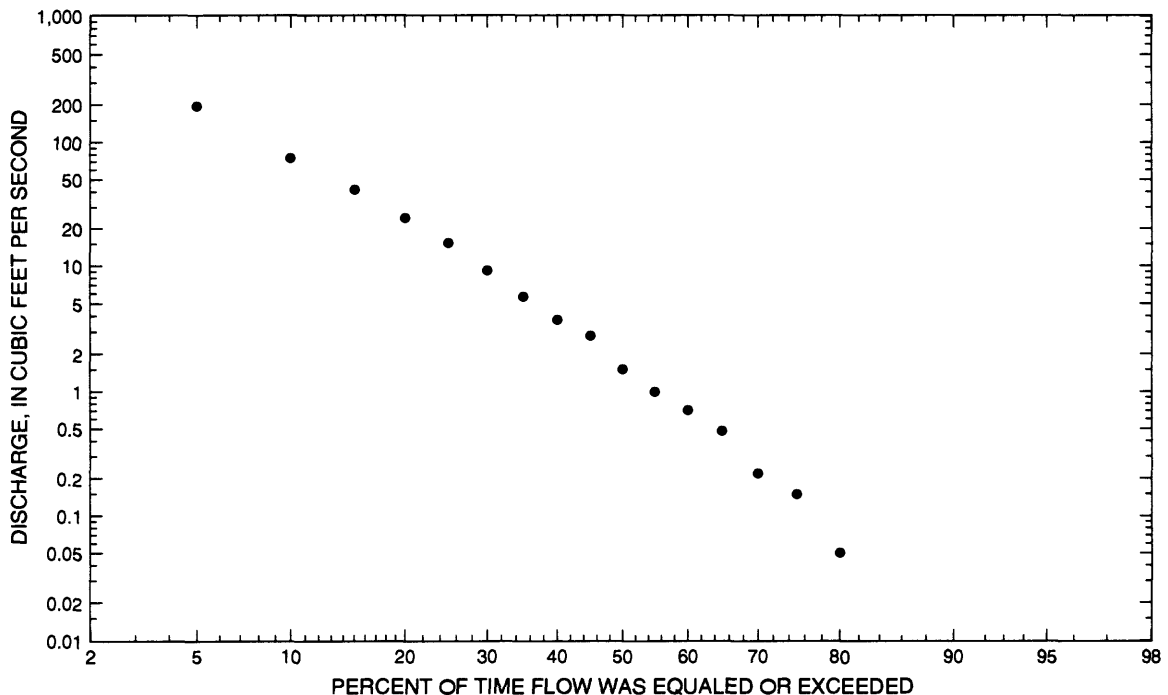
05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	94.1	1983	0	m	8.96	19.5	2.18	1.93
November	33.4	1957	0	m	5.18	7.72	1.49	1.12
December	15.8	1983	0	m	2.33	3.09	1.33	0.50
January	4.65	1983	0	m	1.02	1.22	1.21	0.22
February	3.32	1983	0	m	0.750	0.91	1.21	0.16
March	217	1983	0	m	25.1	43.5	1.73	5.42
April	747	1966	0.197	1991	200	184	0.92	43.0
May	330	1970	2.12	1981	70.0	82.0	1.17	15.1
June	660	1970	0.366	1973	70.0	129	1.84	15.1
July	688	1975	0	1961	54.1	116	2.15	11.7
August	264	1993	0	1961	11.0	39.6	3.60	2.36
September	272	1993	0	m	16.3	50.4	3.09	3.51
Annual	112	1966	1.60	1977	38.5	29.6	0.77	100

Annual flow duration



05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.18	1.50	0.19	0	0	0	0	0	0	0
90	0	0	0	1.80	3.26	1.20	0.15	0	0	0	0	0	0
85	0	0	0	5.19	4.52	2.47	0.33	0	0	0	0.03	0	0
80	0	0	0	10.5	6.59	3.60	0.71	0	0	0	0.09	0.04	0.05
75	0	0	0.02	16.7	10.8	5.10	1.50	0.07	0	0	0.21	0.09	0.15
70	0.03	0	0.16	24.5	15.3	6.66	2.77	0.10	0	0.09	0.36	0.25	0.22
65	0.12	0.06	0.32	36.3	18.5	8.47	3.52	0.19	0	0.12	0.36	0.41	0.48
60	0.27	0.09	0.46	47.9	22.6	11.4	4.07	0.27	0.08	0.16	0.48	0.52	0.71
55	0.39	0.18	0.65	59.9	26.7	13.8	5.79	0.37	0.12	0.22	0.84	0.67	1.00
50	0.57	0.38	0.91	77.7	31.2	16.6	7.84	0.71	0.16	0.29	1.40	0.86	1.50
45	0.70	0.54	1.30	98.6	35.8	19.6	9.87	0.99	0.23	0.40	1.90	1.10	2.79
40	0.70	0.65	1.80	119	41.0	23.0	13.9	1.40	0.47	0.74	2.50	1.40	3.74
35	1.00	0.78	1.80	152	47.9	28.0	18.6	1.90	0.66	1.80	3.85	1.80	5.66
30	1.20	1.10	3.08	193	54.8	34.9	25.5	3.42	1.30	2.50	4.91	2.90	9.17
25	1.50	1.10	3.95	241	70.2	44.5	36.1	4.64	1.90	5.58	6.18	2.90	15.4
20	1.80	1.30	7.80	311	91.5	59.7	47.8	7.75	4.48	10.7	8.28	4.28	24.4
15	2.20	1.60	19.1	417	122	87.2	67.7	12.6	10.3	14.7	11.3	4.96	41.7
10	2.70	1.90	67.3	570	179	157	103	18.9	22.0	23.2	16.0	5.60	74.7
5	3.90	2.80	156	812	297	365	228	37.8	55.9	52.4	23.3	7.17	195

05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	16.4	15.0	11.9	8.78
0.95	1.05	104	62.9	54.6	39.8	27.3
0.90	1.11	171	117	99.5	70.2	46.9
0.80	1.25	300	229	190	130	84.7
0.50	2	771	652	520	349	221
0.20	5	1,680	1,390	1,080	732	465
0.10	10	2,380	1,860	1,440	990	635
0.04	25	3,310	2,390	1,830	1,290	839
0.02	50	4,000	2,710	2,080	1,480	978
0.01	100	4,680	2,980	2,280	1,650	1,100
0.005	200	5,340	3,200	2,450	1,800	1,220
0.002	500	6,170	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0.043	0.093
0.50	2	0	0	0	0	0.051	0.135	0.313	0.471	0.816

05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0.057
0.50	2	0.246	0.249	¹ 0.252	0.255	0.317	0.353	0.472	3.67
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		0	0	0	0	0	0	0	0
		0	0	0	0.015	0	0	0	0
		0	0	0	0.086	0	0	0	0
0.50	2	0.154	0.284	0.411	0.879	0	0.026	0.070	0.209

¹Graphical interpretation.

05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1945	March 30	10.80	939	1972	April 17	10.12	729
1950	April	15.25	2,790	1973	March 15	5.10	93.0
1951	April 9	11.75	1,220	1974	April 23	14.65	2,070
1952	April 11	9.89	612	1975	July 3	16.59	4,260
1953	March 31	6.65	112	1976	April 3	10.21	631
1954	June 18	--	128	1977	May 28	2.50	24.0
1955	June 9	9.87	527	1978	April 10	14.45	1,320
1956	July 11	13.18	1,390	1979	April 20	15.29	2,140
1957	September 7	10.73	734	1980	April 9	6.91	357
1958	July 9	11.38	846	1981	July 3	3.97	107
1959	April 5	11.23	570	1982	April 18	9.96	711
1960	April 10	12.60	903	1983	March 9	14.17	1,020
1961	March 27	6.77	135	1984	June 12	9.10	513
1962	June 12	14.12	1,620	1985	June 29	12.58	939
1963	April 11	11.28	825	1986	March 31	13.43	1,040
1964	June 22	12.40	900	1987	March 28	11.78	550
1965	April 12	15.29	2,590	1988	June 1	7.21	357
1966	April 3	16.00	1,820	1989	April 18	15.25	1,550
1967	April 23	13.41	1,320	1990	April 4	4.86	60.0
1968	July 20	12.87	1,120	1991	July 8	--	87.0
1969	April 11	15.92	2,530	1992	March 9	9.87	350
1970	May 31	14.82	2,200	1993	September 3	14.18	1,180
1971	April 9	11.74	773	1994	September 19	11.30	707
Annual peak discharge, from highest to lowest, and corresponding gage height							
1975	July 3	16.59	4,260	1985	June 29	12.58	939
1950	April	15.25	2,790	1960	April 10	12.60	903
1965	April 12	15.29	2,590	1964	June 22	12.40	900
1969	April 11	15.92	2,530	1958	July 9	11.38	846
1970	May 31	14.82	2,200	1963	April 11	11.28	825
1979	April 20	15.29	2,140	1971	April 9	11.74	773
1974	April 23	14.65	2,070	1957	September 7	10.73	734
1966	April 3	16.00	1,820	1972	April 17	10.12	729
1962	June 12	14.12	1,620	1982	April 18	9.96	711
1989	April 18	15.25	1,550	1994	September 19	11.30	707
1956	July 11	13.18	1,390	1976	April 3	10.21	631
1967	April 23	13.41	1,320	1952	April 11	9.89	612
1978	April 10	14.45	1,320	1959	April 5	11.23	570
1951	April 9	11.75	1,220	1987	March 28	11.78	550
1993	September 3	14.18	1,180	1955	June 9	9.87	527
1968	July 20	12.87	1,120	1984	June 12	9.10	513
1986	March 31	13.43	1,040	1980	April 9	6.91	357
1983	March 9	14.17	1,020	1988	June 1	7.21	357
1945	March 30	10.80	939	1992	March 9	9.87	350

05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1961	March 27	6.77	135	1973	March 15	5.10	93.0
1954	June 18	--	128	1991	July 8	--	87.0
1953	March 31	6.65	112	1990	April 4	4.86	60.0
1981	July 3	3.97	107	1977	May 28	2.50	24.0

05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1945	--	--	--	--	--	--	289.0	73.7	26.5	15.0	4.81	19.5	--
1951	11.0	7.79	5.11	3.21	2.75	4.16	336.9	72.0	7.18	1.53	3.03	27.5	39.9
1952	11.9	4.93	3.61	1.03	1.93	3.42	177.5	19.6	3.50	6.03	0.394	0	19.3
1953	0.035	0.503	0.052	0	0	15.7	33.2	22.0	16.9	3.45	0.245	0	7.68
1954	0	0	0	0	0	0	51.8	39.8	50.7	6.26	0.190	0	12.4
1955	0.052	0.143	0.094	0.026	0	0	70.7	23.9	137.4	8.82	0.371	0	19.9
1956	0.439	0.007	0.129	0.045	0	0	132.3	131.8	26.9	312.6	11.8	7.32	52.3
1957	1.79	33.4	5.50	1.94	1.56	39.8	68.6	42.0	64.7	87.6	3.77	163.4	42.7
1958	40.6	23.5	7.41	2.50	1.70	3.76	12.2	5.32	4.85	186.7	5.28	0.153	24.8
1959	0.271	0.550	0.645	0.200	0	1.61	209.0	29.9	15.7	9.97	4.36	2.43	22.7
1960	12.5	10.4	4.31	2.10	1.11	1.68	307.1	49.9	49.2	10.4	0.887	0.223	37.1
1961	0.316	0.423	0.574	0.326	0.193	23.0	27.3	10.8	0.773	0	0	1.47	5.45
1962	8.23	2.93	0.923	0.377	0.129	0	244.9	298.9	481.9	43.9	7.34	7.60	91.2
1963	2.63	4.19	3.48	0.406	0	18.7	188.6	41.7	30.6	6.88	4.67	0.143	25.0
1964	0.013	0.177	0.032	0	0	0	73.8	44.6	306.1	40.4	28.2	8.43	41.4
1965	27.0	12.9	3.94	2.56	1.17	1.37	577.3	158.8	102.1	92.2	5.02	7.96	82.4
1966	64.5	21.6	8.54	4.05	1.92	93.0	747.1	231.9	32.7	107.2	24.2	4.74	111.7
1967	5.05	1.93	0.913	0.652	0.529	15.6	472.5	236.2	21.0	4.91	0.158	0	63.1
1968	0.535	1.63	0.600	0	0.131	26.0	19.2	4.04	232.7	205.0	28.1	27.9	45.5
1969	23.3	13.0	5.41	0.900	1.65	2.97	552.6	63.2	47.1	11.5	1.18	0.217	59.7
1970	0.174	0.423	0.481	0.358	0.036	0	302.6	330.3	659.8	25.4	2.75	0.873	109.7
1971	2.07	4.52	2.27	1.55	1.44	6.17	162.0	27.8	12.1	3.39	0.261	0.090	18.5
1972	0.703	7.67	2.82	0.361	0.059	20.6	211.8	36.0	17.4	2.22	0.019	0.023	24.7
1973	0.005	0.173	0.003	0	0	34.8	6.42	3.30	0.366	0.001	0.023	0.078	3.82
1974	1.91	2.43	0.046	0.105	0.056	0	426.2	191.7	45.0	3.01	0.493	0.351	55.7
1975	0.349	0.610	0.653	0.795	0.380	1.24	224.5	125.8	46.0	687.7	11.0	1.54	92.7
1976	1.17	4.32	1.70	1.69	1.80	21.1	189.1	16.3	3.29	1.30	0.071	0	19.9
1977	0	0	0	0	0	0.745	10.3	4.38	3.25	0.222	0.319	0.074	1.60
1978	0.079	4.46	4.04	1.24	0.831	13.4	479.2	116.7	48.9	61.3	7.11	1.07	61.2
1979	0.395	1.57	1.24	0.871	0.615	1.42	611.2	126.8	47.7	12.3	1.61	0.667	66.7
1980	0.295	1.63	1.33	1.27	1.04	2.00	112.6	6.72	0.793	0.018	0.138	0.594	10.6
1981	0.302	0.075	0.051	0.014	0.506	5.51	5.38	2.12	8.40	21.3	0.044	0.774	3.74
1982	--	--	--	--	--	9.36	284.1	102.3	16.2	52.3	11.7	0.495	--
1983	94.1	24.0	15.8	4.65	3.32	217.1	155.7	56.7	61.3	19.7	0.999	0.313	54.8
1984	4.17	6.90	3.99	1.64	1.05	57.7	112.8	22.4	90.7	3.09	0.147	0.012	25.2

05087500 MIDDLE RIVER AT ARGYLE, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1985	0.256	0.479	0.341	0.140	0.142	68.7	83.2	41.9	253.5	74.5	29.5	35.9	49.0
1986	52.5	9.39	3.86	3.71	3.30	124.8	314.3	185.2	34.4	2.79	0.543	0.186	61.4
1987	0.478	0.829	0.600	0.600	0.600	118.2	117.1	19.6	9.06	1.57	0.340	0.023	22.5
1988	0.065	0.490	0.307	0.088	0.060	0.351	57.3	12.0	26.9	0.855	0.008	0.011	8.10
1989	0	0	0.019	0.010	0.014	0.022	231.1	28.4	28.1	2.95	0.086	0.002	24.0
1990	0	0.016	0	0	0	9.62	13.3	2.74	4.69	2.25	0.018	0	2.72
1991	0	0	0	0	0.014	0.084	0.197	4.63	3.65	40.6	3.38	0.353	4.48
1992	0.317	1.54	2.22	0.842	0.440	85.6	102.8	38.3	5.20	12.2	0.505	0.681	20.9
1993	1.23	0.465	1.25	0.754	0.691	9.01	120.4	16.1	51.6	97.9	264.5	272.4	69.8
1994	14.4	10.7	5.89	2.67	1.12	47.9	53.3	30.7	10.9	145.6	24.4	138.5	40.7

05088000 SOUTH BRANCH PARK RIVER NEAR PARK RIVER, ND

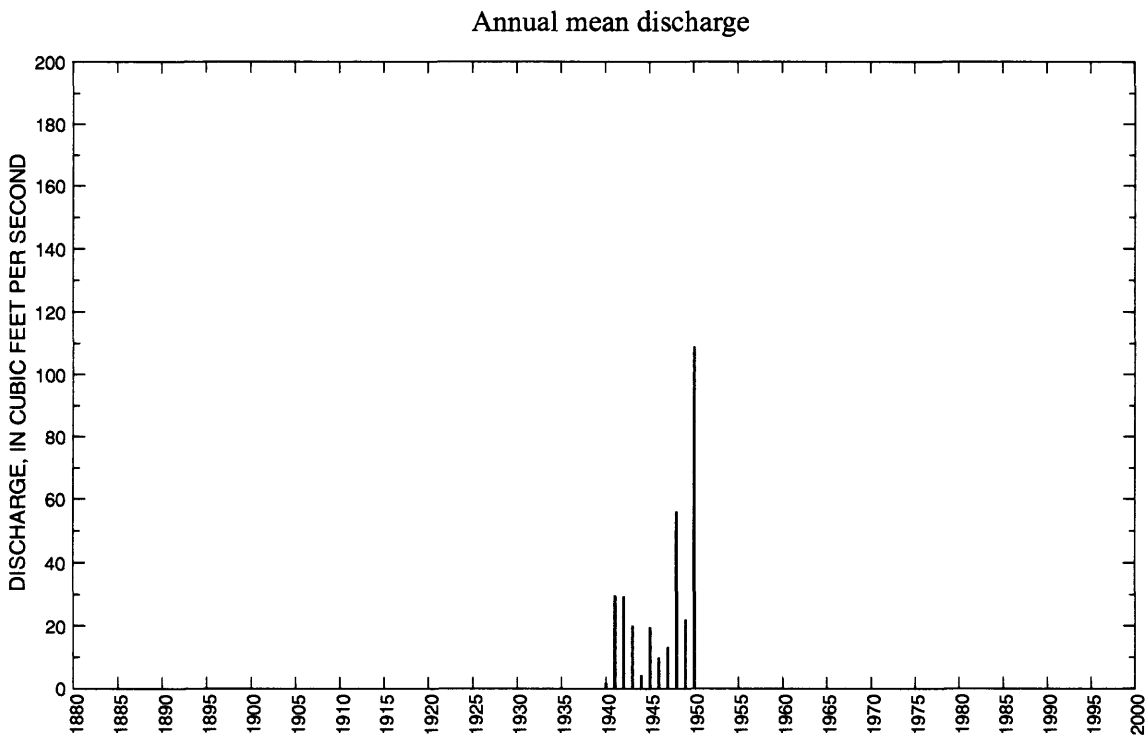
LOCATION.--Lat 48°24'50", long 97°51'40" (revised), on line between sec.15 and 16, T.157 N., R.56 W., Walsh County, Hydrologic Unit 09020310, at bridge on State Highway 32, half a mile upstream from small tributary and 4.5 miles northwest of town of Park River.

DRAINAGE AREA.--214 mi².

PERIOD OF RECORD.--October 1939 to September 1950. October 1939 to March 1940 estimated on basis of weather records and records for Park River at Grafton, North Dakota.

GAGE.--Chain gage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,000 ft³/s, Apr. 18, 1948, gage height, 11.80 ft, from rating curve extended above 6,600 ft³/s; no flow at times most years.



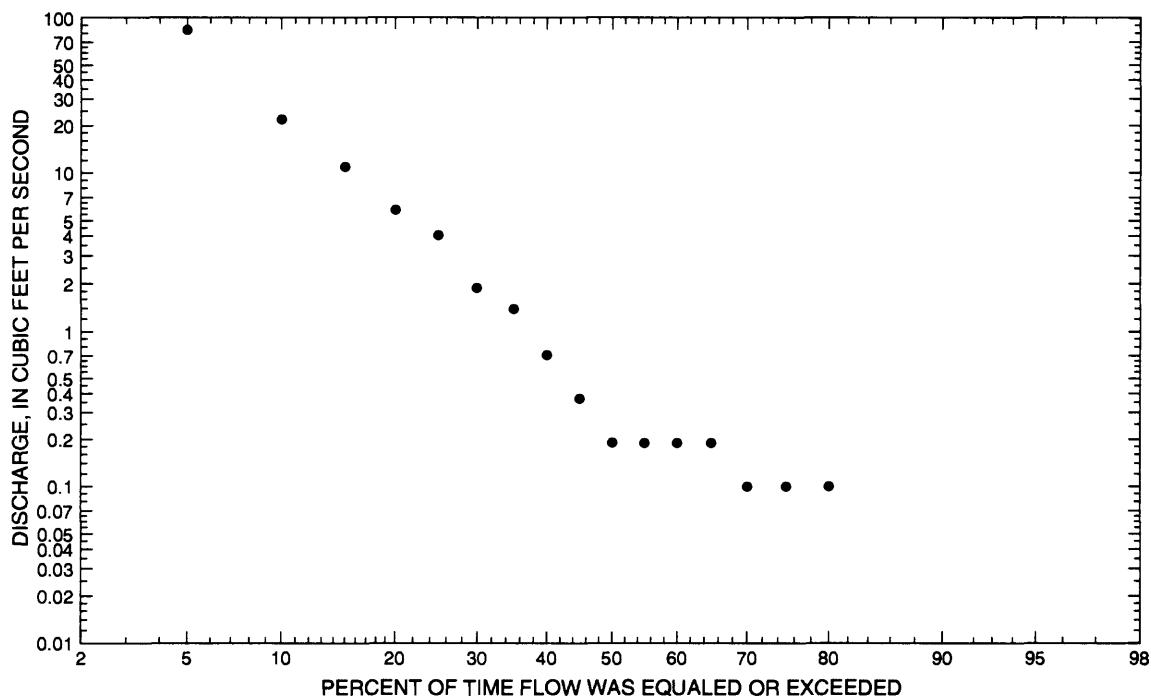
05088000 SOUTH BRANCH PARK RIVER NEAR PARK RIVER, ND--Continued

Statistics of monthly and annual mean dischargesvariation

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	19.6	1942	0	m	2.20	5.79	2.63	0.64
November	3.74	1942	0	m	0.870	1.43	1.65	0.25
December	2.78	1945	0	m	0.490	0.86	1.76	0.14
January	0.274	1945	0	m	0.090	0.09	1.06	0.03
February	0.200	m	0	m	0.070	0.08	1.08	0.02
March	181	1945	0	m	41.7	59.7	1.43	12.1
April	642	1950	17.7	m	208	228	1.10	60.3
May	639	1950	2.28	1940	68.3	190	2.78	19.8
June	56.2	1943	0.180	1940	11.2	15.9	1.42	3.24
July	23.9	1947	0.019	1940	6.07	8.99	1.48	1.76
August	21.7	1948	0.042	m	3.13	6.38	2.04	0.91
September	17.4	1941	0.023	1940	2.76	5.23	1.89	0.80
Annual	109	1950	1.67	1940	28.7	30.5	1.07	100

Annual flow duration



05088000 SOUTH BRANCH PARK RIVER NEAR PARK RIVER, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.19	1.80	0	0	0	0	0	0	0	0
90	0	0	0	1.40	2.30	0.39	0	0	0.10	0	0	0	0
85	0	0	0	3.90	2.30	0.62	0.10	0.10	0.10	0	0	0	0
80	0	0	0	5.60	2.30	0.98	0.10	0.10	0.10	0.10	0.10	0	0.10
75	0	0	0	8.37	3.00	1.50	0.20	0.10	0.10	0.19	0.10	0.10	0.10
70	0	0	0	11.8	3.00	1.90	0.20	0.10	0.10	0.19	0.10	0.10	0.10
65	0	0	0.10	15.1	4.56	2.40	0.25	0.18	0.18	0.19	0.19	0.10	0.19
60	0	0	0.10	17.8	5.16	2.40	0.25	0.18	0.18	0.19	0.19	0.10	0.19
55	0.10	0	0.10	22.6	5.67	3.10	0.49	0.18	0.18	0.19	0.19	0.10	0.19
50	0.10	0.10	0.10	28.0	6.70	4.51	0.61	0.28	0.18	0.19	0.19	0.10	0.19
45	0.10	0.10	0.10	34.8	8.22	6.02	0.96	0.34	0.18	0.28	0.19	0.10	0.37
40	0.10	0.10	0.17	45.2	9.25	6.81	1.50	0.42	0.18	0.28	0.19	0.20	0.71
35	0.10	0.10	0.17	63.2	10.8	8.10	1.90	0.51	0.33	0.35	0.19	0.20	1.40
30	0.10	0.10	0.63	99.1	13.0	9.79	2.40	0.77	0.50	0.43	0.36	0.20	1.90
25	0.10	0.10	3.00	141	15.3	11.0	4.18	1.40	0.74	0.66	0.89	0.27	4.05
20	0.20	0.10	10.0	180	22.0	13.9	5.47	2.20	1.30	1.00	1.00	0.48	5.87
15	0.20	0.10	89.0	274	31.9	17.0	6.79	4.00	2.50	1.50	1.50	0.84	11.0
10	0.20	0.10	164	562	62.9	24.0	14.4	9.72	5.67	2.80	3.70	1.60	22.0
5	0.20	0.10	301	1,140	235	50.0	23.0	13.8	11.5	8.38	4.80	2.90	83.8

05088000 SOUTH BRANCH PARK RIVER NEAR PARK RIVER, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	40.6	48.5	29.1	14.7	7.85
0.95	1.05	110	98.1	65.5	40.0	21.7
0.90	1.11	186	144	101	65.7	36.3
0.80	1.25	346	233	168	116	65.6
0.50	2	1,100	600	446	311	187
0.20	5	3,380	1,620	1,160	737	482
0.10	10	5,980	2,760	1,910	1,100	758
0.04	25	10,800	4,950	3,240	1,640	1,190
0.02	50	15,900	7,280	4,530	2,080	1,570
0.01	100	22,200	10,300	6,130	2,550	2,000
0.005	200	30,100	14,300	8,070	3,030	2,460
0.002	500	43,400	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	0	0	0	0	0	0	0
0.10	10	ng	ng	0	0	0	0	0	0	0
0.20	5	ng	ng	0	0	0	0	0	0.032	0.093
0.50	2	ng	ng	0	0.034	0.054	0.087	0.109	0.125	0.234

05088000 SOUTH BRANCH PARK RIVER NEAR PARK RIVER, ND--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	0	0	0	0	0	0	0
0.10	10	ng	0	0	0	0	0	0	0
0.20	5	ng	0	0	0	0	0	0	0
0.50	2	ng	0.084	¹ 0.087	¹ 0.090	0.088	¹ 0.425	¹ 0.760	1.10
		June-July-August				September-October-November			
		0	0	0	0	0	0	0	0
		0	0	0.004	0.025	0	0	0	0
		0	0	0.023	0.071	0	0.050	0.087	0.114
		0.103	0.115	0.147	0.292	0.102	0.117	0.121	0.207

¹Graphical interpretation.

05088000 SOUTH BRANCH PARK RIVER NEAR PARK RIVER, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1940	April 19	3.16	171	1946	March 22	5.66	400
1941	April 10	8.85	3,340	1947	July 25	4.30	518
1942	April 4	--	1,880	1948	April 18	11.80	11,000
1943	March 24	7.60	900	1949	April 9	5.93	1,200
1944	April 11	--	170	1950	April 19	10.10	5,970
1945	March 14	6.60	800				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1948	April 18	11.80	11,000	1945	March 14	6.60	800
1950	April 19	10.10	5,970	1947	July 25	4.30	518
1941	April 10	8.85	3,340	1946	March 22	5.66	400
1942	April 4	--	1,880	1940	April 19	3.16	171
1949	April 9	5.93	1,200	1944	April 11	--	170
1943	March 24	7.60	900				

05088000 SOUTH BRANCH PARK RIVER NEAR PARK RIVER, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1940	0	0	0	0	0	0	17.7	2.28	0.180	0.019	0.042	0.023	1.67
1941	0	0	0	0	0	0	332.1	5.77	4.01	0.594	0.787	17.4	29.7
1942	19.6	3.74	1.40	0	0	58.9	246.0	16.0	5.60	0.794	1.69	1.70	29.5
1943	0.213	0.180	0.200	0.200	0.200	96.1	63.8	7.98	56.2	14.7	0.342	0.190	20.1
1944	0.261	0.277	0.071	0	0	0	34.0	2.51	1.82	0.245	5.74	6.39	4.23
1945	0.358	3.70	2.78	0.274	0.200	181.0	23.4	11.1	6.75	2.41	0.235	0.163	19.6
1946	0.181	0.150	0.100	0.100	0.100	92.1	17.7	3.65	2.73	0.113	0.100	0.530	9.92
1947	0.374	0.170	0.100	0.032	0	29.4	80.0	3.94	15.8	23.9	2.50	3.16	13.3
1948	1.55	0.947	0.461	0.148	0.100	0.303	578.5	45.8	11.6	20.2	21.7	0.260	56.1
1949	0.381	0.207	0.139	0.100	0.100	0.113	251.1	13.0	2.26	0.368	0.042	0.147	22.1
1950	1.28	0.190	0.113	0.100	0.100	1.04	641.8	639.2	16.0	3.44	1.24	0.397	109.0

05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND

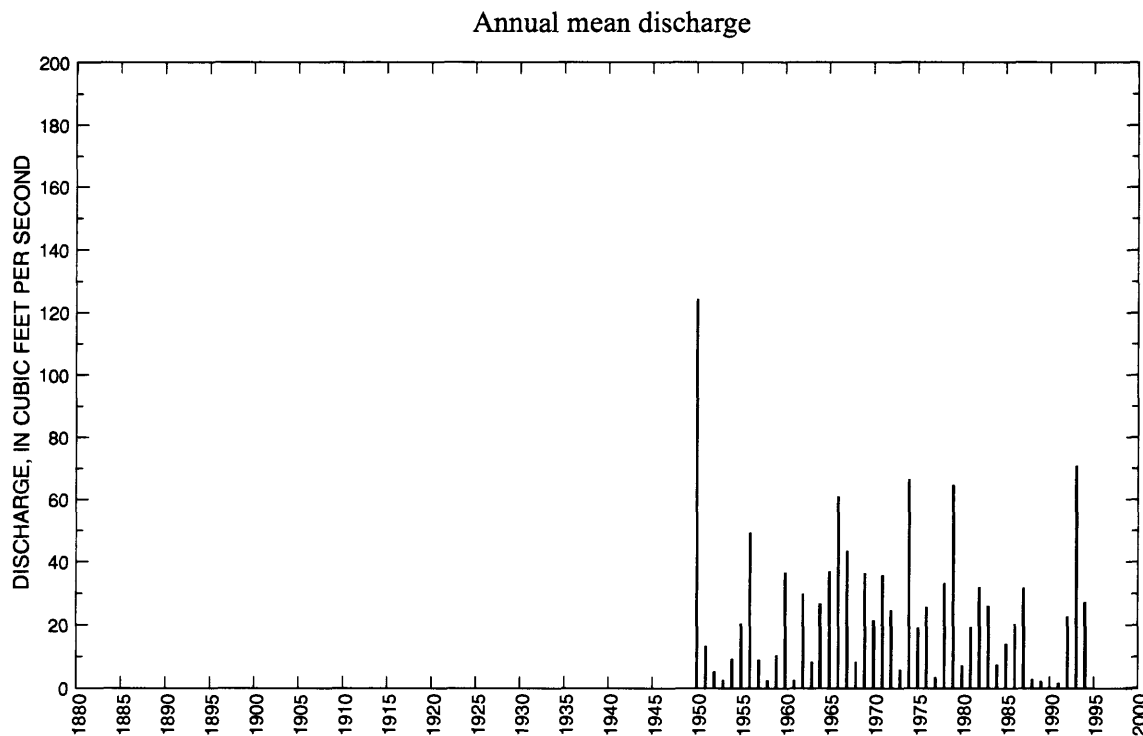
LOCATION.--Lat 48°24'07", long 97°46'55", in SE¹/₄ sec.19, T.157 N., R.55 W., Walsh County, Hydrologic Unit 09020310, on right bank 0.5 mi downstream from Homme Dam, and 2 mi west of town of Park River.

DRAINAGE AREA.--226 mi².

PERIOD OF RECORD.--October 1949 to September 1994. Monthly discharge only for October and November 1949, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,000.00 ft above sea level.

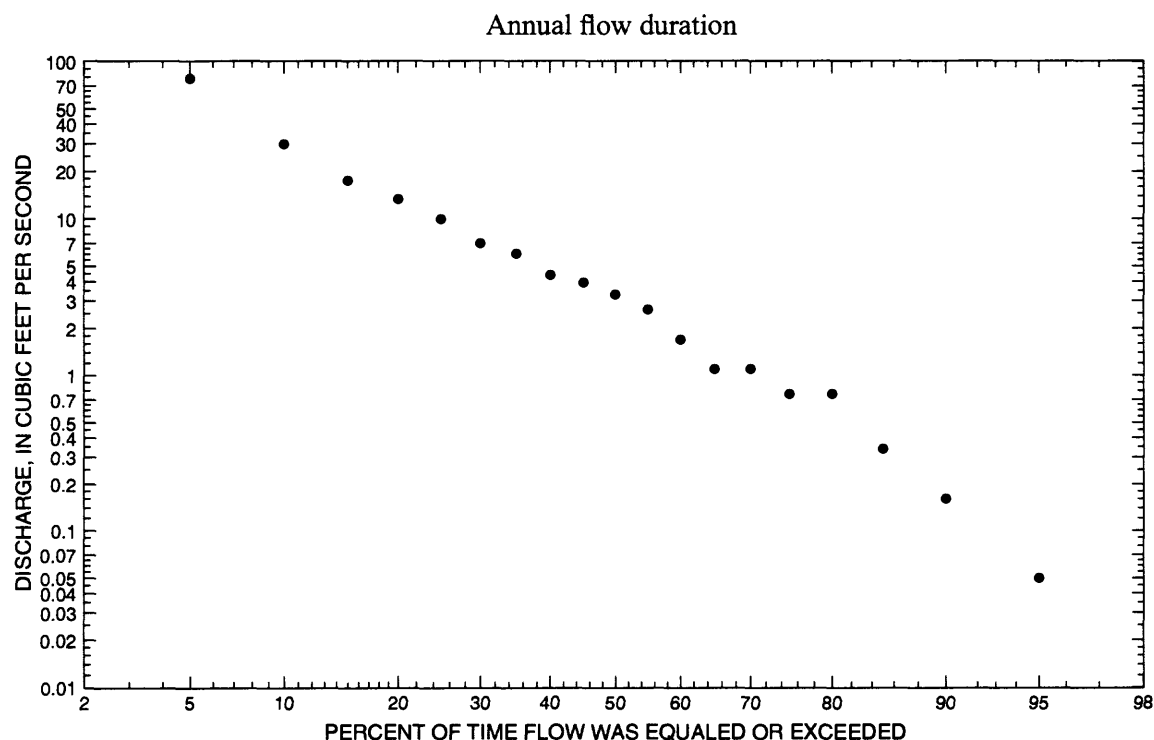
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 13,000 ft³/s, Apr. 24, 1950, gage height, 37.52 ft, dam failure; no flow at times.



05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	25.7	1983	0	1950	3.97	5.98	1.50	1.32
November	16.0	1985	0.015	1989	3.59	3.34	0.93	1.19
December	12.2	1983	0.010	1990	4.21	3.18	0.75	1.40
January	31.2	1974	0	1990	5.39	5.06	0.94	1.79
February	28.6	1981	0	1990	5.75	5.49	0.95	1.91
March	234	1966	0.059	1991	31.8	48.4	1.52	10.6
April	749	1950	0.608	1977	144	174	1.20	47.9
May	706	1950	0.727	1977	48.1	114	2.37	16.0
June	182	1964	0.776	1989	19.5	30.2	1.54	6.49
July	500	1993	0.028	1990	21.6	75.1	3.48	7.18
August	194	1993	0	1990	7.34	28.6	3.90	2.44
September	36.2	1951	0	1990	5.28	8.17	1.55	1.76
Annual	124.5	1950	0.516	1990	25.0	24.0	0.96	100



05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0.04	0.08	0.07	0.40	0.50	0.56	0.10	0.04	0	0	0.07	0.03	0.05
90	0.48	0.40	0.26	1.10	0.96	1.00	0.44	0.07	0.04	0.05	0.13	0.11	0.16
85	0.48	0.50	0.50	2.20	1.30	1.40	0.64	0.19	0.09	0.12	0.21	0.48	0.34
80	1.00	0.50	0.96	3.52	1.80	1.80	0.94	0.37	0.17	0.21	0.34	0.77	0.76
75	1.40	1.00	1.30	4.69	3.48	2.50	0.94	0.51	0.51	0.37	0.43	1.30	0.76
70	1.40	1.30	1.30	5.25	4.38	3.31	1.40	0.51	0.67	0.49	0.68	1.60	1.10
65	1.80	1.60	1.80	7.91	5.55	3.86	1.40	0.71	0.67	0.65	0.86	1.60	1.10
60	2.30	2.00	3.20	12.0	7.36	4.66	2.00	0.99	0.89	0.65	1.10	2.00	1.70
55	3.00	2.50	4.14	16.4	8.43	5.41	2.00	0.99	0.89	0.86	1.40	2.00	2.64
50	4.13	3.20	5.08	22.8	10.8	6.81	3.20	1.40	1.20	1.10	1.40	2.60	3.31
45	4.42	4.27	5.51	29.9	13.3	7.74	3.71	1.40	1.60	1.10	1.70	3.30	3.94
40	4.70	4.86	7.49	39.2	15.7	8.91	4.84	1.90	1.60	1.50	2.20	4.42	4.41
35	5.25	5.43	10.3	54.1	18.2	10.0	5.86	1.90	2.10	1.50	3.50	4.92	6.02
30	5.72	5.99	13.5	72.7	22.1	13.7	6.97	2.92	2.70	2.00	4.53	5.52	7.05
25	6.88	7.22	17.8	105	27.0	16.6	8.12	3.47	2.70	2.60	4.99	6.00	9.98
20	7.78	10.0	27.6	142	34.1	19.6	11.7	4.21	4.53	4.63	5.71	6.98	13.4
15	8.68	11.7	40.9	209	46.8	25.1	15.6	5.81	5.57	6.35	6.56	7.47	17.5
10	12.4	13.6	63.1	332	76.3	36.0	23.5	7.56	11.5	10.4	11.5	10.1	29.9
5	16.5	17.6	166	713	164	63.8	52.8	15.8	24.1	16.7	13.8	12.9	78.1

05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	5.60	2.35	2.08	1.84	1.56
0.95	1.05	27.3	13.6	11.0	8.58	6.43
0.90	1.11	59.1	31.8	24.5	18.1	12.9
0.80	1.25	141	81.5	60.0	41.9	28.2
0.50	2	614	388	267	171	108
0.20	5	2,110	1,370	903	544	337
0.10	10	3,670	2,380	1,540	910	568
0.04	25	6,220	3,970	2,540	1,480	936
0.02	50	8,470	5,300	3,380	1,950	1,260
0.01	100	10,900	6,700	4,270	2,460	1,610
0.005	200	13,600	8,150	5,180	2,980	1,990
0.002	500	17,300	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0.003	0.005	¹ 0.008	0.011	0.041	0.167
0.10	10	0	0	0.006	0.026	0.044	0.076	0.150	0.178	0.425
0.20	5	0.033	0.037	0.054	0.075	0.129	0.253	0.448	0.598	1.06
0.50	2	0.148	0.174	0.250	0.312	0.525	1.04	1.59	2.27	3.29

¹Graphical interpretation.

05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0.005	0.029	0.031	0.052	0.035	0.044	0.072	0.160
0.10	10	0.055	0.085	0.095	0.170	0.084	0.124	0.188	0.396
0.20	5	0.177	0.235	0.270	0.493	0.208	0.337	0.481	1.07
0.50	2	0.874	1.06	1.23	1.99	0.910	1.62	2.14	5.26
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0.012	0.024	0.078	0	0	0.004	0.006
0.10	10	0.030	0.071	0.113	0.277	0	0.006	0.034	0.064
0.20	5	0.094	0.182	0.267	0.565	0.049	0.067	0.102	0.191
0.50	2	0.391	0.700	0.928	1.64	0.256	0.374	0.462	0.802

05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND--Continued

Annual peak discharge and corresponding gage height

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1950	April 24	37.52	13,000	1973	March 24	23.68	101
1951	April 4	28.42	900	1974	May 20	29.12	2,610
1952	September 10	24.75	106	1975	July 1	27.19	1,300
1953	August 28	23.64	17.0	1976	April 2	27.08	1,240
1954	June 14	25.73	386	1977	September 17	23.53	12.0
1955	April 1	28.50	1,600	1978	April 7	28.56	2,170
1956	April 25	29.16	2,000	1979	April 20	31.49	5,380
1957	March 23	25.54	324	1980	May 28	24.67	211
1958	March 21	23.98	58.0	1981	April 2	25.49	429
1959	April 3	25.48	368	1982	July 24	27.40	1,290
1960	April 12	29.43	2,580	1983	March 6	27.10	1,200
1961	April 26	23.91	86.0	1984	March 25	24.83	244
1962	April 18	27.99	1,780	1985	March 19	25.71	473
1963	June 25	24.90	316	1986	March 23	25.90	620
1964	June 19	28.71	2,300	1987	April 6	28.36	2,000
1965	April 11	30.68	3,100	1988	April 3	23.39	29.0
1966	April 1	27.81	1,670	1989	April 24	23.45	61.0
1967	May 7	28.37	1,950	1990	April 5	23.46	24.0
1968	March 26	24.69	233	1991	July 6	23.56	32.0
1969	April 11	29.45	2,900	1992	March 29	25.62	933
1970	April 8	26.63	980	1993	July 28	29.53	4,210
1971	April 9	28.99	2,850	1994	March 22	25.62	500
1972	March 17	27.20	1,210				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 24	37.52	13,000	1970	April 8	26.63	980
1979	April 20	31.49	5,380	1992	March 29	25.62	933
1993	July 28	29.53	4,210	1951	April 4	28.42	900
1965	April 11	30.68	3,100	1986	March 23	25.90	620
1969	April 11	29.45	2,900	1994	March 22	25.62	500
1971	April 9	28.99	2,850	1985	March 19	25.71	473
1974	May 20	29.12	2,610	1981	April 2	25.49	429
1960	April 12	29.43	2,580	1954	June 14	25.73	386
1964	June 19	28.71	2,300	1959	April 3	25.48	368
1978	April 7	28.56	2,170	1957	March 23	25.54	324
1956	April 25	29.16	2,000	1963	June 25	24.90	316
1987	April 6	28.36	2,000	1984	March 25	24.83	244
1967	May 7	28.37	1,950	1968	March 26	24.69	233
1962	April 18	27.99	1,780	1980	May 28	24.67	211
1966	April 1	27.81	1,670	1952	September 10	24.75	106
1955	April 1	28.50	1,600	1973	March 24	23.68	101
1975	July 1	27.19	1,300	1961	April 26	23.91	86.0
1982	July 24	27.40	1,290	1989	April 24	23.45	61.0
1976	April 2	27.08	1,240	1958	March 21	23.98	58.0
1972	March 17	27.20	1,210	1991	July 6	23.56	32.0
1983	March 6	27.10	1,200	1988	April 3	23.39	29.0

05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND--Continued

Annual peak discharge and corresponding gage height--Continued

Water year	Date	Gage height (feet)	Peak discharge (ft³/s)	Water year	Date	Gage height (feet)	Peak discharge (ft³/s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1990	April 5	23.46	24.0	1977	September 17	23.53	12.0
1953	August 28	23.64	17.0				

05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1950	0	0.500	0.445	0.500	0.589	2.21	749.3	705.8	21.3	6.80	2.71	0.793	124.5
1951	1.37	2.86	1.86	1.60	1.60	8.13	93.7	9.76	3.42	0.961	1.00	36.2	13.4
1952	20.4	2.01	2.00	2.60	1.47	0.297	1.30	5.96	1.05	1.79	1.24	23.5	5.30
1953	0.677	2.36	4.07	4.58	4.41	2.96	1.73	0.852	2.42	0.706	1.63	3.27	2.46
1954	1.78	1.53	1.75	3.78	2.27	2.79	2.46	3.52	70.8	9.67	5.36	6.03	9.25
1955	5.90	3.46	2.00	2.04	2.45	8.58	159.2	19.6	18.6	6.01	2.31	16.5	20.4
1956	0.729	0.737	1.86	1.25	1.74	28.8	341.3	137.3	68.5	10.8	1.79	1.74	49.4
1957	4.44	5.43	1.47	1.20	12.5	29.0	15.5	9.85	4.30	1.43	4.84	20.2	9.13
1958	1.87	1.37	5.52	3.09	3.56	3.55	2.94	1.18	2.21	1.71	2.16	1.51	2.55
1959	4.49	0.657	10.5	1.48	0.679	1.02	84.2	11.7	3.30	6.12	1.28	0.973	10.5
1960	1.08	2.36	0.542	5.19	3.77	7.68	391.8	16.2	7.75	2.02	1.71	6.33	36.7
1961	0.910	0.907	0.448	9.17	0.457	0.252	4.77	1.46	1.19	3.64	1.26	5.08	2.47
1962	0.929	5.12	2.33	2.19	3.21	25.9	224.9	37.4	51.9	4.76	1.30	1.31	29.9
1963	3.14	1.68	0.990	8.93	9.85	6.37	5.48	2.93	47.1	6.97	5.55	1.83	8.33
1964	4.16	0.553	1.25	10.6	2.09	1.64	70.8	18.7	181.5	30.4	1.61	1.08	26.8
1965	0.823	0.500	1.34	5.54	9.80	22.1	283.0	60.0	21.4	11.6	8.10	22.3	36.9
1966	22.0	5.02	4.19	4.82	10.4	234.1	200.7	154.7	22.7	57.1	10.0	2.18	61.1
1967	2.33	1.43	7.95	5.43	7.94	83.4	215.1	182.5	7.19	2.22	2.73	2.88	43.6
1968	2.41	2.04	5.80	9.11	2.98	28.1	12.8	14.6	16.9	5.01	0.058	0.046	8.35
1969	3.23	2.26	4.95	11.5	13.1	13.0	355.4	16.4	11.9	3.31	4.25	3.43	36.5
1970	2.41	2.55	7.99	7.45	6.03	4.93	170.8	43.9	8.44	4.03	0.225	1.53	21.6
1971	2.36	3.79	5.72	5.68	5.88	19.4	335.0	13.7	16.8	22.7	1.42	0.913	35.8
1972	4.96	3.75	2.61	7.26	13.6	124.0	118.1	12.0	2.22	1.84	2.34	5.04	24.8
1973	0.557	4.13	6.85	2.52	12.8	23.2	6.15	5.24	3.50	1.70	2.12	1.42	5.82
1974	3.78	6.70	7.85	31.2	8.12	11.7	424.8	275.1	21.0	3.88	2.72	3.08	66.6
1975	2.08	7.94	9.61	5.47	3.72	4.65	86.4	42.4	5.98	57.6	1.44	2.38	19.2
1976	2.05	7.76	4.84	6.98	7.73	32.7	188.2	5.81	46.3	4.78	3.42	2.39	25.8
1977	1.03	6.05	8.43	5.42	5.51	5.64	0.608	0.727	1.65	1.73	1.02	3.51	3.43
1978	1.80	2.38	5.76	4.08	4.60	5.53	336.5	27.0	8.22	3.08	2.48	1.19	33.2
1979	1.31	8.78	4.82	3.48	3.11	5.01	620.0	96.5	11.8	19.4	5.69	4.51	64.8
1980	0.655	4.36	3.37	1.14	0.453	0.243	30.0	13.6	17.2	0.918	1.81	14.0	7.26
1981	9.93	11.8	10.0	2.30	28.6	55.5	39.9	10.4	40.4	20.0	2.22	2.56	19.4
1982	1.77	4.61	5.37	4.95	3.27	36.3	168.6	26.3	23.3	92.3	16.3	0.727	32.0
1983	25.7	8.16	12.2	11.5	12.0	76.0	115.1	20.2	26.2	5.26	1.71	0.949	26.2
1984	0.332	4.30	5.07	6.76	0.614	29.5	24.7	6.88	4.18	2.69	3.59	2.23	7.60

05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1985	10.4	16.0	2.61	2.86	2.37	73.6	19.1	8.34	9.09	3.36	17.6	3.13	14.2
1986	6.95	4.40	4.20	7.92	11.3	87.7	63.6	22.0	8.51	21.3	3.25	3.52	20.5
1987	0.817	0.740	5.94	6.52	6.67	20.9	315.6	12.8	7.61	6.40	2.33	0.948	31.9
1988	0.249	0.156	2.31	5.69	4.82	1.16	8.37	3.32	3.74	3.02	1.43	0.042	2.85
1989	0.011	0.015	0.033	0.077	0.156	10.2	10.4	3.71	0.776	0.040	0.017	0.016	2.14
1990	0.051	0.096	0.010	0	0	0.077	3.79	1.19	0.996	0.028	0	0	0.516
1991	0.021	0.077	0.060	0.042	0.050	0.059	0.951	3.91	3.35	9.18	0.278	0.184	1.53
1992	0.739	3.81	7.22	6.56	0.877	170.9	57.8	10.9	9.05	1.51	1.78	0.041	22.8
1993	0.043	0.037	0.032	1.76	11.5	20.2	25.1	41.3	18.7	500.1	193.6	26.2	70.9
1994	16.2	6.27	5.20	10.3	10.3	103.8	98.0	48.6	14.5	12.0	0.795	0.045	27.3

05089100 MIDDLE BRANCH PARK RIVER NEAR UNION, ND

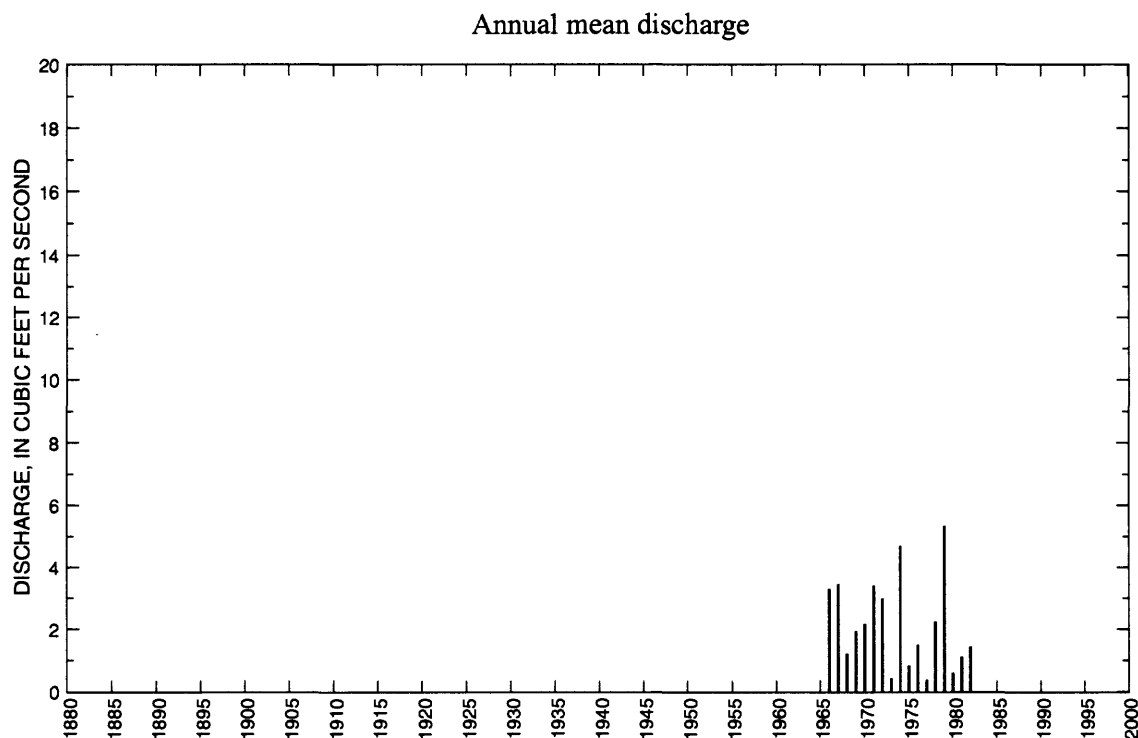
LOCATION.--Lat 48°32'32", long 98°01'10", on north line of sec. 5, T.158 N., R.57 W., Walsh County, Hydrologic Unit 09020310, on left bank 150 ft downstream from bridge on county highway between Walsh and Cavalier counties, and 3.5 mi southwest of Union.

DRAINAGE AREA.--15.3 mi².

PERIOD OF RECORD.--October 1965 to September 1986. Seasonal records only since 1983.

GAGE.--Water-stage recorder. Datum of gage is 1,495 ft above sea level, from topographic map.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 960 ft³/s, Apr. 20, 1979, gage height, 6.16 ft, backwater from ice; maximum gage height, 7.51 ft, May 4, 1966, from floodmark, backwater from snowdrift; no flow for several months each year.



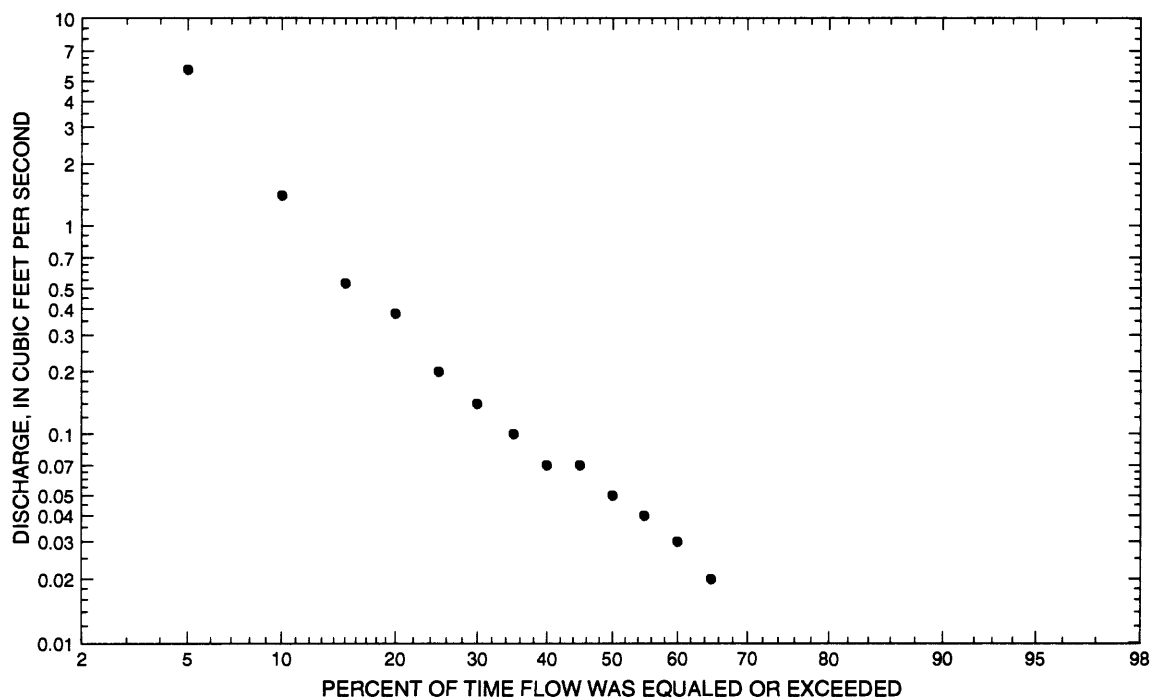
05089100 MIDDLE BRANCH PARK RIVER NEAR UNION, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	1.45	1966	0.032	1968	0.260	0.36	1.39	1.09
November	0.539	1966	0.021	1977	0.120	0.16	1.29	0.51
December	0.164	1978	0	m	0.030	0.05	1.47	0.14
January	0.055	1978	0	m	0	0.01	3.15	0.02
February	2.91	1981	0	m	0.170	0.71	4.12	0.71
March	23.0	1972	0	m	3.95	5.82	1.47	16.5
April	60.0	1979	0.242	1973	14.6	15.9	1.09	60.9
May	17.8	1967	0.039	1973	2.46	4.26	1.73	10.3
June	6.12	1986	0.018	1973	1.13	1.71	1.51	4.73
July	5.46	1966	0.010	1973	0.950	1.65	1.74	3.95
August	0.351	1980	0.351	1980	0.120	0.11	0.93	0.50
September	1.31	1980	0	1984	0.160	0.28	1.78	0.66
Annual	5.35	1979	0.381	1977	2.18	1.48	0.68	100

Annual flow duration



05089100 MIDDLE BRANCH PARK RIVER NEAR UNION, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equalled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0.05	0	0	0.04	0	0	0	0	0.02	0	0	0
90	0	0.10	0	0.13	0.06	0.02	0	0	0	0.03	0	0	0
85	0	0.15	0	0.17	0.08	0.03	0	0	0	0.04	0.02	0	0
80	0	0.21	0	0.23	0.11	0.05	0.02	0	0.02	0.04	0.02	0	0
75	0	0.26	0	0.40	0.11	0.05	0.02	0	0.03	0.05	0.03	0	0
70	0	0.31	0	0.54	0.15	0.07	0.02	0.02	0.03	0.06	0.04	0	0
65	0	0.36	0	0.72	0.15	0.07	0.03	0.02	0.04	0.06	0.04	0	0.02
60	0	0.41	0	0.96	0.20	0.09	0.04	0.03	0.04	0.06	0.05	0	0.03
55	0	0.46	0	1.30	0.20	0.09	0.04	0.03	0.04	0.06	0.05	0	0.04
50	0	0.52	0	1.70	0.27	0.12	0.06	0.05	0.06	0.08	0.06	0	0.05
45	0	0.57	0	3.09	0.36	0.12	0.06	0.06	0.07	0.08	0.06	0	0.07
40	0	0.62	0.06	3.92	0.49	0.16	0.08	0.07	0.07	0.10	0.07	0.02	0.07
35	0	0.67	0.44	4.94	0.66	0.21	0.10	0.07	0.09	0.12	0.08	0.03	0.10
30	0	0.72	0.79	6.27	0.66	0.27	0.13	0.09	0.10	0.14	0.10	0.03	0.14
25	0	0.77	1.90	8.97	0.89	0.27	0.17	0.10	0.12	0.22	0.13	0.04	0.20
20	0	0.82	2.50	12.6	1.20	0.36	0.29	0.12	0.12	0.22	0.17	0.04	0.38
15	0	0.88	4.82	18.4	1.60	0.63	0.49	0.15	0.17	0.40	0.22	0.05	0.53
10	0	0.93	8.39	30.0	3.23	1.40	1.10	0.18	0.35	0.60	0.37	0.15	1.40
5	0.02	0.98	17.2	60.0	5.89	4.55	3.96	0.30	0.60	0.74	0.48	0.19	5.68

05089100 MIDDLE BRANCH PARK RIVER NEAR UNION, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	22.5	4.83	2.71	1.60	1.08
0.95	1.05	42.9	10.1	6.39	3.92	2.60
0.90	1.11	60.3	15.0	9.92	6.14	4.03
0.80	1.25	90.8	24.3	16.6	10.3	6.65
0.50	2	197	62.1	42.5	25.5	15.8
0.20	5	422	162	102	57.3	33.5
0.10	10	626	268	158	84.1	47.6
0.04	25	949	463	246	123	67.0
0.02	50	1,240	661	324	155	82.3
0.01	100	1,570	913	413	189	97.8
0.005	200	1,960	1,230	513	225	114
0.002	500	2,540	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	0	0.015
0.10	10	ng	ng	ng	ng	ng	ng	ng	0	0.017
0.20	5	ng	ng	ng	ng	ng	ng	ng	0	0.021
0.50	2	ng	ng	ng	ng	ng	ng	ng	0	0.036

05089100 MIDDLE BRANCH PARK RIVER NEAR UNION, ND--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	0	0	0
0.10	10	ng	ng	ng	ng	ng	0	0	0
0.20	5	ng	ng	ng	ng	ng	0	0	0.029
0.50	2	ng	ng	ng	ng	ng	0	0	0.129
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0	0	0	0	0	0	0.011
0.10	10	0	0	0	0	0	0	0	0.015
0.20	5	0	0	0	0.009	0	0	0	0.020
0.50	2	0.008	¹ 0.013	0.018	0.030	0.008	0.015	0.025	0.043

¹Graphical interpretation.

05089100 MIDDLE BRANCH PARK RIVER NEAR UNION, ND--Continued

Annual peak discharge and corresponding gage height

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1966	May 4	7.51	200	1977	May 19	3.33	108
1967	May 6	7.22	687	1978	April 6	5.91	300
1968	May 14	5.44	75.0	1979	April 20	6.16	960
1969	April 11	7.10	506	1980	May 26	3.67	112
1970	April 24	6.07	243	1981	June 27	3.42	90.0
1971	April 9	7.00	650	1982	July 24	3.71	94.0
1972	March 16	6.07	385	1983	April 5	3.83	91.0
1973	March 13	4.55	51.0	1984	July 14	3.38	71.0
1974	April 15	6.75	450	1985	March 17	4.07	85.0
1975	April 15	5.00	74.0	1986	June 20	5.38	507
1976	June 12	3.37	285				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 20	6.16	960	1980	May 26	3.67	112
1967	May 6	7.22	687	1977	May 19	3.33	108
1971	April 9	7.00	650	1982	July 24	3.71	94.0
1986	June 20	5.38	507	1983	April 5	3.83	91.0
1969	April 11	7.10	506	1981	June 27	3.42	90.0
1974	April 15	6.75	450	1985	March 17	4.07	85.0
1972	March 16	6.07	385	1968	May 14	5.44	75.0
1978	April 6	5.91	300	1975	April 15	5.00	74.0
1976	June 12	3.37	285	1984	July 14	3.38	71.0
1970	April 24	6.07	243	1973	March 13	4.55	51.0
1966	May 4	7.51	200				

05089100 MIDDLE BRANCH PARK RIVER NEAR UNION, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1966	1.45	0.539	0.079	0	0	12.0	11.7	7.63	0.337	5.46	0.097	0.045	3.31
1967	0.109	0.027	0	0	0	8.27	14.9	17.8	0.067	0.025	0.024	0.016	3.46
1968	0.032	0.120	0.012	0	0	10.1	1.19	2.18	0.261	0.063	0.209	0.160	1.21
1969	0.058	0.044	0	0	0	0	23.1	0.142	0.155	0.052	0.002	0.011	1.94
1970	0.059	0.051	0.031	0	0	0.051	24.2	1.07	0.174	0.291	0.341	0.041	2.17
1971	0.045	0.086	0.013	0	0	0.005	32.5	0.181	4.07	4.15	0.243	0.063	3.41
1972	0.335	0.037	0.017	0	0	23.0	11.4	0.435	0.203	0.092	0.015	0.074	2.99
1973	0.181	0.045	0	0	0	4.30	0.242	0.039	0.018	0.010	0.057	0.175	0.429
1974	0.178	0.103	0.043	0.004	0	0	47.1	9.06	0.135	0.034	0.102	0.086	4.70
1975	0.100	0.056	0.013	0	0	0.043	6.30	1.38	1.33	0.772	0.071	0.076	0.840
1976	0.051	0.052	0.030	0.014	0	0.365	13.3	0.114	4.33	0.022	0.004	0.013	1.50
1977	0.068	0.021	0	0	0	1.01	1.20	1.51	0.087	0.179	0.040	0.413	0.381
1978	0.402	0.215	0.164	0.055	0	0.281	23.7	1.61	0.307	0.200	0.050	0.125	2.24
1979	0.082	0.046	0.001	0	0	0	60.0	3.89	0.379	0.428	0.035	0.035	5.35
1980	0.047	0.035	0.008	0	0	0.481	3.60	1.23	0.213	0.032	0.351	1.31	0.605
1981	0.621	0.506	0.145	0	2.91	3.88	1.60	0.419	2.54	0.374	0.269	0.273	1.11
1982	0.627	0.095	0.019	0	0	0.144	9.42	1.64	1.84	3.36	0.180	0.056	1.44
1983	--	--	--	--	--	3.29	10.9	0.362	0.680	0.102	0.025	0.216	--
1984	--	--	--	--	--	2.27	3.29	0.181	0.105	0.452	0.058	0	--
1985	--	--	--	--	--	9.85	3.42	0.195	0.441	0.114	0.232	0.114	--
1986	--	--	--	--	--	3.67	3.74	0.625	6.12	3.69	0.115	0.038	--

05089500 CART CREEK AT MOUNTAIN, ND

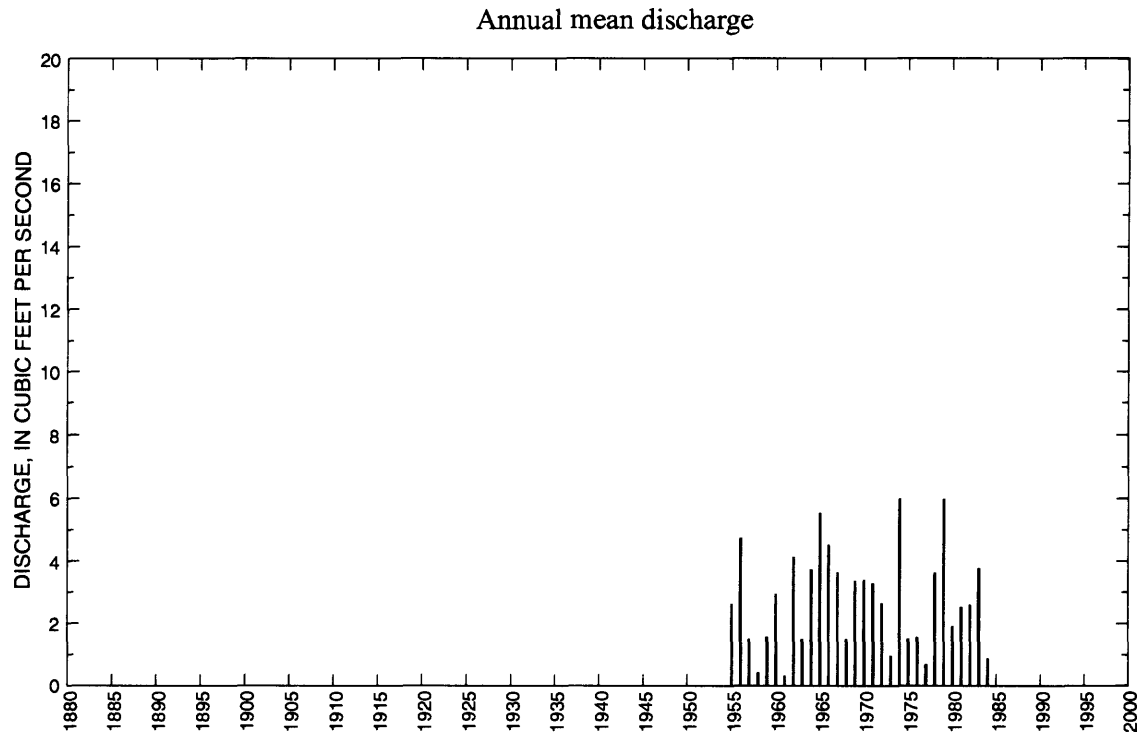
LOCATION.--Lat 48°40'37", long 97°51'41", in SW¹/₄ sec.15, T.160 N., R.56 W., Pembina County, Hydrologic Unit 09020310, on right bank 50 ft downstream from bridge on State Highway 32, and 0.7 mi south of Mountain.

DRAINAGE AREA.--16.9 mi².

PERIOD OF RECORD.--June 1954 to September 1984.

GAGE.--Water-stage recorder and wooden control. Datum of gage is 1,027.40 ft above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,300 ft³/s, June 18, 1964, gage height, 9.18 ft; maximum gage height, 9.51 ft, Apr. 19, 1979; no flow at times in some years.



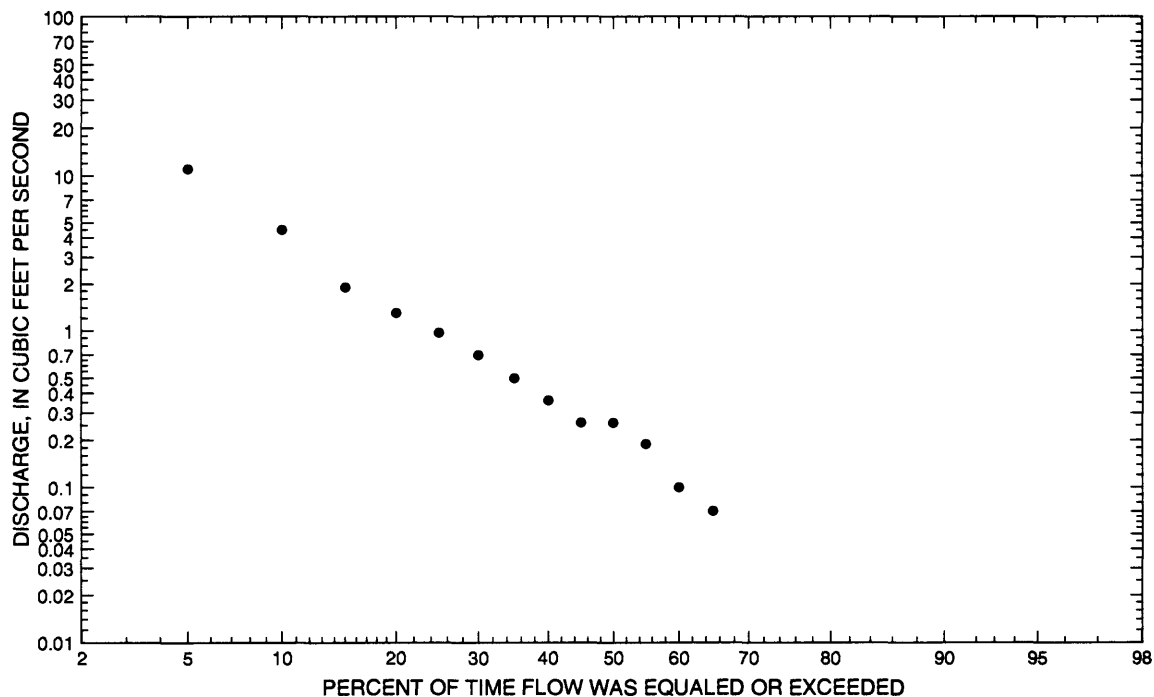
05089500 CART CREEK AT MOUNTAIN, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	4.20	1981	0	m	0.680	0.95	1.41	2.02
November	2.10	1981	0	m	0.460	0.44	0.97	1.36
December	2.54	1983	0	m	0.260	0.49	1.92	0.76
January	0.684	1965	0	m	0.110	0.20	1.84	0.32
February	1.69	1983	0	m	0.190	0.43	2.32	0.56
March	19.8	1983	0	m	3.32	4.55	1.37	9.92
April	55.6	1979	0.940	1961	17.8	15.0	0.84	53.1
May	21.0	1974	0.294	1961	5.70	5.84	1.02	17.0
June	25.5	1964	0.013	1961	3.12	4.84	1.55	9.31
July	3.20	1966	0	1961	0.800	0.86	1.08	2.39
August	3.37	1980	0	m	0.460	0.81	1.77	1.37
September	5.39	1980	0	m	0.610	1.13	1.83	1.83
Annual	6.00	1974	0.311	1961	2.78	1.61	0.58	100

Annual flow duration



05089500 CART CREEK AT MOUNTAIN, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.10	0.28	0.04	0	0	0	0	0	0	0
90	0	0	0	0.50	0.47	0.14	0	0	0	0	0	0	0
85	0	0	0	0.70	0.47	0.19	0	0	0	0	0	0	0
80	0	0	0	0.97	0.79	0.26	0	0	0	0.06	0.09	0	0
75	0	0	0	1.30	0.79	0.34	0.02	0	0	0.10	0.13	0	0
70	0	0	0	1.90	1.00	0.46	0.08	0	0	0.15	0.19	0	0
65	0	0	0	2.63	1.00	0.46	0.10	0	0	0.19	0.19	0	0.07
60	0	0	0.04	3.38	1.30	0.62	0.16	0	0	0.23	0.22	0	0.10
55	0	0	0.10	4.01	1.70	0.84	0.16	0	0	0.29	0.27	0.03	0.19
50	0	0	0.10	4.57	1.70	0.84	0.26	0	0.05	0.37	0.32	0.10	0.26
45	0	0	0.18	5.66	2.30	1.10	0.26	0	0.16	0.37	0.39	0.10	0.26
40	0	0	0.18	7.55	2.90	1.10	0.34	0.07	0.16	0.46	0.47	0.12	0.36
35	0	0	0.24	8.82	4.02	1.50	0.44	0.09	0.26	0.46	0.47	0.19	0.50
30	0.06	0.06	0.43	12.1	5.13	2.00	0.56	0.19	0.33	0.57	0.47	0.19	0.70
25	0.10	0.10	1.00	16.5	5.80	2.00	0.73	0.24	0.42	0.57	0.56	0.30	0.97
20	0.21	0.18	1.80	21.1	7.09	2.70	0.93	0.31	0.53	0.57	0.67	0.38	1.30
15	0.28	0.27	4.82	27.6	9.52	4.07	1.20	0.50	0.67	0.89	0.67	0.38	1.90
10	0.38	0.33	9.70	41.1	13.2	5.28	1.50	0.64	0.84	1.10	0.81	0.48	4.50
5	0.60	0.50	17.9	78.4	21.0	8.41	2.60	1.30	1.70	1.40	1.20	0.75	11.1

05089500 CART CREEK AT MOUNTAIN, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	11.4	4.84	2.95	1.58	1.12
0.95	1.05	28.9	11.2	7.32	4.40	3.02
0.90	1.11	46.2	17.2	11.4	7.15	4.81
0.80	1.25	79.1	28.1	18.9	12.2	8.04
0.50	2	204	67.6	44.7	29.0	18.3
0.20	5	475	150	92.8	56.9	34.6
0.10	10	710	221	129	75.4	45.0
0.04	25	1,060	325	178	97.2	56.8
0.02	50	1,350	413	215	112	64.5
0.01	100	1,660	507	252	125	71.3
0.005	200	1,990	609	288	136	77.2
0.002	500	2,460	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	0	0	0	0	0	0
0.10	10	ng	ng	ng	0	0	0	0	0	0
0.20	5	ng	ng	ng	0	0	0	0	0	0.039
0.50	2	ng	ng	ng	0	0	0	0	0.072	0.175

05089500 CART CREEK AT MOUNTAIN, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0.100
0.50	2	0	0	0	0	0	0	0.041	0.598
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0
0.50	2	0	0	0	0.042	0	0	0	0.153

05089500 CART CREEK AT MOUNTAIN, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1954	June 21	3.63	64.0	1970	April 25	7.45	603
1955	April 1	6.88	392	1971	April 9	5.63	337
1956	April 26	5.96	340	1972	March 16	4.85	230
1957	September 2	3.83	146	1973	March 24	2.69	36.0
1958	July 4	2.43	27.0	1974	April 13	8.10	220
1959	April 2	5.63	160	1975	April 28	2.85	49.0
1960	April 11	7.42	570	1976	June 12	3.88	188
1961	March 21	3.28	30.0	1977	May 29	4.93	267
1962	August 10	6.22	422	1978	April 6	4.97	380
1963	June 3	4.94	218	1979	April 19	9.51	734
1964	June 18	9.18	1,300	1980	April 3	3.38	74.0
1965	April 10	8.22	927	1981	March 27	3.28	62.0
1966	May 4	6.26	329	1982	May 18	3.80	165
1967	May 6	3.96	205	1983	March 30	--	215
1968	May 15	3.01	126	1984	March 26	3.04	22.0
1969	April 9	7.80	528				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1964	June 18	--	1,300	1983	March 30	--	215
1965	April 10	8.22	927	1967	May 6	3.96	205
1979	April 19	9.51	734	1976	June 12	3.88	188
1970	April 25	7.45	603	1982	May 18	3.80	165
1960	April 11	7.42	570	1959	April 2	5.63	160
1969	April 9	7.80	528	1957	September 2	3.83	146
1962	August 10	6.22	422	1968	May 15	3.01	126
1955	April 1	6.88	392	1980	April 3	3.38	74.0
1978	April 6	4.97	380	1954	June 21	3.63	64.0
1956	April 26	5.96	340	1981	March 27	3.28	62.0
1971	April 9	5.63	337	1975	April 28	2.85	49.0
1966	May 4	6.26	329	1973	March 24	2.69	36.0
1977	May 29	4.93	267	1961	March 21	3.28	30.0
1972	March 16	4.85	230	1958	July 4	2.43	27.0
1974	April 13	8.10	220	1984	March 26	3.04	22.0
1963	June 3	4.94	218				

05089500 CART CREEK AT MOUNTAIN, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1954	--	--	--	--	--	--	--	--	--	0.568	0.065	0.257	--
1955	0.445	0.397	0.139	0	0.004	5.89	21.3	1.86	1.52	0.281	0	0	2.64
1956	0.348	0.140	0.187	0.226	0.262	0.106	32.7	16.8	3.37	1.46	0.810	0.857	4.75
1957	0.671	1.04	0.235	0.052	0	6.54	2.07	2.35	1.55	0.458	0.058	2.86	1.50
1958	0.616	0.573	0.384	0	0.079	0.465	1.19	0.526	0.347	0.816	0	0	0.418
1959	0	0.013	0	0	0	1.26	14.5	2.60	0.527	0.052	0	0	1.57
1960	0	0	0	0	0	0.677	32.2	2.39	0.623	0.019	0	0	2.95
1961	0	0	0	0	0	2.45	0.940	0.294	0.013	0	0	0	0.311
1962	0	0	0	0	0	0.006	28.5	9.55	8.37	1.09	2.10	0.273	4.14
1963	0.600	0.610	0.145	0	0	2.57	1.74	1.75	8.64	1.98	0.035	0	1.50
1964	0.116	0.280	0.165	0.100	0.100	0.100	11.1	3.46	25.5	2.51	0.242	1.62	3.74
1965	1.15	0.750	0.526	0.684	0.354	0.316	42.9	10.3	5.96	1.27	0.706	2.09	5.54
1966	1.63	1.15	1.10	0.586	0.629	6.02	18.0	16.9	2.94	3.20	1.54	0.457	4.53
1967	0.844	0.528	0.486	0.514	0.406	5.62	15.5	17.1	1.99	0.428	0.047	0.093	3.65
1968	0.384	0.593	0.076	0	0	5.78	3.41	4.58	1.10	0.744	0.714	0.523	1.50
1969	0.501	0.473	0.039	0	0	0	36.6	1.90	0.998	0.405	0.027	0	3.38
1970	0.234	0.279	0.079	0	0.002	0.027	27.4	10.1	2.29	0.670	0.020	0.046	3.41
1971	0.218	0.262	0.009	0	0	0.195	26.8	1.73	7.02	3.08	0.189	0.252	3.29
1972	0.441	0.619	0.049	0	0	13.5	14.5	2.26	0.280	0.162	0.052	0.019	2.66
1973	0.152	0.175	0	0	0	8.30	1.18	0.936	0.563	0.030	0.014	0.159	0.972
1974	1.05	0.228	0.071	0.010	0.005	0	45.2	21.0	3.22	0.663	0.385	0.332	6.00
1975	0.461	0.435	0.137	0.060	0.045	0.354	11.5	3.98	1.16	0.102	0	0	1.51
1976	0.095	0.122	0.003	0	0.121	0.516	14.0	0.770	3.35	0.073	0	0	1.56
1977	0	0.006	0	0	0	0.873	2.50	2.24	0.304	0.847	0.002	1.50	0.690
1978	0.895	0.267	0.323	0.245	0.200	1.63	31.0	7.62	1.10	0.475	0	0.031	3.63
1979	0.165	0.096	0	0	0	0	55.6	11.0	1.97	0.559	2.05	1.09	5.99
1980	0.557	0.529	0.122	0	0	0.717	11.1	0.760	0.347	0.254	3.37	5.39	1.92
1981	4.20	2.10	0.459	0.331	1.68	6.19	4.44	4.36	3.91	0.657	1.26	0.665	2.53
1982	3.54	0.921	0.339	0	0	6.36	6.49	8.02	2.95	1.52	0.505	0.346	2.60
1983	0.670	0.723	2.54	0.428	1.69	19.8	14.7	2.93	1.15	0.299	0	0.193	3.77
1984	0.335	0.367	0.055	0	0.027	3.46	4.69	1.04	0.475	0.161	0	0	0.883

05090000 PARK RIVER AT GRAFTON, ND

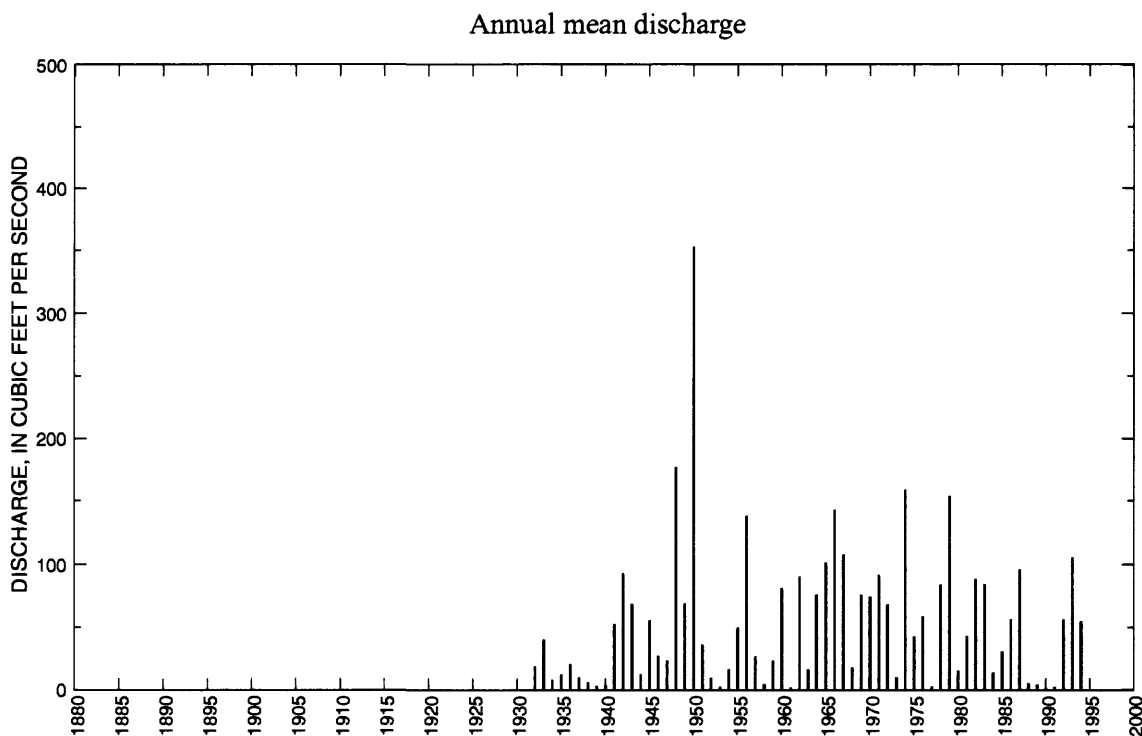
LOCATION.--Lat 48°25'29", long 97°24'42", in NE¹/₄ sec.13, T.157 N., R.53 W., Walsh County, Hydrologic Unit 09020310, on right bank just upstream of U.S. Highway 81 bridge in Grafton, and 3.5 mi downstream from South Branch.

DRAINAGE AREA.--695 mi², approximately.

PERIOD OF RECORD.--April 1931 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 811.00 ft above sea level. Prior to Oct.1, 1984, gage located on right bank 30 ft upstream of Wakeman Avenue bridge. Datum of gage was 807.39 ft. Prior to Sept. 30, 1940, nonrecording gage at site 30 ft downstream at same datum. Oct. 1, 1940, to Sept. 17, 1946, nonrecording gage at site 2 mi downstream above masonry dam at same datum. Sept. 18, 1946, to July 25, 1952, nonrecording gage at site 30 ft downstream at same datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,600 ft³/s, Apr. 19, 1950, gage height, 20.13 ft; no flow at times.



05090000 PARK RIVER AT GRAFTON, ND--Continued

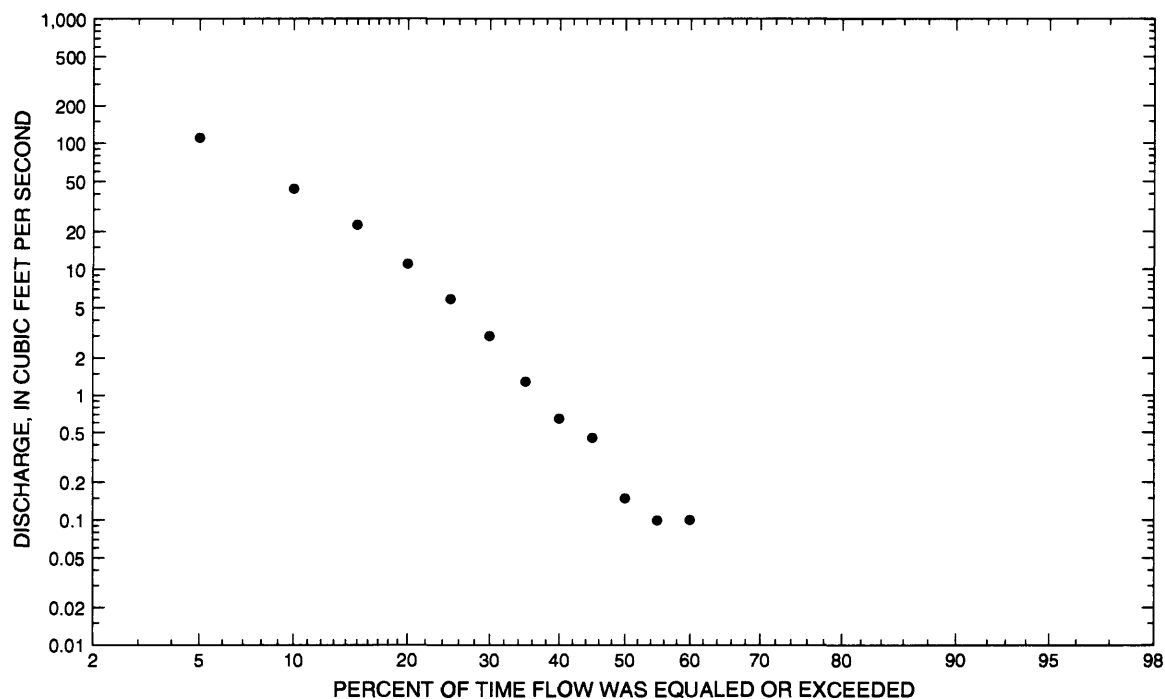
Pre-regulation period, 1932-49

Statistics of monthly and annual mean discharges, pre-regulation period

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	32.7	1942	0	m	2.07	7.65	3.70	0.44
November	14.5	1945	0	m	1.64	3.77	2.30	0.35
December	6.99	1945	0	m	0.770	1.79	2.31	0.17
January	0.484	1948	0	m	0.070	0.13	2.02	0.01
February	2.00	1932	0	m	0.160	0.47	2.97	0.03
March	410	1945	0	m	68.4	116	1.70	14.6
April	1,810	1948	5.40	1938	323	451	1.40	68.9
May	218	1948	2.05	1939	30.0	48.8	1.63	6.40
June	202	1943	0.347	1938	20.6	45.2	2.20	4.40
July	151	1943	0.013	1934	15.2	36.7	2.41	3.26
August	30.5	1948	0	m	3.97	7.81	1.97	0.85
September	31.8	1941	0	m	2.66	7.34	2.76	0.57
Annual	177	1948	3.11	1939	39.0	43.5	1.12	100

Annual flow duration



05090000 PARK RIVER AT GRAFTON, ND--Continued

Monthly and annual flow duration, in cubic feet per second, pre-regulation period

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.05	0.84	0	0	0	0	0	0	0	0
90	0	0	0	2.50	1.40	0.10	0	0	0	0	0	0	0
85	0	0	0	5.32	2.40	0.44	0	0	0	0	0	0	0
80	0	0	0	12.7	3.20	0.72	0	0	0	0	0	0	0
75	0	0	0	20.6	4.89	1.20	0	0	0	0	0	0	0
70	0	0	0	28.5	5.92	1.50	0.10	0	0	0	0	0	0
65	0	0	0	35.9	7.24	2.50	0.28	0	0	0	0	0	0
60	0	0	0.10	47.1	8.12	3.20	0.48	0	0	0	0	0	0.10
55	0	0	0.10	56.9	9.20	4.54	0.62	0.18	0	0	0.10	0	0.10
50	0	0	0.18	65.7	12.2	5.52	1.00	0.18	0	0.10	0.20	0	0.15
45	0	0	0.42	81.4	15.4	6.96	1.40	0.39	0.10	0.10	0.20	0	0.45
40	0	0	0.99	102	19.0	8.62	1.80	0.48	0.10	0.10	0.34	0.10	0.65
35	0	0.05	2.30	124	22.8	10.4	2.30	0.58	0.10	0.18	0.49	0.10	1.30
30	0	0.10	14.2	162	26.6	14.0	3.00	0.71	0.35	0.28	0.70	0.10	3.01
25	0	0.10	16.4	234	32.2	17.8	4.30	1.30	0.66	0.34	0.70	0.27	5.87
20	0.10	0.20	23.6	295	39.1	22.4	5.61	1.50	1.20	0.51	0.99	0.38	11.1
15	0.19	0.20	38.1	438	49.0	28.4	16.2	3.40	1.90	0.94	1.70	1.20	22.7
10	0.29	0.20	134	825	66.3	37.6	42.3	11.7	3.50	0.94	2.40	2.00	43.8
5	0.29	0.40	450	1,680	108	90.0	74.3	26.6	8.91	13.7	10.3	3.40	111

05090000 PARK RIVER AT GRAFTON, ND--Continued

Probability of occurrence of annual high discharges, pre-regulation period

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	70.9	62.7	47.6	26.4	16.3
0.95	1.05	148	123	94.8	55.9	34.3
0.90	1.11	221	178	139	83.8	51.3
0.80	1.25	358	284	222	138	83.9
0.50	2	909	722	565	362	217
0.20	5	2,340	1,940	1,510	974	572
0.10	10	3,840	3,320	2,560	1,650	953
0.04	25	6,550	6,010	4,580	2,900	1,650
0.02	50	9,260	8,900	6,720	4,200	2,370
0.01	100	12,700	12,700	9,540	5,880	3,270
0.005	200	16,900	17,800	13,200	8,010	4,400
0.002	500	23,900	ng	ng	ng	ng

Probability of occurrence of annual low discharges, pre-regulation period

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	0	0	0	0	0	0
0.10	10	ng	ng	ng	0	0	0	0	0	0
0.20	5	ng	ng	ng	0	0	0	0	0	0
0.50	2	ng	ng	ng	0	0	0	0	0.024	0.051

05090000 PARK RIVER AT GRAFTON, ND--Continued

Probability of occurrence of seasonal low discharges, pre-regulation period

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0.137
0.50	2	0	0	0	0	0	0	0.024	2.60
		June-July-August				September-October-November			
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0
		0	0	0.092	0.332	0	0	0	0

05090000 PARK RIVER AT GRAFTON, ND--Continued

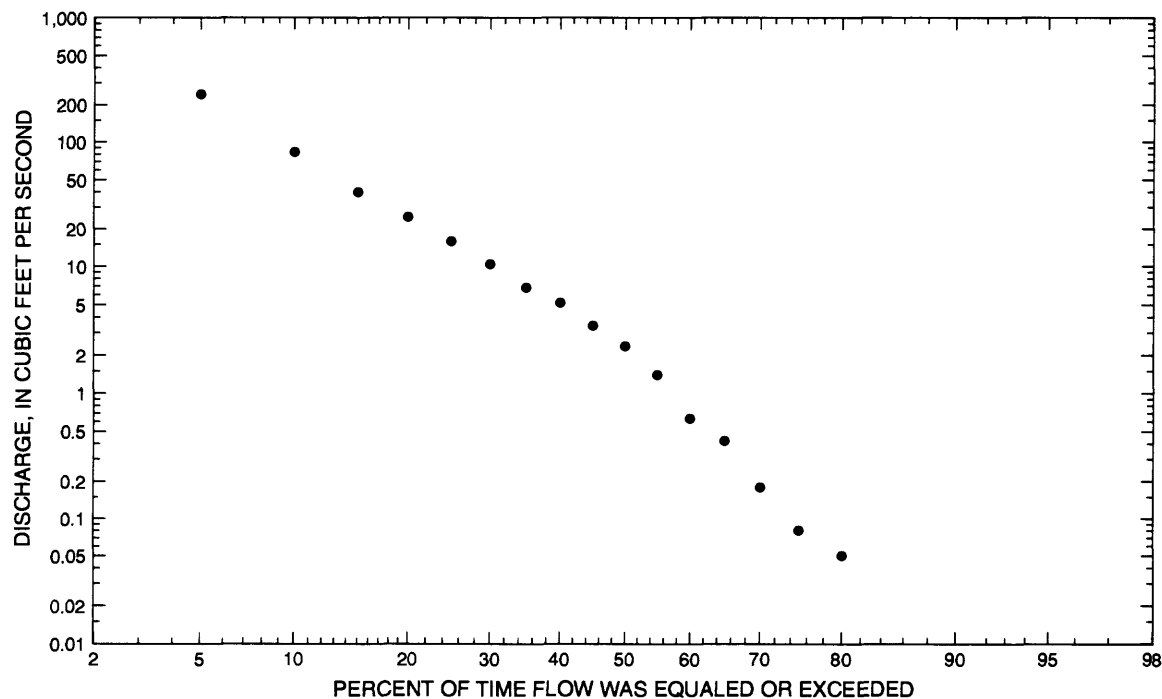
Post-regulation period, 1950-94

Statistics of monthly and annual mean discharges, post-regulation period

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	69.9	1983	0	m	6.41	14.4	2.25	0.86
November	31.3	1981	0	m	4.12	6.25	1.52	0.56
December	17.4	1983	0	m	2.89	4.09	1.41	0.39
January	13.9	1983	0	m	1.79	3.04	1.70	0.24
February	45.7	1981	0	m	3.04	7.09	2.33	0.41
March	400	1983	0	1991	62.8	106	1.69	8.47
April	2,050	1950	0	1991	407	456	1.12	54.9
May	2,070	1950	2.33	1961	140	330	2.36	19.9
June	576	1964	0	1961	54.2	93.5	1.72	7.30
July	398	1993	0	1990	32.0	71.6	2.23	4.32
August	569	1993	0	m	17.8	84.4	4.76	2.39
September	151	1957	0	m	9.59	26.0	2.71	1.29
Annual	353	1950	1.38	1990	61.7	63.1	1.02	100

Annual flow duration



05090000 PARK RIVER AT GRAFTON, ND--Continued

Monthly and annual flow duration, in cubic feet per second, post-regulation period

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	3.51	2.14	0.09	0	0	0	0	0	0	0
90	0	0	0	6.27	3.52	0.82	0.06	0	0	0	0	0	0
85	0	0	0.08	10.0	5.04	2.54	0.09	0	0	0	0	0	0
80	0	0	0.15	13.9	7.89	3.80	0.29	0	0	0	0.03	0.03	0.05
75	0	0	0.30	18.6	11.2	5.68	0.60	0.04	0	0	0.05	0.09	0.08
70	0	0.09	0.60	24.9	14.9	7.56	0.88	0.09	0.02	0.02	0.10	0.09	0.18
65	0.02	0.09	0.84	33.3	18.7	9.49	1.80	0.13	0.06	0.06	0.16	0.15	0.42
60	0.10	0.16	1.20	44.2	22.6	12.5	1.80	0.18	0.08	0.08	0.21	0.19	0.63
55	0.10	0.31	2.33	61.4	27.1	15.6	3.97	0.26	0.11	0.15	0.44	0.39	1.40
50	0.19	0.57	3.05	82.6	32.2	19.4	5.75	0.38	0.16	0.20	0.95	0.50	2.34
45	0.37	0.78	3.76	107	38.1	23.3	6.97	0.54	0.16	0.20	1.20	1.00	3.42
40	0.58	1.10	4.84	136	46.9	28.0	9.58	1.10	0.32	0.50	1.60	1.30	5.20
35	0.91	1.50	6.93	199	56.7	32.6	13.5	1.60	0.65	1.20	2.00	2.20	6.83
30	1.10	2.00	9.50	267	70.3	38.6	16.9	2.93	1.30	1.70	2.60	2.20	10.4
25	1.80	2.71	11.8	348	87.0	44.8	21.5	3.87	2.96	3.04	5.67	3.85	15.9
20	2.20	3.34	22.2	452	114	58.1	27.1	5.77	4.21	4.77	7.78	5.96	24.9
15	3.50	4.08	69.7	695	172	80.1	37.1	9.04	6.43	7.82	9.62	7.83	39.8
10	5.88	5.97	159	1,130	266	121	59.2	17.5	18.1	17.1	13.1	9.54	83.3
5	9.51	10.1	473	2,080	552	232	114	42.3	50.0	32.3	18.7	12.7	242

05090000 PARK RIVER AT GRAFTON, ND--Continued

Probability of occurrence of annual high discharges, post-regulation period

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	11.6	4.90	4.30	3.76	2.99
0.95	1.05	51.5	29.5	24.8	19.8	14.4
0.90	1.11	107	69.5	57.3	43.8	30.7
0.80	1.25	246	179	145	106	71.6
0.50	2	1,010	838	658	451	293
0.20	5	3,380	2,840	2,190	1,440	922
0.10	10	5,860	4,770	3,660	2,360	1,520
0.04	25	9,950	7,630	5,830	3,730	2,430
0.02	50	13,600	9,910	7,570	4,820	3,180
0.01	100	17,600	12,200	9,340	5,920	3,950
0.005	200	22,000	14,500	11,100	7,020	4,730
0.002	500	28,300	ng	ng	ng	ng

Probability of occurrence of annual low discharges, post-regulation period

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0	0.023
0.10	10	0	0	0	0	0	0	0	0.010	0.063
0.20	5	0	0	0	0	0	0	0.017	0.083	0.174
0.50	2	0	0	0	0	0.042	0.097	0.243	0.537	0.947

05090000 PARK RIVER AT GRAFTON, ND--Continued

Probability of occurrence of seasonal low discharges, post-regulation period

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0.059
0.10	10	0	0	0	0	0	0	0	0.250
0.20	5	0	0	0	0	0.029	0.036	0.085	0.980
0.50	2	0.009	0.073	0.074	0.140	0.691	0.945	1.23	7.33
		June-July-August				September-October-November			
		0	0	0	0	0	0	0	0
		0	0	0	0.007	0	0	0	0
		0	0	0	0.081	0	0	0	0
		0.045	0.120	0.217	0.812	0.026	¹ 0.032	0.038	0.088

¹Graphical interpretation.

05090000 PARK RIVER AT GRAFTON, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
¹ 1882	--	16.00	--	1962	April 20	18.27	5,900
¹ 1897	April 15	18.14	3,480	1963	June 6	8.78	344
¹ 1916	April	17.64	3,140	1964	June 20	14.01	2,140
1932	April 10	--	750	1965	April 13	18.21	5,710
1933	April 2	15.20	2,200	1966	April 4	16.08	2,790
1934	April 9	6.61	393	1967	May 9	14.46	2,290
1935	March 28	8.34	443	1968	March 28	9.85	630
1936	April 14	13.68	1,200	1969	April 13	18.13	4,990
1937	April 10	8.21	380	1970	April 29	12.09	1,520
1938	March 21	6.12	291	1971	April 10	16.42	3,600
1939	March 30	7.68	150	1972	April 14	14.30	2,150
1940	April 20	5.83	210	1973	March 27	8.82	251
1941	April 13	13.04	1,830	1974	April 16	17.03	3,660
1942	April 6	15.46	4,310	1975	April 17	11.10	900
1943	March 28	13.15	1,430	1976	April 4	14.06	2,000
1944	April 12	5.55	563	1977	May 5	7.57	40.0
1945	March 16	10.88	1,180	1978	April 8	17.10	3,700
1946	March 23	11.40	1,490	1979	April 22	19.56	8,740
1947	April 4	9.70	520	1980	April 7	9.09	399
1948	April 19	20.06	11,700	1981	April 3	9.51	471
1949	April 11	16.94	2,530	1982	April 1	12.26	1,420
1950	April 19	20.13	12,600	1983	March 7	12.34	1,360
1951	April 6	13.34	1,640	1984	March 27	8.72	269
1952	April 5	6.66	180	1985	March 19	9.74	1,000
1953	June 5	5.45	125	1986	March 24	9.48	859
1954	June 16	7.24	478	1987	April 7	13.44	3,220
1955	April 3	16.84	2,100	1988	April 6	7.79	143
1956	April 22	16.25	4,200	1989	April 24	7.79	143
1957	September 3	10.96	1,300	1990	April 21	7.28	24.0
1958	April 7	5.70	41.0	1991	May 23	7.47	48.0
1959	April 6	12.29	1,200	1992	March 8	9.90	1,030
1960	April 15	15.40	2,770	1993	July 30	12.22	2,420
1961	April 27	7.51	40.0	1994	March 22	10.49	800
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 19	20.13	12,600	1971	April 10	16.42	3,600
1948	April 19	20.06	11,700	¹ 1897	April 15	18.14	3,480
1979	April 22	19.56	8,740	1987	April 7	13.44	3,220
1962	April 20	18.27	5,900	¹ 1916	April	17.64	3,140
1965	April 13	18.21	5,710	1966	April 4	16.08	2,790
1969	April 13	18.13	4,990	1960	April 15	15.40	2,770
1942	April 6	15.46	4,310	1949	April 11	16.94	2,530
1956	April 22	16.25	4,200	1993	July 30	12.22	2,420
1978	April 8	17.10	3,700	1967	May 9	14.46	2,290
1974	April 16	17.03	3,660	1933	April 2	15.20	2,200

05090000 PARK RIVER AT GRAFTON, ND--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1972	April 14	14.30	2,150	1947	April 4	9.70	520
1964	June 20	14.01	2,140	1954	June 16	7.24	478
1955	April 3	16.84	2,100	1981	April 3	9.51	471
1976	April 4	14.06	2,000	1935	March 28	8.34	443
1941	April 13	13.04	1,830	1980	April 7	9.09	399
1951	April 6	13.34	1,640	1934	April 9	6.61	393
1970	April 29	12.09	1,520	1937	April 10	8.21	380
1946	March 23	11.40	1,490	1963	June 6	8.78	344
1943	March 28	13.15	1,430	1938	March 21	6.12	291
1982	April 1	12.26	1,420	1984	March 27	8.72	269
1983	March 7	12.34	1,360	1973	March 27	8.82	251
1957	September 3	10.96	1,300	1940	April 20	5.83	210
1936	April 14	13.68	1,200	1952	April 5	6.66	180
1959	April 6	12.29	1,200	1939	March 30	7.68	150
1945	March 16	10.88	1,180	1988	April 6	7.79	143
1992	March 8	9.90	1,030	1989	April 24	7.79	143
1985	March 19	9.74	1,000	1953	June 5	5.45	125
1975	April 17	11.10	900	1991	May 23	7.47	48.0
1986	March 24	9.48	859	1958	April 7	5.70	41.0
1994	March 22	10.49	800	1961	April 27	7.51	40.0
1932	April 10	--	750	1977	May 5	7.57	40.0
1968	March 28	9.85	630	1990	April 21	7.28	24.0
1944	April 12	5.55	563	¹ 1882	--	16.00	--

¹Determined by U.S. Army Corps of Engineers; not used in statistics.

050900000 PARK RIVER AT GRAFTON, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1931	--	--	--	--	--	--	--	12.5	3.04	0.984	0.194	0.100	--
1932	0.100	0.400	0.100	0	2.00	15.0	185.0	21.7	5.58	0.268	0	0	19.0
1933	1.00	0.800	0	0	0	40.0	411.4	22.3	12.2	0.500	0.200	0	40.3
1934	0	0	0	0	0.050	15.0	78.0	2.16	0.413	0.013	0	0.080	7.91
1935	0	0	0	0	0	68.9	65.9	6.07	3.91	2.00	0.500	0	12.3
1936	0	0	0	0	0	0	227.0	12.0	13.0	0.035	0	0	20.7
1937	0	0	0	0	0	0	90.2	21.1	3.69	4.75	1.17	0	10.0
1938	0	0	0	0	0	53.7	5.40	5.88	0.347	4.71	0	0	5.93
1939	0	0	0	0	0	8.77	23.7	2.05	2.83	0.123	0	0	3.11
1940	0	0	0	0	0	0	38.0	4.20	0.377	0.135	0.271	0	3.54
1941	0	0	0	0	0	0.377	577.3	17.6	12.0	1.48	0.232	31.8	52.7
1942	32.7	8.40	3.12	0	0	119.7	872.8	59.6	16.4	3.48	3.38	3.29	92.9
1943	0.274	0.727	0.045	0.097	0.107	256.4	170.1	30.1	202.3	150.6	12.7	0.253	68.9
1944	0.016	0.750	0.706	0.006	0	0.326	111.0	7.11	8.32	2.42	11.4	7.81	12.4
1945	0.835	14.5	6.99	0.265	0.229	410.0	134.3	56.7	31.5	7.34	0.845	0.610	55.9
1946	0.161	0.210	0.139	0.100	0.125	236.7	68.5	9.54	4.93	1.27	0.129	0.373	27.2
1947	0.381	0.190	0.039	0	0	4.74	169.8	9.75	20.8	62.0	12.7	3.74	23.6
1948	1.28	2.51	2.41	0.484	0.117	0.465	1,809	217.5	37.8	45.2	30.5	2.33	177.0
1949	0.484	1.03	0.384	0.226	0.200	0.310	768.8	51.4	11.5	2.28	1.15	0.060	69.0
1950	0.387	0.187	0.100	0.100	0.100	0.171	2,051	2,071	65.0	21.2	12.9	1.26	352.9
1951	2.18	1.61	2.11	1.10	0.568	12.1	331.1	33.8	6.43	0.706	2.98	41.3	36.0
1952	34.1	1.33	0.574	0.097	0	0.197	46.9	8.24	0.393	0.226	0	22.1	9.48
1953	0	0.027	0.806	0.206	0	2.22	8.09	5.26	10.1	1.15	0.048	0.197	2.34
1954	0.065	0.690	0.174	0.016	1.49	5.90	16.1	13.6	130.9	19.0	6.04	4.87	16.5
1955	4.87	3.92	1.17	0.200	0.200	0.800	445.3	46.4	76.8	10.5	1.30	11.8	49.8
1956	0.439	0	0	0	0	11.9	1,013	446.8	164.3	19.6	3.38	7.50	138.0
1957	7.23	8.14	3.09	1.58	5.45	57.5	48.0	22.8	10.4	1.88	4.66	151.2	26.7
1958	6.90	7.16	4.33	1.69	1.36	3.63	17.9	3.96	2.68	2.85	0.077	0	4.38
1959	1.26	0	0.190	0.400	0	0.661	243.0	27.0	5.85	3.28	0.032	0.007	23.2
1960	0	0.070	0.065	0.045	0.014	1.04	942.0	34.2	11.3	1.05	0.029	0.423	81.3
1961	0.526	0	0	0	0	3.17	12.6	2.33	0	0.058	0.052	0.040	1.56
1962	0.019	0.857	0.287	0.084	2.92	10.2	716.6	103.3	232.8	18.6	11.0	0.117	90.5
1963	0.248	0.483	0.081	0	0.239	30.3	25.7	8.74	105.3	17.2	8.83	0	16.4
1964	0.416	0.023	0	0.074	0.745	0.729	221.6	58.3	575.9	64.2	2.63	1.16	76.2
1965	6.69	1.99	0.400	0.110	1.48	5.83	892.6	162.7	85.2	22.0	9.93	37.8	101.4

050900000 PARK RIVER AT GRAFTON, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1966	46.1	15.7	9.72	2.09	0.193	297.6	637.5	441.0	84.9	136.0	33.3	2.03	142.9
1967	0.923	1.22	1.88	1.13	1.33	110.5	636.7	513.0	23.3	1.98	0.085	0	107.9
1968	0.032	0.130	0.050	0.024	1.68	83.4	46.4	50.9	23.2	9.40	0.263	0.107	18.1
1969	0.161	0.076	0.115	0.081	2.27	8.02	859.5	30.6	14.5	7.12	0.418	2.25	76.1
1970	0.438	0.089	2.47	0.268	0.125	0.597	633.7	207.7	38.7	15.0	0.291	0.010	74.5
1971	0.013	3.20	0.788	0.010	0.633	17.0	876.1	57.4	75.7	74.7	4.96	0.034	91.7
1972	5.34	6.67	0.426	0.002	3.86	320.9	417.4	57.2	9.56	0.218	0.024	1.91	68.5
1973	0.041	0.075	3.25	0.724	0.311	62.7	28.2	12.4	9.45	0.383	0.918	0.567	10.0
1974	5.47	5.51	7.41	1.60	1.82	8.50	1,078	687.7	100.7	5.58	4.54	0.762	158.7
1975	0.211	4.02	8.68	5.09	3.29	3.63	245.9	145.9	15.4	79.6	0.499	0.274	42.8
1976	0.797	7.36	6.97	5.17	4.55	33.8	542.4	26.7	81.7	3.69	0.400	0.375	58.7
1977	0.229	1.70	2.12	2.19	2.00	6.06	8.83	4.86	1.54	0.127	0.092	0.057	2.48
1978	0.210	2.41	2.50	2.40	1.45	19.8	864.6	98.9	22.4	4.61	0.349	2.02	84.3
1979	0.181	5.23	4.12	0.916	0.768	2.37	1,450	285.0	47.0	54.2	6.20	4.46	153.9
1980	0.311	5.57	4.28	2.44	1.32	2.29	92.4	12.3	24.5	0.669	2.01	39.6	15.4
1981	40.3	31.3	14.1	5.42	45.7	112.5	108.2	28.3	50.7	59.1	9.49	10.7	42.9
1982	8.76	7.50	6.29	5.39	3.38	29.0	497.5	111.5	98.0	254.3	38.6	1.47	88.5
1983	69.9	22.1	17.4	13.9	10.4	399.6	319.9	58.3	74.1	20.4	0.646	0.134	84.3
1984	1.29	4.95	0.974	0.471	1.71	36.7	77.6	21.1	17.1	2.25	1.27	0.059	13.7
1985	2.76	7.67	1.63	0	0.114	217.8	68.5	21.1	13.4	2.26	25.3	2.19	30.6
1986	10.2	7.19	1.27	8.25	11.2	228.1	195.2	106.9	18.2	55.4	23.2	8.35	56.5
1987	0.769	0.484	0.353	0.341	1.98	97.3	988.3	47.5	14.3	9.39	4.60	0.079	96.2
1988	0.072	0.090	0.191	0.116	0.737	3.85	42.6	7.89	5.52	0.980	0.182	0	5.13
1989	0.042	0.040	0.011	0	0.002	2.32	32.5	10.9	1.55	0.291	0.025	0.003	3.96
1990	0.005	0.432	0.093	0.018	0	0.359	9.60	4.42	1.66	0	0	0	1.38
1991	0	0	0	0	0	0	0	5.11	1.68	16.0	2.24	1.13	2.22
1992	1.24	4.49	8.97	10.1	4.74	357.7	217.6	36.1	23.3	5.57	4.35	0.208	56.4
1993	0	0.012	0.232	0.105	10.8	20.7	91.8	59.4	26.9	398.4	568.6	72.8	105.5
1994	27.3	13.8	10.5	6.58	5.85	199.0	221.5	109.5	36.2	21.2	2.10	0.127	54.7

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND

LOCATION.--Lat 48°34'20", long 97°08'50", in SE¹/₄SE¹/₄ SE¹/₄ sec.24, T.159 N., R.51 W., Pembina County, Hydrologic Unit 09020311, on downstream side of bridge on North Dakota State Highway 11, at the North Dakota-Minnesota border, 1.5 mi northeast of Drayton, and at mile 206.7.

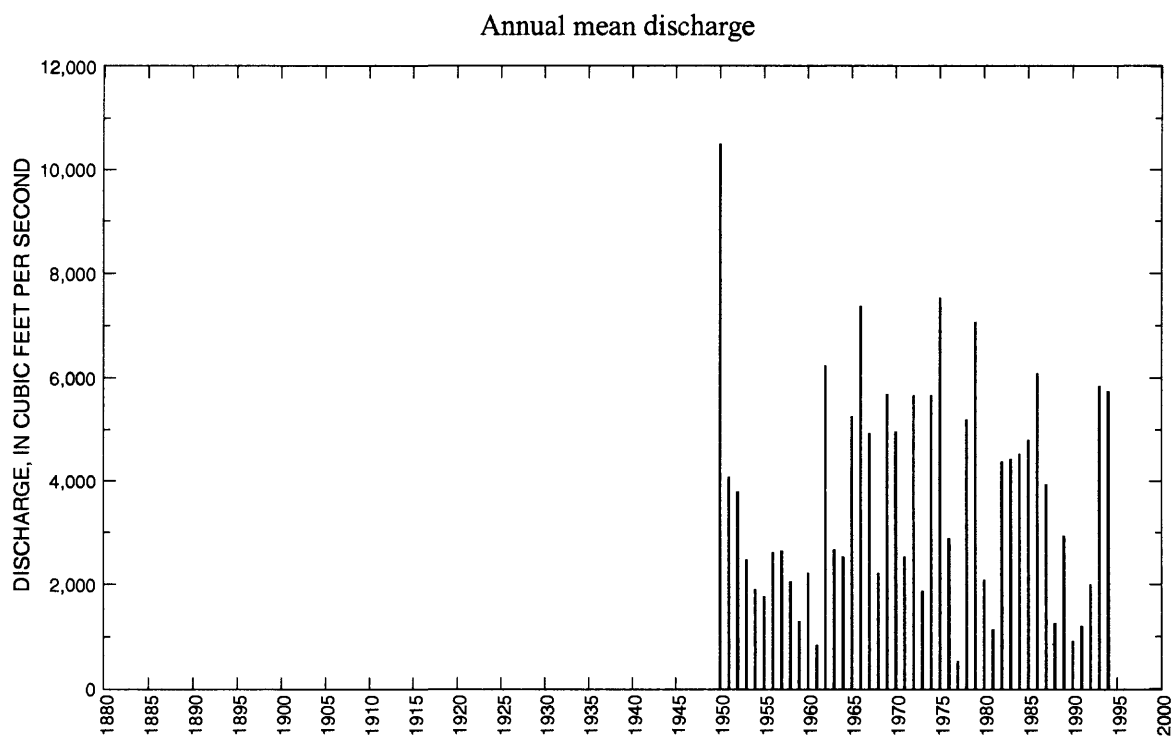
DRAINAGE AREA.--34,800 mi², approximately, includes 3,800 mi² in closed basins.

PERIOD OF RECORD.--April 1936 to June 1937, April 1941 to current year (fragmentary prior to April 1949).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 755.00 ft above sea level (Minnesota highway benchmark). Prior to Nov. 30, 1954, nonrecording gage at site 1.5 mi upstream at datum 1.59 ft higher.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 92,900 ft³/s, Apr. 28, 1979, gage height, 43.66 ft; minimum daily discharge, 7.7 ft³/s, Oct. 16, 1936, gage height, 1.75 ft.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1897 reached a stage of about 41 ft at site and datum in use prior to Nov. 30, 1954.

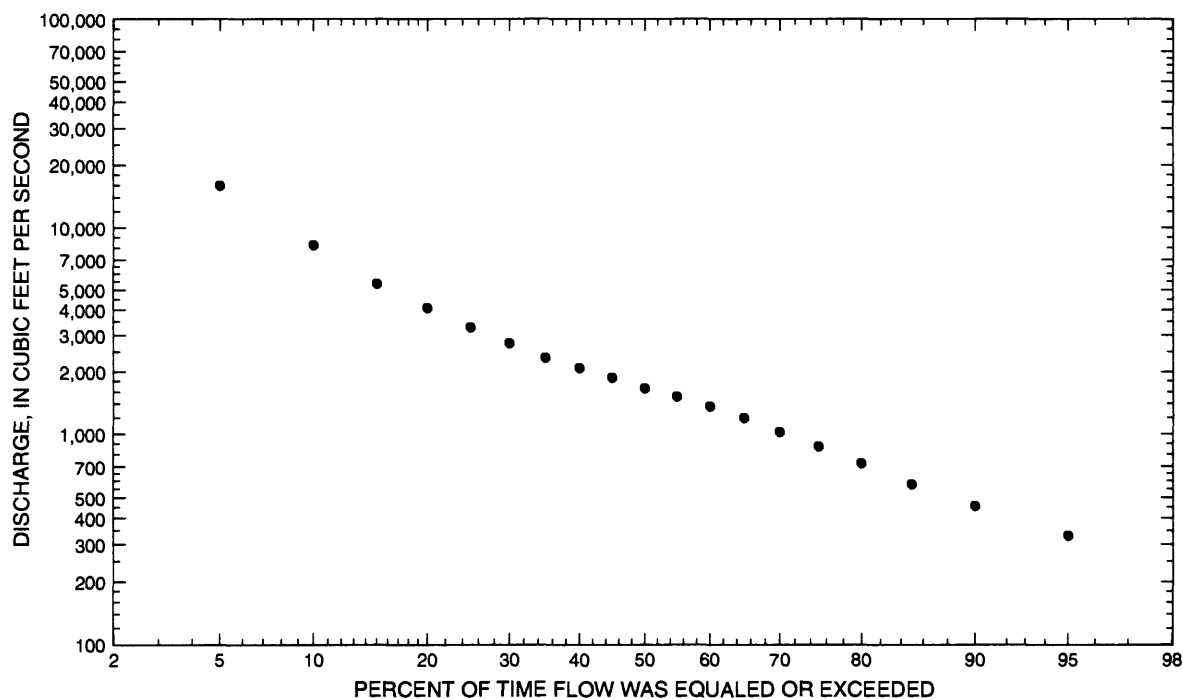


05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	4,460	1972	13.8	1937	1,700	1,270	0.75	3.89
November	5,650	1972	277	1977	1,460	1,010	0.69	3.36
December	3,070	1972	149	1977	1,180	713	0.61	2.69
January	2,060	1966	174	1990	1,040	584	0.56	2.37
February	1,880	1952	201	1977	1,010	534	0.53	2.32
March	9,330	1983	280	1962	2,620	2,380	0.91	6.01
April	38,400	1966	1,280	1981	13,200	9,460	0.72	30.2
May	58,900	1950	938	1977	7,900	9,630	1.22	18.1
June	23,400	1962	399	1936	5,010	4,170	0.83	11.5
July	28,200	1975	118	1936	4,410	4,650	1.05	10.1
August	21,600	1993	50.1	1936	2,350	3,210	1.37	5.39
September	7,910	1993	27.4	1936	1,790	1,480	0.82	4.11
Annual	10,500	1950	536	1977	3,740	2,190	0.59	100

Annual flow duration



05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	195	222	354	1,110	1,120	747	420	239	264	304	343	224	330
90	267	316	466	1,560	1,470	1,100	666	397	462	379	428	298	455
85	346	379	563	2,040	1,700	1,430	1,080	548	542	461	498	375	578
80	421	446	650	2,430	2,070	1,730	1,420	752	650	544	588	472	726
75	496	522	790	2,890	2,400	1,960	1,720	909	774	688	667	550	871
70	583	573	948	3,540	2,700	2,200	1,980	1,000	892	789	743	662	1,030
65	709	671	1,110	4,360	3,020	2,470	2,260	1,100	993	881	813	757	1,200
60	771	761	1,260	5,280	3,330	2,800	2,530	1,230	1,100	966	894	821	1,360
55	840	861	1,390	6,350	3,620	3,200	2,780	1,370	1,210	1,090	1,030	912	1,510
50	1,030	1,040	1,500	7,820	4,030	3,550	3,040	1,520	1,320	1,270	1,230	1,080	1,670
45	1,190	1,140	1,610	9,980	4,530	3,930	3,350	1,680	1,490	1,440	1,400	1,210	1,870
40	1,320	1,260	1,750	12,300	5,090	4,360	3,680	1,910	1,680	1,620	1,570	1,360	2,080
35	1,380	1,400	1,890	14,900	6,200	4,830	4,060	2,140	1,930	1,810	1,740	1,510	2,340
30	1,440	1,440	2,030	17,700	7,460	5,410	4,470	2,380	2,110	2,020	1,900	1,630	2,740
25	1,540	1,480	2,190	20,500	8,890	6,220	4,990	2,640	2,280	2,300	2,050	1,730	3,280
20	1,610	1,550	2,480	23,000	10,900	7,200	5,690	2,910	2,500	2,720	2,190	1,850	4,090
15	1,680	1,620	3,370	25,900	13,900	8,680	6,700	3,380	2,810	3,250	2,390	1,990	5,390
10	1,810	1,720	6,420	29,900	18,000	10,800	8,780	4,170	3,430	3,800	2,690	2,170	8,280
5	1,990	1,830	11,600	40,400	26,400	14,500	13,700	6,630	5,030	4,500	3,300	2,440	16,000

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	2,830	2,450	2,230	1,790	1,360
0.95	1.05	5,580	5,050	4,640	3,770	2,850
0.90	1.11	7,810	7,220	6,680	5,460	4,130
0.80	1.25	11,500	10,900	10,100	8,370	6,340
0.50	2	22,400	22,000	20,700	17,600	13,600
0.20	5	40,100	40,500	38,700	34,000	26,900
0.10	10	52,600	53,800	51,700	46,400	37,300
0.04	25	68,700	71,000	68,700	63,000	51,700
0.02	50	80,600	83,800	81,400	75,800	63,200
0.01	100	92,300	96,400	93,900	88,700	75,000
0.005	200	104,000	109,000	106,000	102,000	87,200
0.002	500	119,000	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	136	138	147	155	178	212	235	260	312
0.10	10	194	198	209	222	252	294	322	354	419
0.20	5	290	296	314	333	372	425	461	501	589
0.50	2	577	593	626	666	724	800	855	913	1,070

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	169	174	180	196	268	281	305	436		
0.10	10	248	257	265	285	363	383	417	576		
0.20	5	379	394	408	431	512	541	594	807		
0.50	2	759	793	820	849	916	971	1,080	1,530		
		June-July-August				September-October-November					
		0.05	20	161	183	200	233	183	211	230	308
		0.10	10	274	303	328	390	252	288	314	401
		0.20	5	482	522	561	676	363	412	449	548
		0.50	2	1,140	1,200	1,300	1,590	685	767	851	978

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1897	April	41.00	--	1967	April 8	36.70	32,200
1936	April 19	--	16,600	1968	July 23	20.41	12,500
1937	May 5	--	4,530	1969	April 19	41.08	59,000
1941	April 15	32.00	22,800	1970	April 29	38.20	31,700
1942	April 7	--	21,900	1971	April 11	29.50	23,400
1943	April 17	33.66	28,700	1972	April 20	34.75	31,100
1944	April 18	21.05	12,300	1973	March 25	24.49	13,400
1945	April 2	31.70	24,600	1974	April 25	--	43,900
1946	March 30	--	23,000	1975	May 4	39.80	44,000
1947	April 28	33.12	29,300	1976	April 7	35.00	27,600
1948	April 21	39.81	57,000	1977	April 9	12.12	3,400
1949	April 12	--	27,900	1978	April 16	41.19	56,200
1950	May 12	41.58	86,500	1979	April 28	43.66	92,900
1951	April 15	30.10	24,600	1980	April 10	29.00	22,400
1952	April 25	--	23,900	1981	July 3	13.96	7,520
1953	June 26	20.00	14,700	1982	April 17	36.78	35,500
1954	April 15	16.38	11,100	1983	April 9	30.88	21,300
1955	April 11	27.28	18,000	1984	April 6	--	32,400
1956	April 27	35.16	28,000	1985	May 21	28.12	17,700
1957	July 4	22.33	14,100	1986	April 7	36.59	29,700
1958	July 12	14.53	7,850	1987	April 7	36.61	27,600
1959	April 8	23.78	11,200	1988	April 7	22.12	13,900
1960	April 14	33.71	24,700	1989	April 19	39.35	41,800
1961	March 31	12.98	3,600	1990	April 7	15.54	5,080
1962	April 24	36.26	32,300	1991	July 11	13.26	4,940
1963	April 12	20.42	12,900	1992	March 16	23.28	8,800
1964	April 20	23.60	15,600	1993	August 14	36.48	27,600
1965	April 22	40.43	47,200	1994	April 6	33.57	27,900
1966	April 8	42.15	67,500				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 28	43.66	92,900	1970	April 29	38.20	31,700
1950	May 12	41.58	86,500	1972	April 20	34.75	31,100
1966	April 8	42.15	67,500	1986	April 7	36.59	29,700
1969	April 19	41.08	59,000	1947	April 28	33.12	29,300
1948	April 21	39.81	57,000	1943	April 17	33.66	28,700
1978	April 16	41.19	56,200	1956	April 27	35.16	28,000
1965	April 22	40.43	47,200	1949	April 12	--	27,900
1975	May 4	39.80	44,000	1994	April 6	33.57	27,900
1974	April 25	--	43,900	1976	April 7	35.00	27,600
1989	April 19	39.35	41,800	1987	April 7	36.61	27,600
1982	April 17	36.78	35,500	1993	August 14	36.48	27,600
1984	April 6	--	32,400	1960	April 14	33.71	24,700
1962	April 24	36.26	32,300	1945	April 2	31.70	24,600
1967	April 8	36.70	32,200	1951	April 15	30.10	24,600

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

Annual peak discharge and corresponding gage height—Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height—Continued							
1952	April 25	--	23,900	1963	April 12	20.42	12,900
1971	April 11	29.50	23,400	1968	July 23	20.41	12,500
1946	March 30	--	23,000	1944	April 18	21.05	12,300
1941	April 15	32.00	22,800	1959	April 8	23.78	11,200
1980	April 10	29.00	22,400	1954	April 15	16.38	11,100
1942	April 7	--	21,900	1992	March 16	23.28	8,800
1983	April 9	30.88	21,300	1958	July 12	14.53	7,850
1955	April 11	27.28	18,000	1981	July 3	13.96	7,520
1985	May 21	28.12	17,700	1990	April 7	15.54	5,080
1936	April 19	--	16,600	1991	July 11	13.26	4,940
1964	April 20	23.60	15,600	1937	May 5	--	4,530
1953	June 26	20.00	14,700	1961	March 31	12.98	3,600
1957	July 4	22.33	14,100	1977	April 9	12.12	3,400
1988	April 7	22.12	13,900	1897	April	41.00	--
1973	March 25	24.49	13,400				

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1936	--	--	--	--	--	--	5,768	1,826	398.9	117.8	50.1	27.4	--
1937	13.8	--	--	--	--	--	1,729	1,952	968.4	--	--	--	--
1941	--	--	--	--	--	--	--	--	--	--	--	--	--
1942	--	--	--	--	--	--	11,400	--	--	--	--	--	--
1943	--	--	--	--	--	--	--	--	--	--	--	--	--
1944	--	--	--	--	--	--	--	--	--	--	--	--	--
1945	--	--	--	--	--	--	15,870	6,780	3,504	--	--	--	--
1946	--	--	--	--	--	--	12,430	3,687	2,132	--	--	--	--
1947	--	--	--	--	--	--	--	10,360	11,140	5,267	1,762	--	--
1948	--	--	--	--	--	--	--	12,700	3,096	2,067	--	--	--
1949	--	--	--	--	--	--	11,440	2,977	5,460	3,425	3,265	1,737	--
1950	1,125	1,283	1,069	798.1	729.6	978.7	31,120	58,890	15,360	8,463	3,325	2,300	10,510
1951	2,954	1,987	2,013	1,974	1,830	2,281	17,170	9,022	4,466	2,441	1,245	1,711	4,085
1952	1,360	1,285	1,742	1,639	1,876	1,989	16,590	6,534	3,559	5,676	2,121	1,322	3,797
1953	906.5	812.3	695.5	599.7	619.3	1,669	3,643	3,068	8,839	5,236	2,229	1,320	2,472
1954	864.0	928.2	894.2	809.7	845.4	1,597	5,472	3,862	3,693	2,237	981.3	691.5	1,906
1955	658.3	730.7	683.2	722.6	652.5	661.0	7,273	2,084	3,016	2,271	1,684	862.7	1,771
1956	849.2	607.2	431.0	423.5	451.0	523.9	10,930	8,233	3,963	2,503	908.0	1,616	2,613
1957	599.2	1,080	562.9	441.0	426.8	1,320	4,856	3,728	3,833	6,863	2,614	5,392	2,649
1958	3,625	3,324	1,632	1,356	1,286	1,894	2,986	1,527	1,476	3,990	976.9	479.9	2,052
1959	416.1	498.1	362.3	368.4	382.9	775.8	5,005	1,769	2,587	2,132	776.5	547.8	1,300
1960	547.5	550.2	465.2	572.9	563.4	544.8	13,490	3,778	2,807	2,151	563.7	684.0	2,212
1961	345.2	489.7	356.5	337.1	336.4	1,667	2,097	2,375	1,060	472.0	260.6	368.2	849.5
1962	663.3	422.5	241.1	200.5	203.0	279.5	14,090	9,922	23,420	14,970	6,987	3,390	6,237
1963	2,379	2,114	1,602	1,343	1,120	1,743	6,430	3,511	6,511	2,850	1,172	1,197	2,662
1964	1,435	1,025	787.7	774.2	763.6	694.8	7,567	4,700	7,483	3,227	1,301	694.7	2,529
1965	1,770	1,313	843.3	884.8	872.9	987.4	25,310	13,030	9,178	5,034	2,042	1,915	5,256
1966	4,098	2,497	2,258	2,065	1,826	7,663	38,390	14,400	5,895	3,581	3,512	2,431	7,376
1967	1,847	1,729	1,576	1,710	1,550	2,213	22,710	14,520	5,993	3,278	1,315	876.2	4,939
1968	840.5	724.7	659.3	524.5	535.5	1,713	3,531	2,185	5,594	5,739	2,570	1,899	2,211
1969	1,600	1,865	1,660	1,525	1,576	2,153	27,480	18,730	5,060	3,548	1,666	1,471	5,693
1970	1,968	1,924	1,726	1,381	1,401	1,544	17,340	13,940	12,470	3,727	1,131	1,201	4,973
1971	1,105	1,357	1,096	1,065	1,131	2,640	11,130	3,480	2,429	2,471	1,135	1,413	2,532
1972	4,463	5,653	3,072	1,861	1,449	7,256	22,230	9,171	6,079	2,395	2,439	2,079	5,666
1973	1,775	1,473	1,149	1,126	1,197	6,106	2,450	1,575	1,200	578.7	801.9	3,008	1,874

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1974	4,412	2,707	2,014	1,744	1,672	2,016	18,950	18,260	7,633	3,297	3,232	1,967	5,668
1975	1,951	2,079	1,284	1,329	1,435	1,686	16,280	22,890	5,971	28,240	4,003	2,479	7,527
1976	2,364	2,573	1,724	1,630	1,729	3,298	13,300	3,016	1,914	1,359	1,163	712.8	2,886
1977	375.1	276.6	149.3	197.4	201.4	428.5	1,793	938.1	676.4	638.6	243.3	521.0	536.3
1978	1,287	1,121	1,449	1,343	1,124	2,171	36,740	7,427	3,798	3,710	1,537	1,074	5,206
1979	986.1	813.6	797.1	725.2	723.2	879.7	29,260	32,090	6,653	6,268	3,341	2,097	7,076
1980	1,661	1,800	1,491	1,388	1,463	1,654	10,040	2,072	1,532	758.1	488.8	846.2	2,087
1981	556.1	650.7	411.0	304.2	339.6	1,233	1,275	1,365	1,311	2,765	1,509	1,897	1,140
1982	2,571	1,903	1,186	1,112	1,041	1,946	23,650	7,805	3,705	4,246	2,292	1,263	4,386
1983	4,272	2,457	2,114	1,607	1,471	9,329	10,940	3,388	5,122	6,550	2,886	2,941	4,437
1984	2,195	1,978	1,805	1,581	1,582	4,443	19,240	4,246	11,920	3,331	1,442	975.3	4,534
1985	2,208	2,152	1,540	1,326	1,323	6,441	5,751	9,248	8,252	6,962	7,247	4,909	4,803
1986	3,845	2,428	2,313	1,977	1,681	5,311	21,630	16,860	6,437	4,764	2,715	2,993	6,090
1987	3,496	2,037	2,339	1,845	1,673	7,776	15,170	3,427	2,984	2,865	2,502	1,096	3,938
1988	763.6	767.4	695.9	461.5	513.1	2,419	6,250	1,427	946.4	347.7	274.5	328.7	1,262
1989	350.0	332.2	271.0	269.5	356.4	424.8	23,900	4,576	2,292	1,145	451.5	1,048	2,930
1990	474.4	450.9	285.2	174.4	251.8	1,117	2,848	1,513	1,989	1,109	434.7	364.4	917.6
1991	316.6	336.5	245.3	187.0	289.6	680.2	1,894	2,746	2,056	3,179	1,104	1,405	1,208
1992	792.4	593.9	521.7	520.7	500.4	4,887	4,205	2,657	2,176	2,984	1,556	2,557	2,000
1993	1,142	729.2	821.0	813.0	998.0	1,572	15,000	3,915	4,585	10,760	21,580	7,912	5,845
1994	3,800	2,029	1,858	1,539	1,488	7,433	15,550	6,835	6,070	13,920	3,986	4,211	5,748

05092200 PEMBINA COUNTY DRAIN 20 NEAR GLASSTON, ND

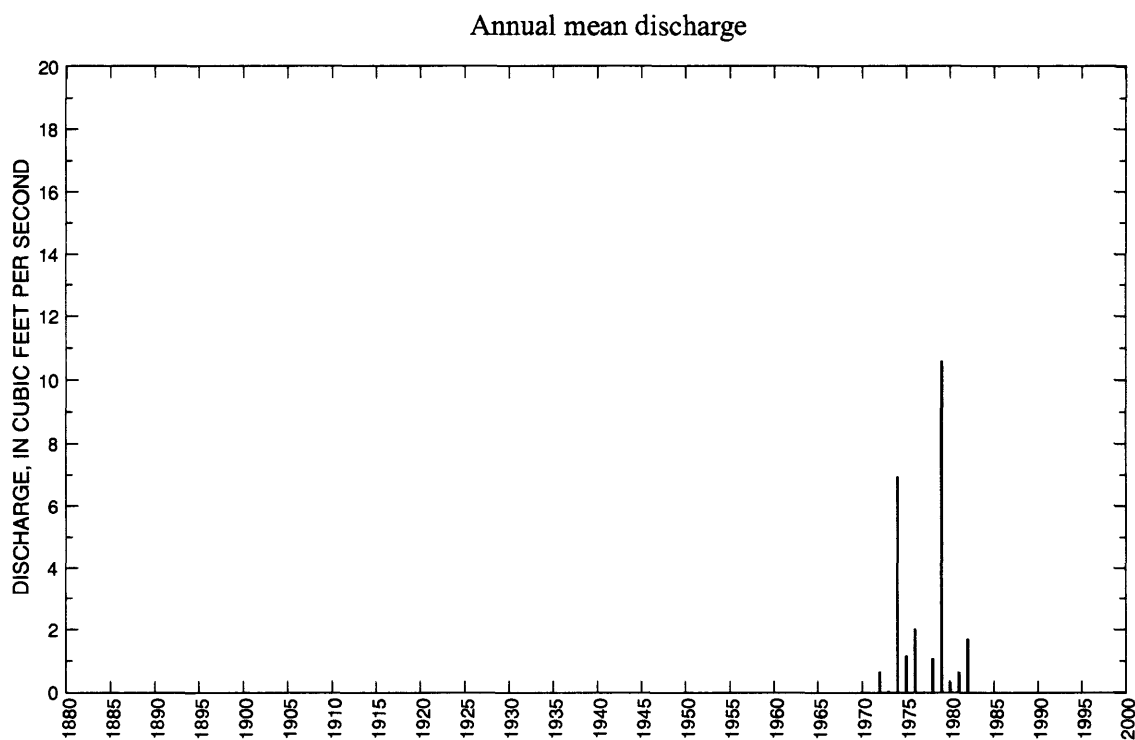
LOCATION.--Lat 48°41'49", long 97°23'03", in NW¹/₄ sec.8, T.160 N., R.52 W., Pembina County, Hydrologic Unit 09020311, on left bank 50 ft downstream from bridge on county highway, and 3 mi southeast of Glasston.

DRAINAGE AREA.--80 mi².

PERIOD OF RECORD.--October 1971 to September 1986. Seasonal records only since 1983.

GAGE.--Water-stage recorder. Datum of gage is 808 ft above sea level, from topographic map.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 940 ft³/s, Apr. 20, 1979, gage height, 9.3 ft; maximum gage height, 14.64 ft, Apr. 19, 1979, backwater from ice; no flow most of time.



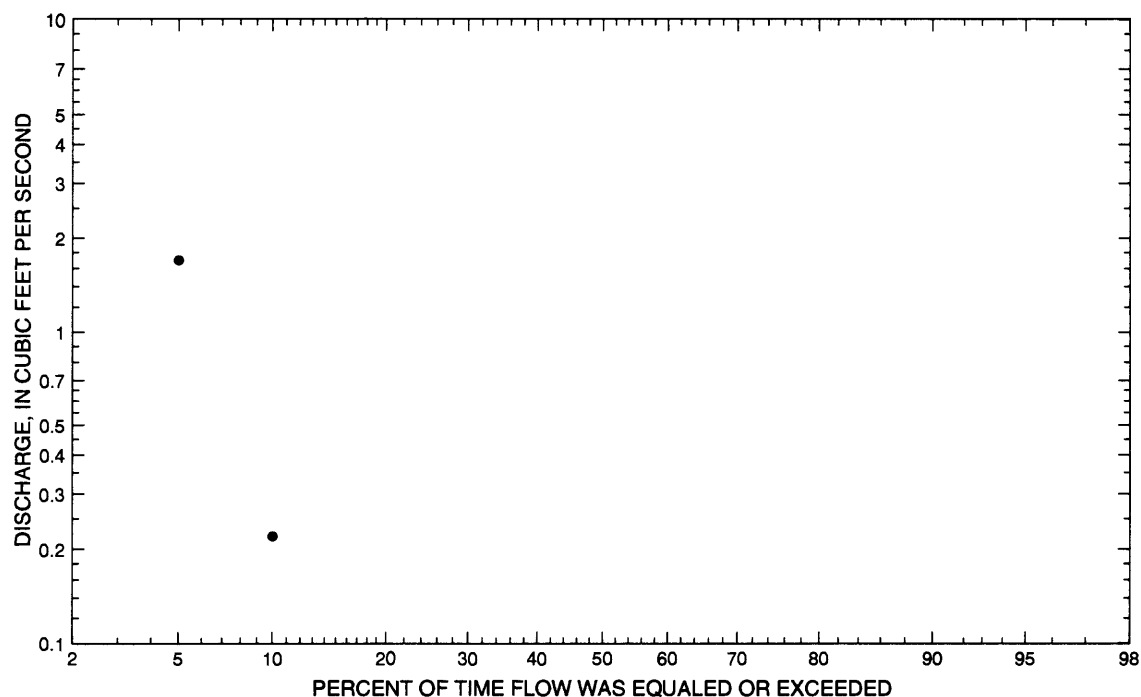
05092200 PEMBINA COUNTY DRAIN 20 NEAR GLASSTON, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence; ng, statistic not given]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	0.224	1981	0	m	0.030	0.07	2.40	0.11
November	0.125	1981	0	m	0.010	0.04	3.32	0.04
December	0	m	0	m	0	0	ng	0
January	0	m	0	m	0	0	ng	0
February	0	m	0	m	0	0	ng	0
March	7.92	1985	0	m	2.03	2.54	1.26	7.83
April	124	1979	0	m	19.6	32.5	1.66	75.7
May	38.1	1974	0	m	3.21	9.74	3.03	12.4
June	2.36	1983	0	m	0.370	0.64	1.73	1.43
July	6.17	1986	0	m	0.450	1.58	3.53	1.74
August	1.27	1985	0	m	0.100	0.32	3.15	0.40
September	0.670	1985	0	m	0.080	0.18	2.29	0.31
Annual	10.6	1979	0.005	1977	2.29	3.37	1.47	100

Annual flow duration



05092200 PEMBINA COUNTY DRAIN 20 NEAR GLASSTON, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0.16	0	0	0	0	0	0	0	0	0
50	0	0	0	0.43	0	0	0	0	0	0	0	0	0
45	0	0	0	0.86	0	0	0	0	0	0	0	0	0
40	0	0	0	1.20	0	0	0	0	0	0	0	0	0
35	0	0	0	1.70	0	0	0	0	0	0	0	0	0
30	0	0	0	3.34	0.02	0	0	0	0	0	0	0	0
25	0	0	0	6.90	0.25	0.02	0	0	0	0	0	0	0
20	0	0	0	15.3	0.61	0.09	0	0	0	0	0	0	0
15	0	0	0.37	24.8	1.50	0.36	0	0	0	0	0	0	0
10	0	0	4.32	49.7	2.70	0.70	0.07	0	0.09	0.08	0	0	0.22
5	0	0	17.4	92.3	13.8	1.40	0.43	0.21	0.44	0.16	0.03	0	1.70

05092200 PEMBINA COUNTY DRAIN 20 NEAR GLASSTON, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	0.029	0.014	0.005	0.005
0.95	1.05	ng	0.449	0.250	0.112	0.085
0.90	1.11	15.7	1.60	0.946	0.467	0.310
0.80	1.25	28.8	6.21	3.90	2.11	1.24
0.50	2	85.6	50.0	33.7	19.8	10.4
0.20	5	232	219	151	88.2	46.5
0.10	10	376	384	264	149	81.7
0.04	25	614	609	415	224	129
0.02	50	830	768	517	271	163
0.01	100	1,080	909	607	308	192
0.005	200	1,360	1,030	682	338	218
0.002	500	1,780	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	ng	ng
0.10	10	ng	ng	ng	ng	ng	ng	ng	ng	ng
0.20	5	ng	ng	ng	ng	ng	ng	ng	ng	ng
0.50	2	ng	ng	ng	ng	ng	ng	ng	ng	ng

05092200 PEMBINA COUNTY DRAIN 20 NEAR GLASSTON, ND--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	ng	ng	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	0
Non-exceedance probability	Recurrence interval (years)	June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	ng	ng	ng	ng	ng	ng	ng	ng
0.10	10	ng	ng	ng	ng	ng	ng	ng	ng
0.20	5	ng	ng	ng	ng	ng	ng	ng	ng
0.50	2	ng	ng	ng	ng	ng	ng	ng	ng

05092200 PEMBINA COUNTY DRAIN 20 NEAR GLASSTON, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1972	April 13	6.02	85.0	1980	March 30	8.92	40.0
1973	June 19	3.94	4.60	1981	April 1	6.53	80.0
1974	April 23	7.19	212	1982	April 13	--	90.0
1975	April 30	5.70	73.0	1983	April 4	7.95	166
1976	April 3	7.10	268	1984	March 29	8.66	88.0
1977	July 2	4.72	2.20	1985	March 14	11.25	59.0
1978	March 27	11.60	73.0	1986	July 12	7.50	90.0
1979	April 20	9.30	940				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 20	9.30	940	1981	April 1	6.53	80.0
1976	April 3	7.10	268	1975	April 30	5.70	73.0
1974	April 23	7.19	212	1978	March 27	11.60	73.0
1983	April 4	7.95	166	1985	March 14	11.25	59.0
1982	April 13	--	90.0	1980	March 30	8.92	40.0
1986	July 12	7.50	90.0	1973	June 19	3.94	4.60
1984	March 29	8.66	88.0	1977	July 2	4.72	2.20
1972	April 13	6.02	85.0				

05092200 PEMBINA COUNTY DRAIN 20 NEAR GLASSTON, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1972	0	0	0	0	0	0	7.93	0	0	0	0	0	0.650
1973	0	0	0	0	0	0.214	0	0	0.242	0	0	0	0.038
1974	0	0	0	0	0	0	44.7	38.1	0.436	0	0	0	6.95
1975	0	0	0	0	0	0	10.0	3.88	0	0	0	0	1.16
1976	0	0	0	0	0	0.355	24.2	0	0	0	0	0	2.02
1977	0	0	0	0	0	0	0	0.003	0.001	0.014	0	0.047	0.005
1978	0.049	0	0	0	0	5.35	7.46	0.031	0	0	0	0.057	1.08
1979	0	0	0	0	0	0	123.8	3.55	0.811	0.078	0.119	0.107	10.6
1980	0	0	0	0	0	1.58	1.68	0	0.014	0	0.079	0.329	0.306
1981	0.224	0.125	0	0	0	2.24	3.95	0.147	1.06	0.044	0.012	0	0.648
1982	0.035	0	0	0	0	1.39	18.4	0.279	0.173	0.326	0	0	1.70
1983	--	--	--	--	--	3.62	45.4	0.050	2.36	0.071	0	0	--
1984	--	--	--	--	--	1.82	1.38	0.003	0.409	0	0	0	--
1985	--	--	--	--	--	7.92	1.13	0.055	0.006	0.036	1.27	0.670	--
1986	--	--	--	--	--	5.90	4.09	2.10	0.051	6.17	0.066	0	--

05093000 SOUTH BRANCH TWO RIVERS AT PELAN, MN

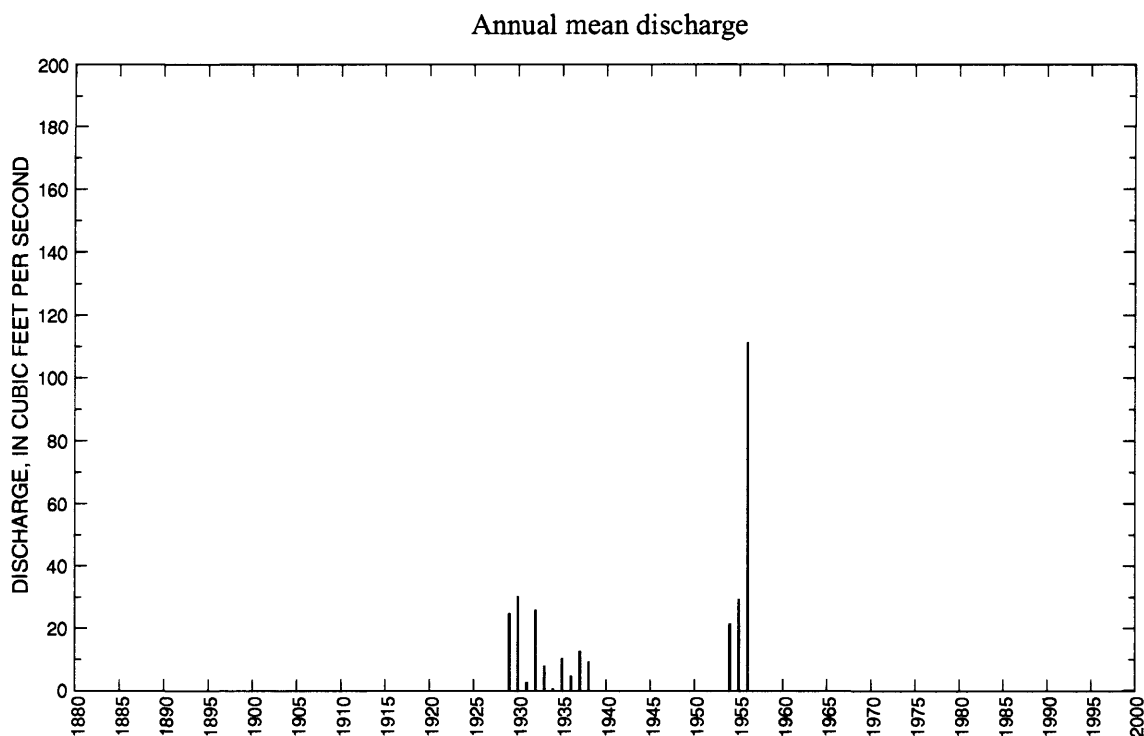
LOCATION.--Lat 48°38'45", long 96°23'15", in NW¹/₄ sec.31, T.160 N., R.44 W., Kittson County, Hydrologic Unit 09020312, on left bank 40 ft downstream from bridge on State Highway 11 and 0.25 mi west of Pelan.

DRAINAGE AREA.--281 mi².

PERIOD OF RECORD.--August 1928 to September 1938, October 1953 to November 1956. Monthly discharge only for some periods, published in WSP 1308. Published as South Fork Two Rivers at Pelan 1928-38.

GAGE.--Water-stage recorder. Datum of gage is 1,028.23 ft above mean sea level. Prior to Mar. 24, 1936, chain gage at site 500 ft upstream at same datum. Mar. 24, 1936, to Sept. 30, 1938, chain gage at site 40 ft upstream at same datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,040 ft³/s, July 10, 1956, gage height, 10.90 ft; no flow at times each year.



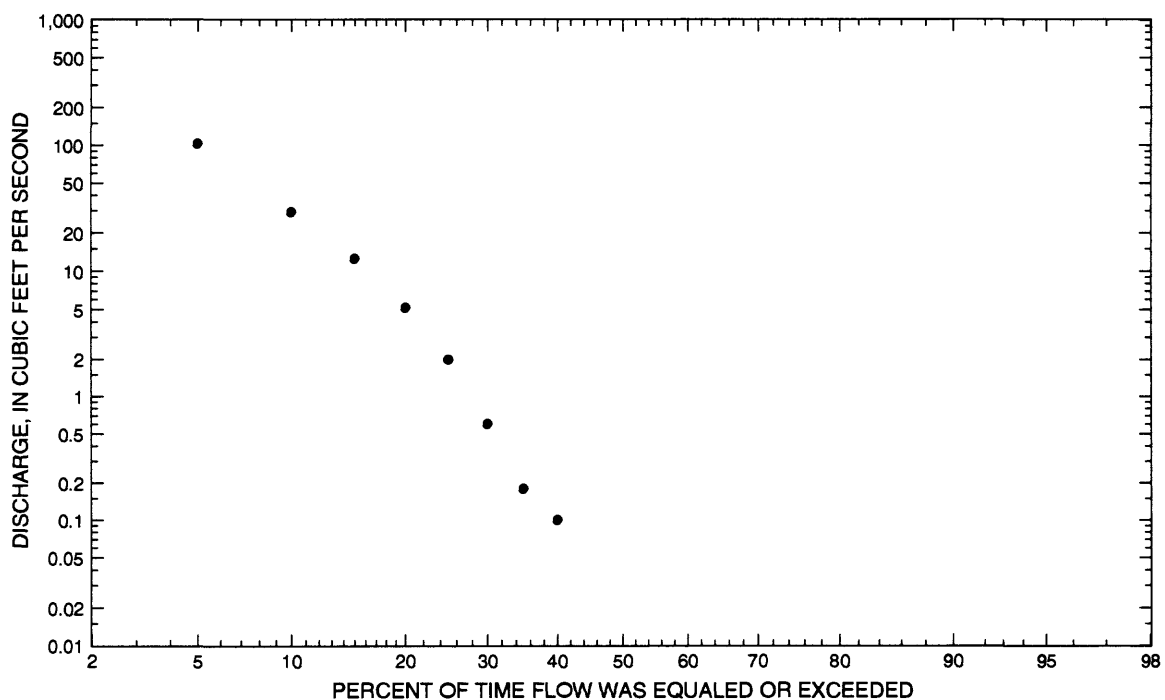
05093000 SOUTH BRANCH TWO RIVERS AT PELAN, MN--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence; ng, statistic not given]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	5.22	1929	0	m	0.670	1.57	2.35	0.24
November	54.9	1957	0	m	4.12	14.6	3.55	1.50
December	1.00	1929	0	m	0.090	0.28	3.14	0.03
January	0	m	0	m	0	0	ng	0
February	0	m	0	m	0	0	ng	0
March	193	1929	0	m	17.5	53.0	3.03	6.36
April	345	1956	7.40	1938	89.8	97.1	1.08	32.6
May	278	1930	0.477	1934	68.2	80.7	1.18	24.7
June	243	1955	0.040	1934	32.8	68.1	2.08	11.9
July	699	1956	0	1934	55.8	193	3.46	20.2
August	18.2	1956	0	m	2.75	6.18	2.25	1.00
September	43.5	1956	0	m	3.97	11.8	2.97	1.44
Annual	111	1956	0.766	1934	22.5	28.6	1.27	100

Annual flow duration



05093000 SOUTH BRANCH TWO RIVERS AT PELAN, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0.05	0	0.50	0	0	0	0	0	0	0	0
90	0	0	0.05	0.32	1.10	0	0	0	0	0	0	0	0
85	0	0	0.05	1.00	3.10	0.17	0	0	0	0	0	0	0
80	0	0	0.05	1.80	4.70	0.30	0	0	0	0	0	0	0
75	0	0	0.05	3.70	5.90	0.40	0	0	0	0	0	0	0
70	0	0	0.05	5.97	7.76	0.69	0	0	0	0	0	0	0
65	0	0	0.05	12.0	9.12	1.20	0	0	0	0	0	0	0
60	0	0	0.05	21.3	10.4	2.10	0.10	0	0	0	0	0	0
55	0	0	0.05	27.8	12.9	2.10	0.18	0	0	0	0	0	0
50	0	0	0.05	34.5	15.7	3.74	0.33	0	0	0	0	0	0
45	0	0	0.05	41.6	18.2	4.26	0.60	0	0	0	0	0	0
40	0	0	0.05	49.3	21.8	5.24	0.60	0.10	0	0	0	0	0.10
35	0	0	0.05	57.2	26.5	7.92	1.10	0.10	0	0	0	0	0.18
30	0	0	0.05	72.6	36.4	12.6	1.50	0.25	0	0	0	0	0.60
25	0	0	0.05	95.4	55.2	15.8	2.00	0.78	0	0.10	0.10	0	2.00
20	0	0	0.05	122	78.7	19.0	4.32	1.10	0.10	0.80	0.25	0	5.18
15	0	0	1.90	152	128	30.7	8.34	5.55	0.48	0.80	0.49	0.10	12.6
10	0	0	10.5	184	179	56.0	18.0	9.55	6.21	2.90	1.90	0.10	29.4
5	0	0	78.7	353	293	203	373	17.3	19.0	4.90	15.3	0.20	104

05093000 SOUTH BRANCH TWO RIVERS AT PELAN, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	20.4	18.0	13.9	7.56	3.95
0.95	1.05	52.5	45.7	37.4	22.8	13.4
0.90	1.11	84.9	73.6	61.4	39.2	24.0
0.80	1.25	149	129	109	72.4	45.9
0.50	2	410	358	301	205	132
0.20	5	1,040	931	748	496	306
0.10	10	1,650	1,490	1,160	742	439
0.04	25	2,620	2,430	1,790	1,090	609
0.02	50	3,500	3,290	2,330	1,370	731
0.01	100	4,500	4,290	2,930	1,650	846
0.005	200	5,620	5,450	3,590	1,940	954
0.002	500	7,310	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	ng	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	ng	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	ng	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	ng	0

05093000 SOUTH BRANCH TWO RIVERS AT PELAN, MN--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	ng	ng	ng	ng	ng	ng	ng	0		
0.10	10	ng	ng	ng	ng	ng	ng	ng	0		
0.20	5	ng	ng	ng	ng	ng	ng	ng	0		
0.50	2	ng	ng	ng	ng	ng	ng	ng	0		
		June-July-August				September-October-November					
		0.05	20	ng	ng	0	0	ng	ng	ng	ng
		0.10	10	ng	ng	0	0	ng	ng	ng	ng
		0.20	5	ng	ng	0	0	ng	ng	ng	ng
		0.50	2	ng	ng	0	0.017	ng	ng	ng	ng

05093000 SOUTH BRANCH TWO RIVERS AT PELAN, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1929	March 21	6.40	718	1936	April 20	3.25	178
1930	May 13	10.18	1,810	1937	May 3	5.00	506
1931	April 7	--	77.0	1938	May 13	4.04	285
1932	April 9	8.02	1,140	1954	June 18	3.70	266
1933	April 3	4.90	242	1955	June 7	8.07	1,040
1934	April 8	2.44	46.0	1956	July 10	10.90	2,040
1935	March 29	5.24	242				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1956	July 10	10.90	2,040	1954	June 18	3.70	266
1930	May 13	10.18	1,810	1933	April 3	4.90	242
1932	April 9	8.02	1,140	1935	March 29	5.24	242
1955	June 7	8.07	1,040	1936	April 20	3.25	178
1929	March 21	6.40	718	1931	April 7	--	77.0
1937	May 3	5.00	506	1934	April 8	2.44	46.0
1938	May 13	4.04	285				

05093000 SOUTH BRANCH TWO RIVERS AT PELAN, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1928	--	--	--	--	--	--	--	--	--	--	16.3	11.7	--
1929	5.22	2.15	1.00	0	0	192.9	64.5	19.6	9.30	0.977	0.013	0	24.9
1930	0	0	0	0	0	0	67.7	277.8	9.33	5.58	0.023	0	30.4
1931	0	0	0	0	0	4.57	18.2	6.75	2.73	0.858	0.203	0	2.77
1932	0	0	0	0	0	0.613	239.2	72.5	1.03	0.242	1.85	0.143	26.1
1933	0.100	0	0	0	0	3.92	80.0	8.48	3.98	0.016	0	0	7.97
1934	0	0	0	0	0	0	8.79	0.477	0.040	0	0	0	0.766
1935	0	0	0	0	0	21.7	85.0	17.2	2.47	0.287	0	0	10.5
1936	0	0	0	0	0	0	52.2	6.67	0.270	0	0	0	4.87
1937	0	0	0	0	0	0	23.9	111.8	6.98	8.53	0.952	0	12.8
1938	0	0	0	0	0	4.01	7.40	92.2	6.68	0.039	0	0	9.33
1954	0.800	0.467	0.100	0	0	0	97.9	73.4	82.9	4.15	0.910	0.170	21.6
1955	0	0.047	0.023	0	0	0	76.9	32.3	243.4	5.54	0.048	0.020	29.5
1956	0.019	0.113	0.016	0	0	0	345.0	167.1	56.7	698.9	18.2	43.5	111.4
1957	3.25	54.9	--	--	--	--	--	--	--	--	--	--	--

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN

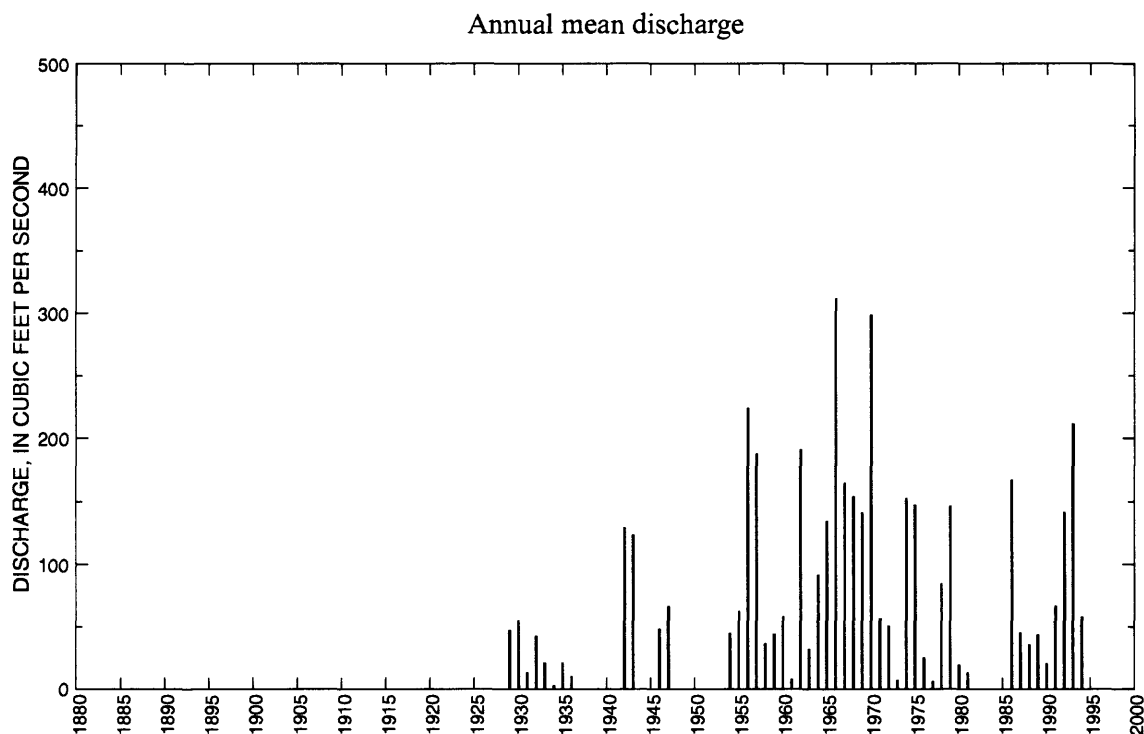
LOCATION.--Lat 48°43'50", long 96°39'50", in SW¹/₄SW¹/₄ sec.30, T.161 N., R.46 W., Kittson County, Hydrologic Unit 09020312, on left bank 70 ft upstream from culvert on U.S. Highway 59 at Lake Bronson and 3.4 mi downstream from dam at outlet of Bronson Lake.

DRAINAGE AREA.--444 mi².

PERIOD OF RECORD.--September 1928 to November 1936, April to September 1937, April 1941 to October 1943, April to December 1944, April 1945 to September 1947, October 1953 to September 1981, April 1985 to current year. Monthly discharge only for some periods, published in WSP 1308. October 1981 to March 1985, annual maximums only. Published as South Fork Two Rivers at Bronson prior to 1941.

GAGE.--Water-stage recorder. Datum of gage is 928.53 ft above mean sea level (Minnesota Department of Transportation benchmark). Prior to Nov. 23, 1953, nonrecording gage at bridge 100 ft downstream at datum 2.00 ft higher. Nov. 23, 1953, to Oct. 5, 1963, water-stage recorder at same site at datum 2.00 ft higher.

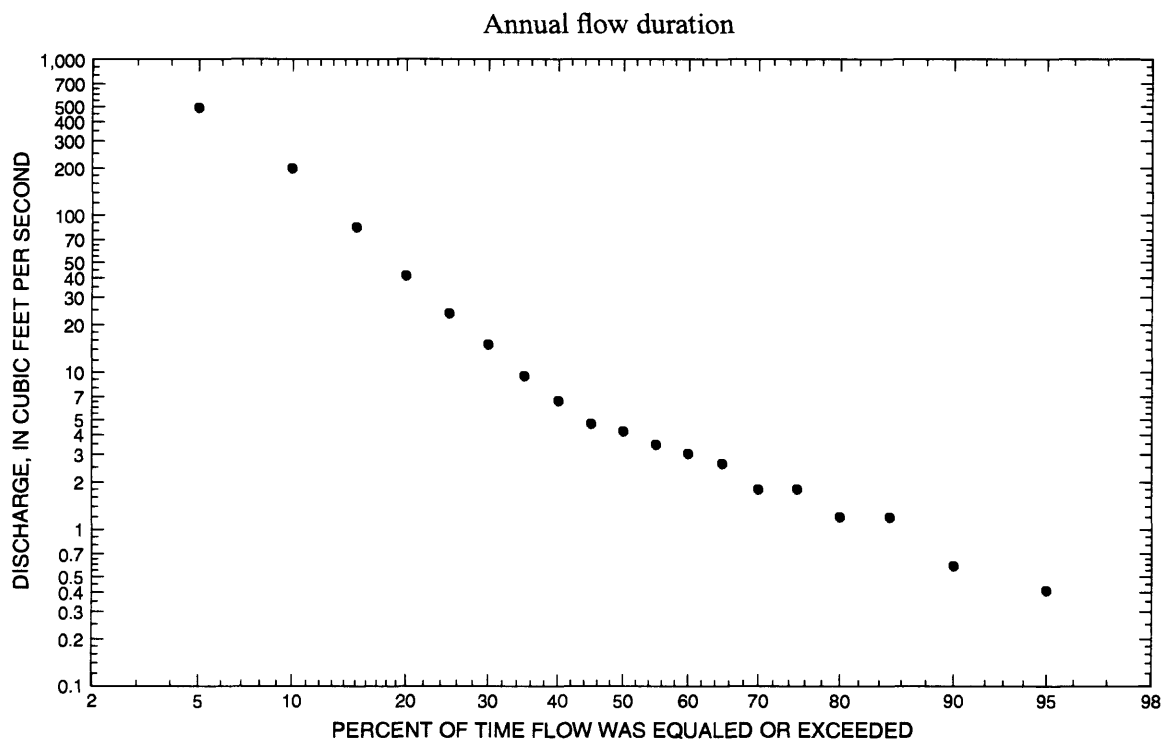
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,410 ft³/s, Apr. 5, 1966, gage height, 18.23 ft; no flow at times.



05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	153	1958	0.400	1991	19.0	34.5	1.81	1.82
November	87.5	1957	0.381	1990	11.2	19.3	1.72	1.07
December	34.5	1992	0.131	1987	4.59	5.74	1.25	0.44
January	12.1	1992	0.116	1987	2.81	2.56	0.91	0.27
February	23.6	1981	0.120	1987	3.20	4.07	1.27	0.31
March	362	1986	0.658	1934	59.8	89.6	1.50	5.70
April	1,980	1966	0.539	1991	398	387	0.97	37.9
May	1,340	1970	0.984	1991	189	274	1.45	18.1
June	1,340	1970	1.43	1980	161	268	1.66	15.4
July	1,140	1956	0.437	1988	106	223	2.11	10.1
August	1,350	1993	0.089	1988	48.2	189	3.93	4.60
September	525	1957	0	1937	45.7	107	2.34	4.36
Annual	312	1966	2.89	1934	87.5	76.6	0.88	100



05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0.29	0.18	0.46	2.10	2.00	1.10	0.53	0.24	0.24	0.41	0.37	0.36	0.41
90	0.34	0.38	0.63	4.35	3.67	2.00	1.30	0.71	0.60	0.84	0.46	0.43	0.59
85	0.47	0.55	1.10	7.76	5.08	3.83	1.80	1.00	0.81	1.10	0.73	0.51	1.20
80	0.64	0.80	1.10	15.8	7.28	4.93	2.62	1.40	1.10	1.30	0.91	0.74	1.20
75	1.00	0.97	1.60	24.8	12.1	5.62	3.74	1.40	1.50	1.70	1.10	1.50	1.80
70	1.40	1.20	1.60	33.7	16.1	7.88	4.26	2.10	1.50	1.70	1.40	1.80	1.80
65	1.40	1.40	2.10	50.8	20.7	11.0	4.98	2.10	2.00	2.20	2.20	1.80	2.63
60	1.70	1.40	2.10	73.2	25.6	14.0	5.52	2.10	2.00	2.70	2.20	2.20	3.05
55	2.00	1.70	3.00	102	31.4	17.2	7.36	3.36	2.81	3.50	2.80	2.20	3.47
50	2.00	1.70	3.42	139	38.1	21.8	9.31	3.78	3.25	4.44	3.50	2.60	4.23
45	2.30	1.70	3.85	184	49.5	28.8	12.6	4.40	3.70	4.87	3.50	2.60	4.72
40	2.30	2.10	4.54	234	72.7	38.3	16.0	4.82	4.33	5.30	3.50	3.10	6.59
35	2.70	2.10	5.95	299	103	52.3	20.2	6.12	5.47	6.27	4.60	3.80	9.51
30	2.70	2.50	10.2	382	142	74.0	26.3	7.33	7.35	8.00	5.34	3.80	15.1
25	3.20	3.00	17.0	496	213	127	39.2	9.94	11.0	11.7	7.23	4.50	23.7
20	3.20	3.00	34.2	662	290	210	58.3	14.4	19.8	18.5	11.8	4.50	41.5
15	4.40	3.70	57.2	904	377	299	109	22.5	47.5	27.6	20.3	8.09	83.9
10	5.20	5.45	131	1,220	541	429	214	67.3	116	49.3	30.0	11.7	199
5	9.95	9.94	417	1,780	929	795	646	216	261	102	53.4	15.7	494

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	57.3	41.0	25.0	15.8
0.95	1.05	337	166	128	83.9	53.3
0.90	1.11	462	275	219	148	94.5
0.80	1.25	667	478	394	274	176
0.50	2	1,280	1,170	1,000	730	477
0.20	5	2,330	2,320	2,040	1,520	1,020
0.10	10	3,100	3,090	2,730	2,040	1,380
0.04	25	4,140	3,990	3,520	2,630	1,810
0.02	50	4,940	4,590	4,040	3,010	2,090
0.01	100	5,770	5,120	4,490	3,350	2,340
0.005	200	6,610	5,590	4,890	3,630	2,560
0.002	500	7,740	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0.015	0.015	0.050	0.092	0.187	0.302	0.387	0.458	0.947
0.10	10	0.098	0.103	0.123	0.183	0.295	0.451	0.569	0.647	1.21
0.20	5	0.247	0.264	0.287	0.354	0.492	0.710	0.884	0.982	1.71
0.50	2	0.836	0.890	0.939	0.978	1.18	1.54	1.90	2.17	3.81

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0.252	0.258	0.264	0.298	0.177	0.202	0.343	0.679
0.10	10	0.375	0.385	0.392	0.441	0.338	0.393	0.514	1.10
0.20	5	0.592	0.608	0.619	0.694	0.631	0.753	0.814	2.01
0.50	2	1.30	1.35	1.39	1.55	1.60	2.02	¹ 3.00	6.85
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0.042	0.103	0.235	0.544	0.153	0.214	0.294	0.353
0.10	10	0.193	0.282	0.431	0.803	0.246	0.338	0.429	0.525
0.20	5	0.515	0.726	0.845	1.35	0.434	0.587	0.695	0.876
0.50	2	1.84	2.70	2.89	4.20	1.25	1.66	1.91	2.58

¹Graphical interpretation.

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1929	March 20	9.00	940	1967	April 21	11.43	2,430
1930	May 15	10.90	1,820	1968	July 19	11.08	2,290
1931	April 9	6.00	300	1969	April 14	14.01	3,520
1932	April 11	9.70	1,310	1970	April 14	14.51	4,140
1933	April 4	7.58	415	1971	April 8	9.00	1,500
1934	April 10	5.00	64.0	1972	April 15	8.50	1,480
1935	April 13	7.21	565	1973	March 14	10.18	800
1936	April 19	6.64	358	1974	April 24	11.35	2,460
1937	May 4	7.02	594	1975	July 6	10.37	1,960
1941	April 11	10.09	1,580	1976	April 1	7.24	980
1942	April 1	12.05	2,210	1977	April 8	5.06	219
1943	April 11	8.31	1,050	1978	April 12	12.12	2,770
1944	June 12	7.46	820	1979	April 22	13.17	3,340
1945	April 16	6.96	670	1980	April 8	6.90	820
1946	March 26	7.03	668	1981	June 30	5.39	340
1947	June 17	9.07	1,290	1982	April 2	7.94	1,040
1954	June 16	7.03	567	1983	March 8	9.33	1,530
1955	June 9	8.33	1,020	1984	April 3	6.45	623
1956	April 24	12.79	2,650	1985	June 26	12.16	2,790
1957	July 8	10.52	1,810	1986	March 29	11.47	2,510
1958	September 23	6.29	355	1987	March 27	7.62	996
1959	April 8	8.60	1,110	1988	March 24	8.46	1,170
1960	April 11	8.72	1,270	1989	April 19	10.78	2,100
1961	March 26	6.86	451	1990	April 1	7.10	784
1962	June 13	12.82	2,960	1991	July 13	11.35	2,160
1963	April 8	7.56	1,570	1992	April 2	10.82	1,870
1964	June 14	10.88	2,210	1993	August 10	12.87	3,050
1965	April 15	12.30	2,780	1994	March 26	--	850
1966	April 5	18.23	5,410				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1966	April 5	18.23	5,410	1942	April 1	12.05	2,210
1970	April 14	14.51	4,140	1964	June 14	10.88	2,210
1969	April 14	14.01	3,520	1991	July 13	11.35	2,160
1979	April 22	13.17	3,340	1989	April 19	10.78	2,100
1993	August 10	12.87	3,050	1975	July 6	10.37	1,960
1962	June 13	12.82	2,960	1992	April 2	10.82	1,870
1985	June 26	12.16	2,790	1930	May 15	10.90	1,820
1965	April 15	12.30	2,780	1957	July 8	10.52	1,810
1978	April 12	12.12	2,770	1941	April 11	10.09	1,580
1956	April 24	12.79	2,650	1963	April 8	7.56	1,570
1986	March 29	11.47	2,510	1983	March 8	9.33	1,530
1974	April 24	11.35	2,460	1971	April 8	9.00	1,500
1967	April 21	11.43	2,430	1972	April 15	8.50	1,480
1968	July 19	11.08	2,290	1932	April 11	9.70	1,310

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1947	June 17	9.07	1,290	1945	April 16	6.96	670
1960	April 11	8.72	1,270	1946	March 26	7.03	668
1988	March 24	8.46	1,170	1984	April 3	6.45	623
1959	April 8	8.60	1,110	1937	May 4	7.02	594
1943	April 11	8.31	1,050	1954	June 16	7.03	567
1982	April 2	7.94	1,040	1935	April 13	7.21	565
1955	June 9	8.33	1,020	1961	March 26	6.86	451
1987	March 27	7.62	996	1933	April 4	7.58	415
1976	April 1	7.24	980	1936	April 19	6.64	358
1929	March 20	9.00	940	1958	September 23	6.29	355
1994	March 26	--	850	1981	June 30	5.39	340
1944	June 12	7.46	820	1931	April 9	6.00	300
1980	April 8	6.90	820	1977	April 8	5.06	219
1973	March 14	10.18	800	1934	April 10	5.00	64.0
1990	April 1	7.10	784				

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1929	10.0	8.13	3.71	2.16	2.00	311.9	160.7	36.1	23.0	7.39	1.00	1.50	47.7
1930	5.50	4.93	2.82	1.98	1.00	1.52	159.6	440.5	20.3	14.4	3.72	3.37	55.5
1931	4.94	4.19	2.95	2.16	2.00	24.9	83.1	15.6	8.97	4.98	4.45	3.47	13.4
1932	4.44	5.41	4.42	3.48	2.43	2.55	360.8	117.3	8.06	4.41	4.91	2.16	43.0
1933	2.88	3.87	2.74	2.00	1.36	14.6	191.5	21.2	14.2	2.28	2.46	2.25	21.6
1934	1.62	1.25	0.665	0.465	0.400	0.658	20.0	2.85	1.83	1.37	1.82	1.99	2.89
1935	4.60	3.72	2.24	1.00	0.800	29.5	163.8	35.4	7.24	4.46	1.92	2.84	21.4
1936	3.25	3.47	2.24	1.74	1.50	2.10	83.4	18.8	2.93	1.69	3.91	2.55	10.5
1937	23.9	--	--	--	--	--	--	182.1	13.9	2.30	1.65	0	--
1941	--	--	--	--	--	--	453.9	41.2	178.2	11.6	4.80	19.7	--
1942	131.1	23.6	5.99	3.00	2.57	154.4	675.4	456.5	45.7	5.83	15.6	35.0	129.9
1943	6.85	3.36	2.03	1.71	2.59	35.3	459.0	253.9	607.3	113.7	7.80	1.54	124.0
1944	0.887	--	--	--	--	--	79.9	13.2	402.7	55.9	11.5	14.0	--
1945	6.65	23.0	11.6	--	--	--	417.9	197.5	44.0	16.2	9.47	51.5	--
1946	34.2	12.6	5.58	3.41	2.41	220.4	248.4	29.8	5.76	15.0	3.72	2.99	48.9
1947	1.24	3.34	5.08	3.20	1.38	12.5	184.4	33.8	478.3	32.3	43.1	12.2	67.0
1954	5.32	0.867	1.16	2.45	6.36	2.80	208.5	135.2	167.7	9.79	5.51	3.97	45.6
1955	4.94	4.00	2.98	2.72	2.46	14.9	256.8	70.0	369.6	24.9	4.53	5.06	63.0
1956	8.25	3.78	3.30	3.58	3.88	34.2	711.8	445.2	192.5	1,136	40.6	97.6	224.3
1957	10.6	87.5	9.87	7.42	5.51	158.8	263.4	108.7	233.5	725.1	116.7	524.6	188.1
1958	153.0	77.0	13.8	8.48	2.12	2.16	47.7	14.8	6.74	98.7	4.77	9.68	36.9
1959	1.74	1.12	0.555	0.265	0.218	26.3	372.7	74.4	42.6	11.7	2.31	6.24	44.7
1960	22.4	11.3	4.30	4.78	4.79	4.95	534.2	55.2	53.5	13.1	3.86	1.33	58.8
1961	2.77	2.03	1.67	1.44	13.5	26.7	23.1	14.0	2.74	4.50	2.65	0.757	7.96
1962	2.54	1.36	4.43	3.63	3.21	30.3	369.6	655.4	1,031	109.5	77.3	11.8	191.4
1963	7.15	9.85	3.40	1.32	1.01	28.9	287.2	23.9	20.8	4.50	3.43	3.17	32.6
1964	2.59	1.21	0.745	0.600	0.600	0.765	196.3	118.8	742.9	40.2	7.09	6.72	92.2
1965	4.92	6.05	4.77	4.65	4.53	4.52	907.0	403.9	188.4	57.8	6.00	34.3	135.0
1966	99.4	16.0	13.8	10.8	8.91	11.7	1,977	913.2	250.3	282.9	124.9	41.6	312.2
1967	10.2	3.23	3.28	1.71	1.16	22.7	1,157	664.5	110.0	4.38	5.70	2.84	165.2
1968	2.07	2.79	2.26	1.55	1.35	125.3	69.0	5.66	502.8	707.0	193.9	239.7	154.7
1969	74.9	31.1	9.92	5.43	4.83	3.31	1,158	299.1	104.3	10.6	4.45	6.21	141.8
1970	3.71	2.45	2.07	1.97	1.67	3.06	751.4	1,336	131.1	131.1	12.3	6.55	299.1
1971	15.8	35.5	4.54	3.53	2.51	32.2	516.6	58.3	13.5	5.09	3.35	2.98	57.4
1972	2.06	11.0	4.55	2.55	2.79	65.6	444.6	42.9	31.0	4.51	3.68	4.18	51.1

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1973	3.98	2.21	1.86	2.96	6.01	46.2	5.57	5.46	3.38	4.15	1.81	4.26	7.37
1974	7.94	4.78	2.59	1.86	1.70	1.61	882.1	634.7	253.2	12.3	30.4	8.30	153.2
1975	4.39	3.78	2.89	2.23	1.67	1.26	607.7	526.3	130.1	474.7	5.18	5.03	147.9
1976	4.15	3.55	3.28	1.99	1.68	59.0	207.7	10.4	7.81	4.16	3.02	3.38	25.7
1977	7.47	1.06	0.463	0.598	0.847	2.76	35.8	3.87	13.9	2.28	4.31	2.34	6.27
1978	0.780	0.420	2.06	2.52	1.85	2.04	778.3	103.1	27.9	102.3	5.51	1.33	85.1
1979	3.92	1.99	1.29	1.94	2.29	14.7	992.1	489.8	203.2	52.8	3.24	2.73	147.0
1980	5.60	0.993	2.55	2.14	1.83	3.32	216.9	4.14	1.43	3.12	1.31	0.960	20.1
1981	1.03	1.64	5.04	0.989	23.6	39.5	9.71	6.71	36.9	34.3	0.941	0.874	13.4
1982	6.13	--	--	--	--	--	--	--	--	--	--	--	--
1985	--	--	--	--	--	--	280.9	211.8	482.8	385.6	360.3	279.5	--
1986	112.9	32.6	16.8	4.82	2.54	361.8	818.6	574.8	33.6	14.0	8.53	25.6	167.9
1987	5.59	0.418	0.131	0.116	0.120	200.7	288.3	35.2	9.43	7.52	1.29	0.656	45.8
1988	0.430	1.55	1.38	0.661	0.600	253.3	165.2	4.34	3.37	0.437	0.089	0.523	36.1
1989	1.57	0.503	0.549	0.338	0.177	1.49	407.2	35.9	68.0	17.3	2.99	1.10	44.3
1990	21.6	0.381	0.378	0.322	0.291	115.9	60.1	3.50	6.69	10.2	27.0	3.17	21.0
1991	0.400	0.484	0.413	0.346	2.90	10.2	0.539	0.984	13.4	527.4	27.4	217.2	67.4
1992	76.0	69.4	34.5	12.1	12.5	200.8	1,010	170.9	20.5	16.8	6.28	88.2	142.2
1993	34.6	0.527	0.443	0.472	0.520	5.93	201.1	46.2	107.8	340.4	1,349	431.6	211.9
1994	34.8	24.1	9.59	6.08	3.94	199.5	112.3	24.6	10.3	29.5	19.3	225.5	58.4

05095500 TWO RIVERS BELOW HALLOCK, MN

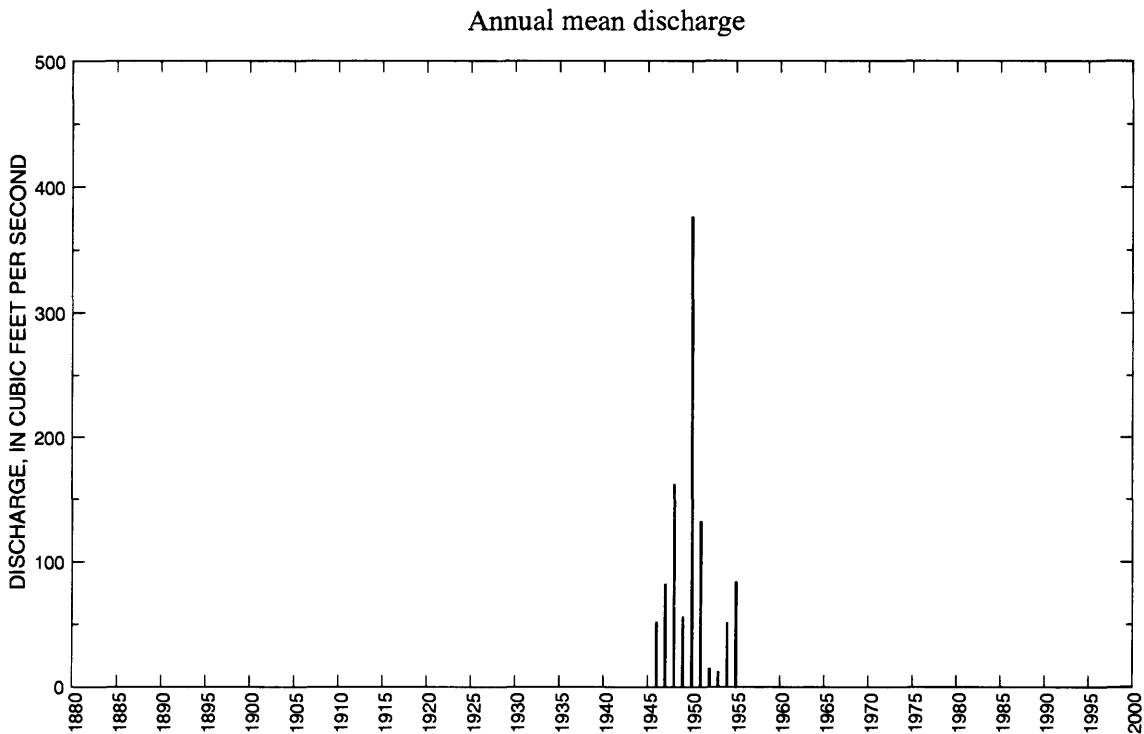
LOCATION.--Lat 48°46'50", long 97°02'25", in NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.7, T.161 N., R.49 W., Kittson County, Hydrologic Unit 09020312, on downstream side of highway bridge, 4 mi west of Hallock and 5 mi upstream from North Branch Two Rivers.

DRAINAGE AREA.--644 mi².

PERIOD OF RECORD.--March 1945 to September 1955.

GAGE.--Chain gage. Datum of gage is 780 ft, from topographic map.

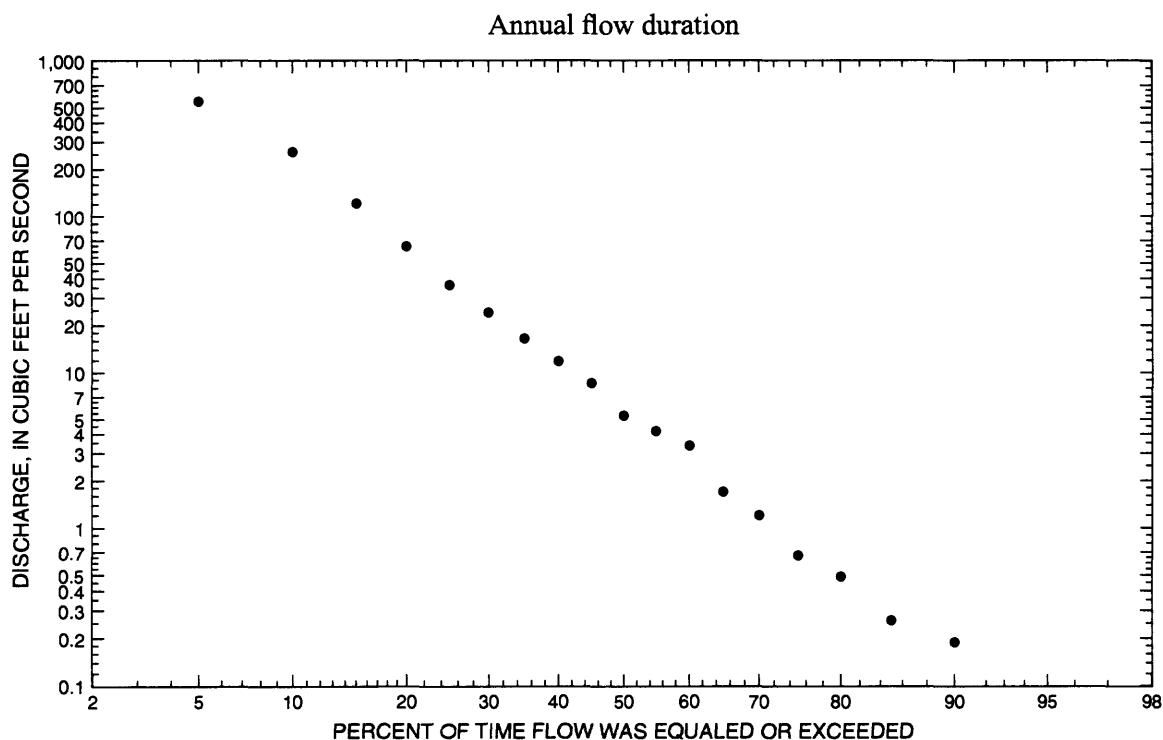
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,690 ft³/s, May 13, 1950, gage height, 25.78 ft, from graph based on gage readings, backwater from Red River of the North; no flow at times in many years.



05095500 TWO RIVERS BELOW HALLOCK, MN--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	168	1951	0.171	1949	28.3	51.1	1.80	2.30
November	25.9	1948	0.570	1954	11.3	9.88	0.87	0.92
December	12.0	1948	0.261	1954	5.04	4.45	0.88	0.41
January	8.40	1951	0.048	1953	2.24	2.98	1.33	0.18
February	6.61	1953	0	1949	2.13	2.41	1.13	0.17
March	299	1945	0.448	1955	49.7	104	2.08	4.04
April	900	1951	30.0	1953	436	304	0.70	35.4
May	2,520	1950	6.79	1952	378	732	1.93	30.7
June	612	1950	4.42	1952	198	230	1.16	16.1
July	354	1950	0.913	1952	80.2	127	1.58	6.52
August	108	1948	0.910	1952	21.4	32.5	1.52	1.74
September	85.1	1950	0	1952	17.7	29.8	1.68	1.44
Annual	377	1950	12.2	1953	103	107	1.05	100



05095500 TWO RIVERS BELOW HALLOCK, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equalled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	3.58	6.31	1.70	0.10	0	0	0	0.47	0.18	0
90	0.10	0	0	6.87	9.67	4.72	1.90	0.32	0.10	0.10	0.64	0.18	0.19
85	0.10	0	0.20	22.1	18.1	8.22	2.50	0.41	0.20	0.34	1.00	0.38	0.26
80	0.10	0	0.26	46.0	25.9	12.6	3.91	0.65	0.50	0.55	1.40	0.45	0.49
75	0.10	0.10	0.33	71.9	31.6	20.2	4.69	0.65	0.63	0.70	1.90	0.60	0.67
70	0.20	0.10	0.33	90.7	37.1	28.9	5.70	1.30	0.99	0.89	2.30	0.81	1.20
65	0.20	0.10	0.55	120	45.7	36.6	6.41	1.70	1.20	1.40	3.10	1.10	1.70
60	0.30	0.20	1.50	160	51.8	44.7	8.68	2.10	1.20	1.40	3.70	1.50	3.36
55	0.30	0.20	1.90	242	57.8	53.2	11.1	2.70	1.60	1.90	6.98	2.30	4.19
50	0.39	0.20	2.50	293	73.3	69.9	14.3	3.40	2.00	2.40	8.41	3.60	5.30
45	0.45	0.20	3.20	338	101	91.7	17.8	5.84	3.10	3.00	10.4	4.20	8.62
40	0.89	0.27	3.20	379	131	110	21.2	9.47	3.90	10.5	12.6	4.90	11.8
35	1.70	1.70	4.27	419	178	131	28.4	18.1	6.37	16.5	13.9	7.32	16.5
30	3.00	2.80	4.79	469	239	161	39.3	23.8	8.80	21.9	15.2	8.20	24.3
25	3.50	2.80	5.67	561	312	253	62.5	27.7	12.5	26.5	16.7	9.08	36.4
20	4.50	3.40	7.43	684	395	363	98.1	34.1	16.2	32.2	18.4	10.4	64.5
15	6.00	4.00	13.3	843	575	489	176	44.8	25.6	50.0	21.4	11.9	121
10	7.71	4.70	66.2	1,060	1,090	656	297	60.7	52.0	98.5	27.4	12.7	260
5	0	7.55	457	1,540	2,430	871	448	83.5	120	163	33.6	13.5	553

05095500 TWO RIVERS BELOW HALLOCK, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	92.1	72.5	63.1	44.2	33.1
0.95	1.05	194	167	147	107	77.2
0.90	1.11	282	253	225	166	119
0.80	1.25	434	406	364	278	198
0.50	2	932	919	846	686	500
0.20	5	1,840	1,870	1,770	1,540	1,180
0.10	10	2,560	2,610	2,510	2,280	1,820
0.04	25	3,540	3,600	3,540	3,350	2,810
0.02	50	4,310	4,370	4,350	4,240	3,700
0.01	100	5,110	5,150	5,180	5,200	4,700
0.005	200	5,940	5,940	6,030	6,210	5,820
0.002	500	7,060	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0.130	0.223	0.482
0.10	10	0	0	0	0	0	0	0.183	0.354	0.766
0.20	5	0	0	0	0	0	0.055	0.286	0.608	1.36
0.50	2	0.080	0.083	0.107	0.116	0.153	0.262	0.739	1.62	4.17

05095500 TWO RIVERS BELOW HALLOCK, MN--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0.273
0.10	10	0	0	0	0	0	0	0	0.426
0.20	5	0	0	0	0	0.066	0.072	0.075	0.789
0.50	2	0.160	0.180	0.188	0.229	0.989	1.10	1.27	3.31
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		0	0	0	0	0	0	0	0
		0.094	0.094	0.118	0.469	0	0	0	0
		0.314	0.351	0.477	1.22	0	0	0.046	0.265
0.50	2	1.32	1.74	2.44	4.48	0.461	0.650	0.863	1.77

05095500 TWO RIVERS BELOW HALLOCK, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1945	March 28	--	856	1951	April 17	15.64	1,350
1946	March 26	11.07	670	1952	April 14	10.24	392
1947	June 19	14.74	1,280	1953	June 8	5.42	146
1948	April 26	22.84	2,270	1954	June 19	10.80	553
1949	April 15	14.47	1,040	1955	June 13	12.97	902
1950	May 13	25.78	3,690				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	May 13	25.78	3,690	1945	March 28	--	856
1948	April 26	22.84	2,270	1946	March 26	11.07	670
1951	April 17	15.64	1,350	1954	June 19	10.80	553
1947	June 19	14.74	1,280	1952	April 14	10.24	392
1949	April 15	14.47	1,040	1953	June 8	5.42	146
1955	June 13	12.97	902				

05095500 TWO RIVERS BELOW HALLOCK, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1945	--	--	--	--	--	299.2	456.0	268.5	58.5	21.7	4.81	68.9	--
1946	39.0	14.2	4.09	0.439	0.189	212.1	286.7	44.0	8.11	9.62	1.35	4.67	52.2
1947	3.25	6.43	8.48	6.46	3.68	6.75	184.2	36.2	587.9	106.3	38.1	12.3	82.7
1948	29.5	25.9	12.0	2.43	0.059	0.790	829.6	535.0	99.4	300.9	107.7	2.98	162.2
1949	0.171	1.70	4.88	0.639	0	0.674	505.9	76.3	59.1	7.05	21.4	1.95	56.2
1950	12.7	21.7	6.55	3.36	2.53	1.88	826.7	2,523	612.5	354.3	44.4	85.1	377.4
1951	168.3	25.2	11.4	8.40	5.41	10.6	899.5	400.0	52.6	5.34	2.18	2.63	132.4
1952	25.1	10.5	1.03	0.335	2.02	3.76	124.3	6.79	4.42	0.913	0.910	0	14.9
1953	0.416	4.09	0.368	0.048	6.61	6.68	30.0	22.2	70.1	4.03	1.94	1.41	12.2
1954	3.51	0.570	0.261	0.100	0.568	4.25	209.6	158.0	217.8	14.0	7.14	5.77	51.6
1955	1.38	2.77	1.34	0.206	0.207	0.448	441.7	91.0	412.2	57.9	4.99	8.70	84.5

05096000 NORTH BRANCH TWO RIVERS NEAR LANCASTER, MN

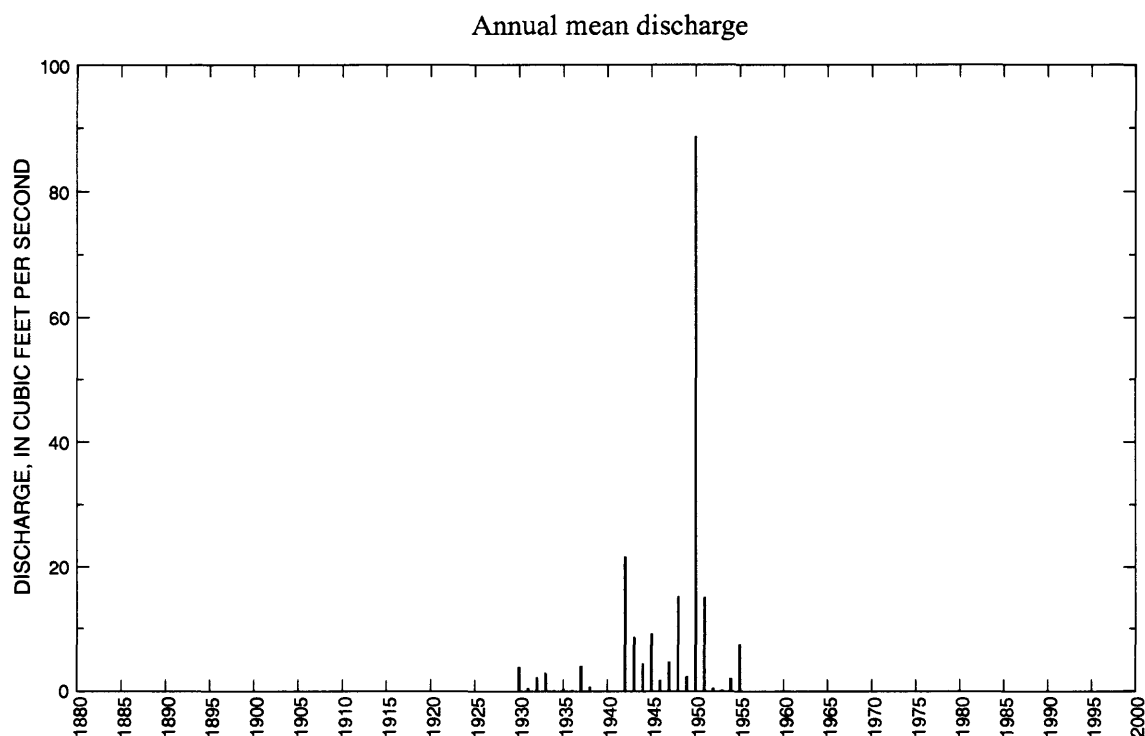
LOCATION.--Lat 48°53'21", long 96°40'01", in NE¹/₄ sec.1, T.162 N., R.47 W., Kittson County, Hydrologic Unit 09020312, on downstream side of highway bridge, 0.5 mi upstream from State ditch 85 and 7 mi northeast of Lancaster.

DRAINAGE AREA.--32 mi², approximately.

PERIOD OF RECORD.--April 1929 to September 1938, April 1941 to September 1955. Prior to 1941, published as North Fork Two Rivers near Lancaster.

GAGE.--Staff gage. Datum of gage is 963.69 ft above mean sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 912 ft³/s, May 20, 1950, gage height, 6.25 ft; no flow during several months each year.



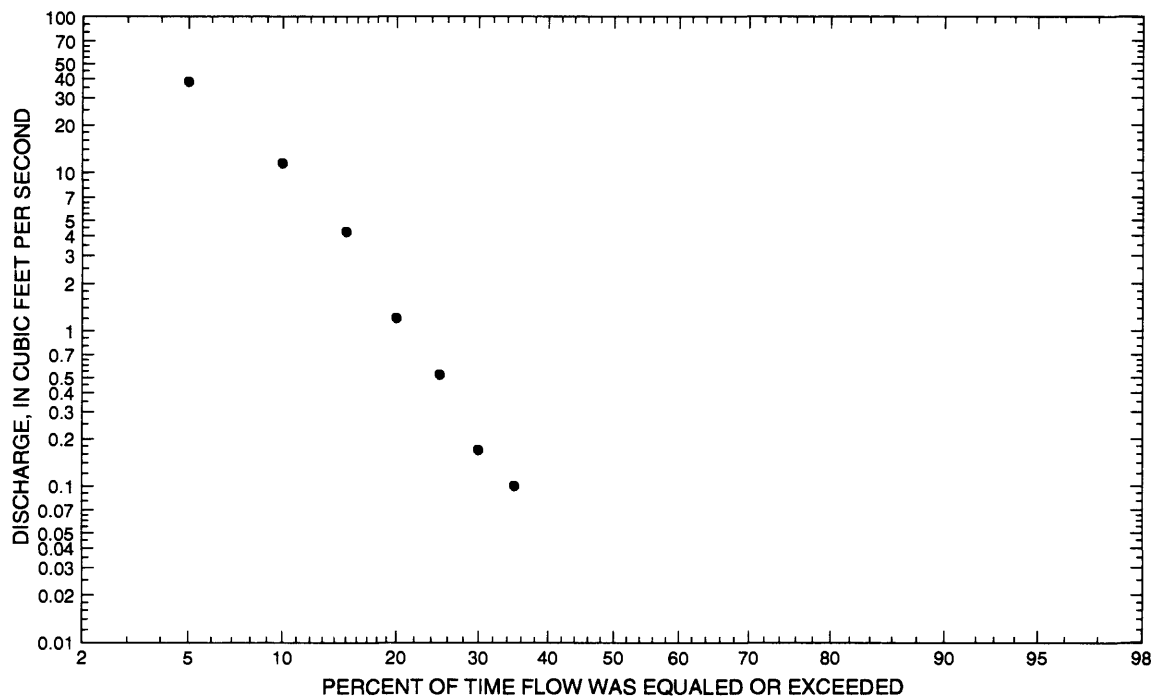
05096000 NORTH BRANCH TWO RIVERS NEAR LANCASTER, MN--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	57.7	1942	0	m	3.46	12.2	3.51	3.52
November	8.60	1945	0	m	0.900	2.11	2.36	0.91
December	0.397	1945	0	m	0.060	0.12	1.93	0.07
January	0.213	1948	0	m	0.010	0.05	3.93	0.01
February	0.048	1948	0	m	0	0.01	4.80	0
March	38.6	1942	0	m	3.48	9.81	2.82	3.54
April	108	1942	0.100	1953	26.7	33.2	1.24	27.2
May	635	1950	0.006	1934	38.8	126	3.24	39.5
June	235	1950	0	m	16.4	47.0	2.86	16.7
July	86.6	1950	0	m	5.24	17.5	3.34	5.33
August	5.76	1950	0	m	0.630	1.48	2.37	0.64
September	47.1	1941	0	m	2.57	9.39	3.65	2.61
Annual	88.7	1950	0.096	1934	8.52	18.4	2.16	100

Annual flow duration



05096000 NORTH BRANCH TWO RIVERS NEAR LANCASTER, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0.10	0	0	0	0	0	0	0	0
85	0	0	0	0.10	0.10	0	0	0	0	0	0	0	0
80	0	0	0	0.26	0.17	0	0	0	0	0	0	0	0
75	0	0	0	0.43	0.30	0	0	0	0	0	0	0	0
70	0	0	0	0.69	0.40	0.10	0	0	0	0	0	0	0
65	0	0	0	1.10	0.52	0.10	0	0	0	0	0	0	0
60	0	0	0	1.80	0.69	0.16	0	0	0	0	0	0	0
55	0	0	0	2.90	0.90	0.27	0	0	0	0	0	0	0
50	0	0	0	5.18	1.20	0.57	0	0	0	0	0	0	0
45	0	0	0	7.76	2.10	0.94	0	0	0	0	0	0	0
40	0	0	0	11.5	4.44	2.00	0.10	0	0	0	0	0	0
35	0	0	0	15.9	6.65	2.50	0.20	0	0	0	0	0	0.10
30	0	0	0	23.4	12.0	4.88	0.40	0	0	0.10	0	0	0.17
25	0	0	0	32.4	19.1	8.17	0.64	0.10	0.20	0.19	0.10	0	0.52
20	0	0	0	42.3	30.5	14.4	1.30	0.18	0.40	0.37	0.27	0	1.20
15	0	0	0	52.9	46.1	19.1	3.20	0.49	1.00	2.10	1.40	0.10	4.23
10	0	0	0.25	82.7	63.3	29.9	7.09	1.40	2.00	6.03	3.30	0.19	11.5
5	0.10	0	15.0	128	130	87.0	27.6	5.00	5.35	15.3	4.60	0.40	38.2

05096000 NORTH BRANCH TWO RIVERS NEAR LANCASTER, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	1.80	1.22	0.916	0.598	0.328
0.95	1.05	6.30	4.38	3.20	2.07	1.17
0.90	1.11	11.7	8.30	6.03	3.91	2.27
0.80	1.25	23.9	17.3	12.6	8.25	4.94
0.50	2	83.4	62.9	46.8	32.2	20.7
0.20	5	252	197	155	115	80.5
0.10	10	426	338	276	216	159
0.04	25	716	576	496	411	322
0.02	50	980	796	711	616	501
0.01	100	1,280	1,050	970	878	742
0.005	200	1,620	1,340	1,280	1,200	1,050
0.002	500	2,120	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	0	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	0	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	0	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	0	0

05096000 NORTH BRANCH TWO RIVERS NEAR LANCASTER, MN--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	ng	ng	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	0
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	ng	ng	0	0	0	0	0	0
0.10	10	ng	ng	0	0	0	0	0	0
0.20	5	ng	ng	0	0	0	0	0	0
0.50	2	ng	ng	0	0	0	0	0	0

05096000 NORTH BRANCH TWO RIVERS NEAR LANCASTER, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1930	May 12	3.10	226	1944	June 6	3.52	203
1931	April 8	1.90	38.0	1945	March 27	2.88	124
1932	April 15	1.90	59.0	1946	March 20	2.38	56.0
1933	May 26	2.68	126	1947	June 11	3.40	217
1934	April 9	1.06	15.0	1948	April 18	3.68	281
1935	April 15	--	12.0	1949	April 13	--	50.0
1936	April 14	1.20	8.00	1950	May 20	6.25	912
1937	April 30	3.80	277	1951	April 30	2.91	173
1938	June 2	1.20	8.00	1952	April 8	1.22	21.0
1941	September 25	4.06	290	1953	June 29	0.75	4.00
1942	April 4	--	253	1954	June 15	1.97	50.0
1943	April 5	3.50	175	1955	April 22	2.92	151
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	May 20	6.25	912	1945	March 27	2.88	124
1941	September 25	4.06	290	1932	April 15	1.90	59.0
1948	April 18	3.68	281	1946	March 20	2.38	56.0
1937	April 30	3.80	277	1949	April 13	--	50.0
1942	April 4	--	253	1954	June 15	1.97	50.0
1930	May 12	3.10	226	1931	April 8	1.90	38.0
1947	June 11	3.40	217	1952	April 8	1.22	21.0
1944	June 6	3.52	203	1934	April 9	1.06	15.0
1943	April 5	3.50	175	1935	April 15	--	12.0
1951	April 30	2.91	173	1936	April 14	1.20	8.00
1955	April 22	2.92	151	1938	June 2	1.20	8.00
1933	May 26	2.68	126	1953	June 29	0.75	4.00

05096000 NORTH BRANCH TWO RIVERS NEAR LANCASTER, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1929	--	--	--	--	--	--	2.39	0.452	0.123	0	0	0	--
1930	0	0	0	0	0	0	6.97	38.0	0.300	0.081	0	0	3.84
1931	0	0	0	0	0	0.129	4.97	0.500	0.060	0.019	0	0	0.468
1932	0	0	0	0	0	0	22.1	4.18	0.013	0	0	0	2.16
1933	0	0	0	0	0	0.613	15.9	14.2	4.33	0	0	0	2.92
1934	0	0	0	0	0	0	1.16	0.006	0	0	0	0	0.096
1935	0	0	0	0	0	0	2.15	0.732	0.193	0.719	0	0	0.316
1936	0	0	0	0	0	0	1.18	0.268	0	0	0	0	0.119
1937	0	0	0	0	0	0	19.7	24.2	1.19	1.35	0.845	0	3.96
1938	0	0	0	0	0	0.577	0.687	3.14	3.15	0	0	0	0.632
1941	--	--	--	--	--	--	21.5	10.2	17.3	0.265	0	47.1	--
1942	57.7	4.73	0.329	0	0	38.6	107.9	42.9	4.40	0	0	3.25	21.7
1943	0	0	0	0	0	0	54.7	19.3	23.5	5.91	0.603	0	8.62
1944	0	0	0	0	0	0	8.14	0.410	37.9	1.85	0.200	4.85	4.38
1945	0.706	8.60	0.397	0.052	0	27.3	34.5	32.0	2.25	0.497	0	2.57	9.11
1946	0.532	0	0	0	0	12.7	6.58	0.261	0	0	0	0	1.68
1947	0	0	0	0	0	0	6.03	1.81	40.8	2.25	3.07	1.58	4.59
1948	3.47	1.12	0.200	0.213	0.048	0	88.9	53.9	10.5	19.5	4.33	0.033	15.2
1949	0	0	0	0	0	0	21.7	4.26	0.890	0.803	0.294	0	2.32
1950	3.95	3.78	0.248	0	0	0	80.8	634.9	235.0	86.6	5.76	4.21	88.7
1951	12.8	2.21	0.248	0	0	0	90.8	70.3	3.60	0.026	0.206	0.257	15.1
1952	0.258	0.090	0.035	0	0	0	4.96	0.106	0.070	0	0	0	0.453
1953	0	0	0	0	0	0.032	0.100	0.135	1.07	0.335	0.039	0	0.142
1954	0	0	0	0	0	0	5.41	6.34	11.4	0.429	0.068	0.080	1.97
1955	0.110	0.100	0.016	0	0	0	59.2	7.34	12.5	10.3	0.268	0.320	7.46

05096500 STATE DITCH 85 NEAR LANCASTER, MN

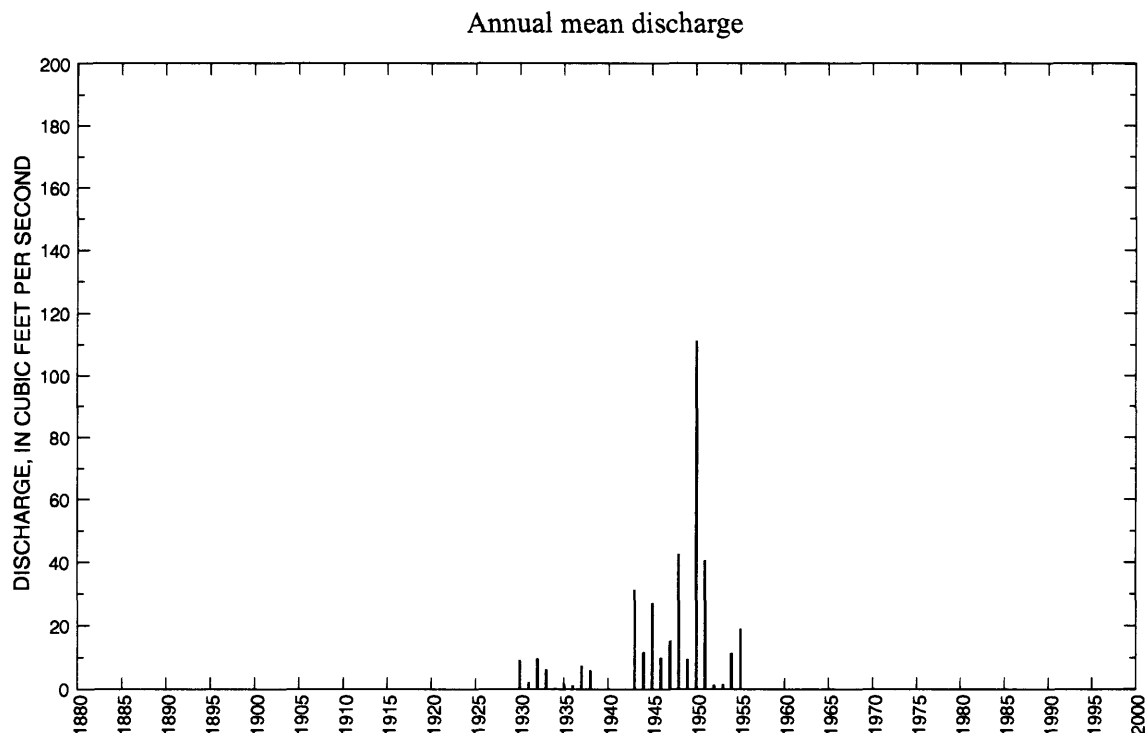
LOCATION.--Lat 48°52'02", long 96°40'01", in SW¹/₄ sec.6, T.162 N., R.46 W., Kittson County, Hydrologic Unit 09020312, on left bank at upstream side of highway bridge, 1 mi upstream from North Branch Two Rivers, and 7 mi northeast of Lancaster.

DRAINAGE AREA.--95 mi², approximately.

PERIOD OF RECORD.--April 1929 to September 1938, March 1942 to September 1955.

GAGE.--Staff gage. Datum of gage is 969.28 ft above mean sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,480 ft³/s, May 20, 1950; gage height, 5.90 ft; maximum gage height, 6.30 ft, Mar. 29, 1942, backwater from ice; no flow for several months each year.



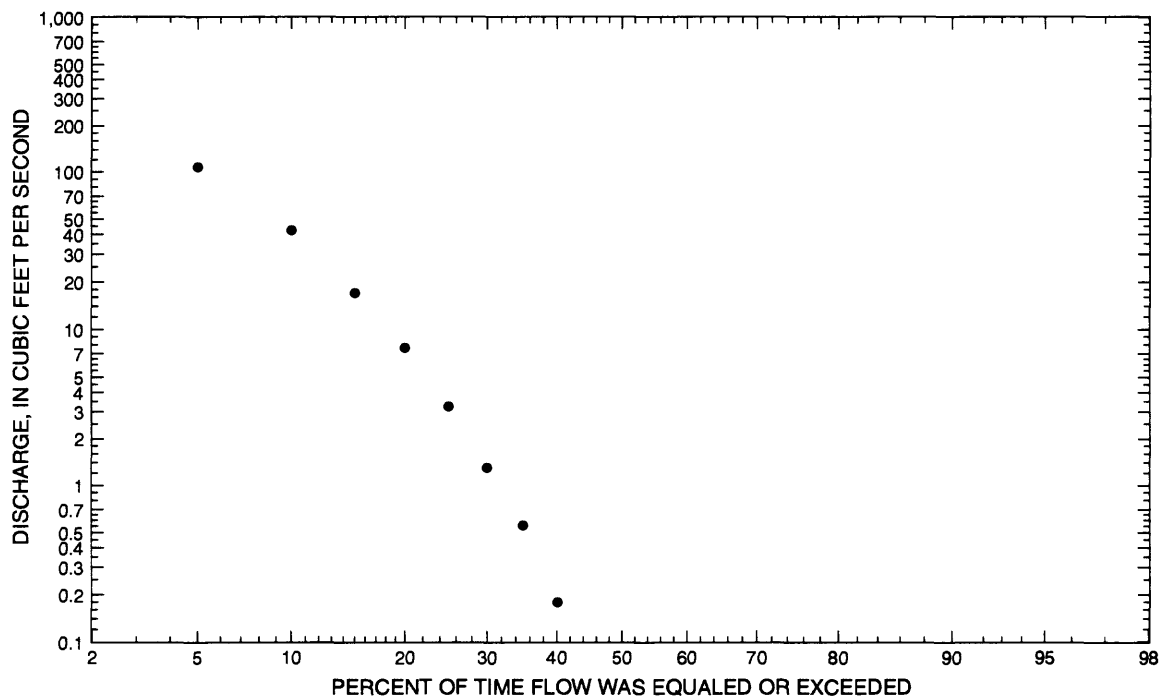
05096500 STATE DITCH 85 NEAR LANCASTER, MN--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence; ng, statistic not given]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	43.5	1951	0	m	3.70	9.74	2.63	1.74
November	7.88	1945	0	m	1.37	2.57	1.88	0.64
December	0.945	1948	0	m	0.070	0.21	2.87	0.04
January	0.084	1948	0	m	0	0.02	4.69	0
February	0	m	0	m	0	0	ng	0
March	55.2	1945	0	m	5.35	14.0	2.62	2.52
April	245	1942	0.267	1953	62.2	64.2	1.03	29.3
May	714	1950	0.081	1934	78.2	151	1.94	36.8
June	297	1950	0.107	1952	39.6	65.0	1.64	18.6
July	175	1950	0	m	14.3	36.6	2.56	6.71
August	34.0	1950	0	m	3.60	7.89	2.19	1.70
September	39.8	1942	0	m	4.24	9.84	2.32	2.00
Annual	111	1950	0.276	1934	17.1	24.4	1.43	100

Annual flow duration



05096500 STATE DITCH 85 NEAR LANCASTER, MN--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0.05	0	0.10	0	0	0	0	0	0	0	0
90	0	0	0.11	0	0.18	0	0	0	0	0	0	0	0
85	0	0	0.16	0.10	0.56	0.10	0	0	0	0	0	0	0
80	0	0	0.22	0.69	0.99	0.16	0	0	0	0	0	0	0
75	0	0	0.27	1.40	1.30	0.27	0	0	0	0	0	0	0
70	0	0	0.33	3.00	1.80	0.44	0.10	0	0	0	0	0	0
65	0	0	0.38	6.23	2.30	0.72	0.16	0	0	0	0	0	0
60	0	0	0.44	11.1	4.74	1.90	0.16	0	0	0	0	0	0
55	0	0	0.49	17.6	8.70	2.50	0.33	0	0	0	0	0	0
50	0	0	0.55	24.7	14.2	4.62	0.68	0	0	0	0	0	0
45	0	0	0.60	32.0	23.9	6.96	0.87	0	0	0	0	0	0
40	0	0	0.66	49.3	33.4	11.6	0.87	0.10	0	0.18	0	0	0.18
35	0	0	0.71	65.2	42.9	23.0	1.80	0.39	0.10	0.49	0.10	0	0.56
30	0	0	0.77	81.6	64.5	36.6	3.70	0.86	0.76	0.74	0.40	0	1.30
25	0	0	0.82	102	90.4	52.7	5.96	1.90	1.70	0.90	0.67	0	3.26
20	0	0	0.88	126	137	75.3	10.9	4.10	2.60	2.00	1.30	0	7.68
15	0	0	0.93	155	169	95.6	22.5	6.13	7.68	5.81	2.20	0	17.2
10	0	0	0.99	196	205	120	39.9	11.7	12.5	11.7	4.50	0.10	42.8
5	0	0	26.4	246	280	200	75.5	21.7	30.8	23.9	9.07	0.56	108

05096500 STATE DITCH 85 NEAR LANCASTER, MN--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	7.38	6.67	4.34	2.24
0.95	1.05	33.5	18.3	15.9	11.4	6.86
0.90	1.11	45.2	28.8	24.7	18.5	11.9
0.80	1.25	65.2	48.4	41.3	32.4	22.4
0.50	2	132	120	104	87.0	67.0
0.20	5	272	266	241	210	173
0.10	10	399	387	364	319	269
0.04	25	602	560	552	485	415
0.02	50	786	700	713	626	536
0.01	100	1,000	846	892	778	667
0.005	200	1,250	998	1,090	943	806
0.002	500	1,640	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	0	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	0	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	0	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	0	0

05096500 STATE DITCH 85 NEAR LANCASTER, MN--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	ng	ng	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	0
Non-exceedance probability	Recurrence interval (years)	June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0
0.50	2	0	0	0	0	0	0	0	0

05096500 STATE DITCH 85 NEAR LANCASTER, MN--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water Year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1929	April 8	3.28	102	1944	June 6	4.48	190
1930	May 19	4.23	160	1945	May 3	4.50	180
1931	April 9	3.12	99.0	1946	March 22	4.00	113
1932	April 18	4.90	202	1947	June 13	4.74	218
1933	April 18	3.52	112	1948	May 2	5.26	288
1934	April 12	1.14	11.0	1949	April 13	4.12	136
1935	April 22	--	47.0	1950	May 20	5.90	1,480
1936	April 25	--	22.0	1951	April 30	4.90	250
1937	May 1	--	180	1952	April 8	2.20	57.0
1938	June 3	3.42	60.0	1953	June 7	2.28	56.0
1942	April 5	--	298	1954	June 17	3.70	124
1943	June 6	4.47	190	1955	April 24	4.76	211
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	May 20	5.90	1,480	1949	April 13	4.12	136
1942	April 5	--	298	1954	June 17	3.70	124
1948	May 2	5.26	288	1946	March 22	4.00	113
1951	April 30	4.90	250	1933	April 18	3.52	112
1947	June 13	4.74	218	1929	April 8	3.28	102
1955	April 24	4.76	211	1931	April 9	3.12	99.0
1932	April 18	4.90	202	1938	June 3	3.42	60.0
1943	June 6	4.47	190	1952	April 8	2.20	57.0
1944	June 6	4.28	190	1953	June 7	2.28	56.0
1937	May 1	--	180	1935	April 22	--	47.0
1945	May 3	4.50	180	1936	April 25	--	22.0
1930	May 19	4.23	160	1934	April 12	1.14	11.0

05096500 STATE DITCH 85 NEAR LANCASTER, MN--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1929	--	--	--	--	--	--	42.3	1.85	0.550	0.065	0	0	--
1930	0	0	0	0	0	0	30.1	71.7	4.33	2.70	0	0	9.15
1931	0	0	0	0	0	0.258	22.7	2.52	0.313	0.210	0	0	2.14
1932	0	0	0	0	0	0	89.8	27.4	0.337	0	0	0	9.71
1933	0	0	0	0	0	0	43.4	18.1	12.9	0.297	0	0	6.19
1934	0	0	0	0	0	0	2.83	0.081	0.157	0.277	0	0	0.276
1935	0	0	0	0	0	0	15.5	1.71	0.270	0.361	0	0	1.47
1936	0	0	0	0	0	0	7.57	5.65	0.193	0	0	0	1.12
1937	0	0	0	0	0	0	22.2	50.4	3.96	4.55	5.32	2.67	7.49
1938	0.935	0	0	0	0	6.19	1.81	30.4	31.4	1.00	0	0	6.00
1942	--	--	--	--	--	28.1	245.3	180.2	42.1	0.610	3.82	39.8	--
1943	3.62	0.870	0	0	0	0	121.9	94.1	108.1	44.8	2.65	0.423	31.3
1944	0	0	0	0	0	0	21.5	1.08	82.7	24.1	8.22	5.28	11.8
1945	1.04	7.88	0.023	0	0	55.2	125.2	115.1	8.42	1.01	0.032	10.7	27.2
1946	9.71	1.90	0	0	0	33.3	65.5	8.68	0.483	0.135	0	0	9.98
1947	0.713	0.237	0	0	0	0	15.1	4.25	99.4	37.7	19.2	9.23	15.4
1948	16.4	6.13	0.945	0.084	0	0	126.8	235.6	84.0	29.3	9.72	0.793	42.6
1949	0	0.130	0	0	0	0	71.9	31.2	4.50	3.93	2.36	0	9.48
1950	4.74	5.92	0.239	0	0	0	61.7	714.5	296.9	174.9	34.0	28.8	111.2
1951	43.5	6.32	0.368	0	0	0	195.2	198.2	41.6	0.039	0.113	0.033	40.6
1952	0.168	0.007	0	0	0	0	13.8	0.223	0.107	0.013	0	0	1.17
1953	0	0	0	0	0	0	0.267	0.223	15.1	1.70	0.068	0	1.43
1954	0	0	0	0	0	0	33.2	47.2	51.3	2.32	0.561	0.993	11.3
1955	0.610	0.663	0.068	0	0	0	116.7	35.2	60.3	12.3	0.410	3.06	19.0

05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND

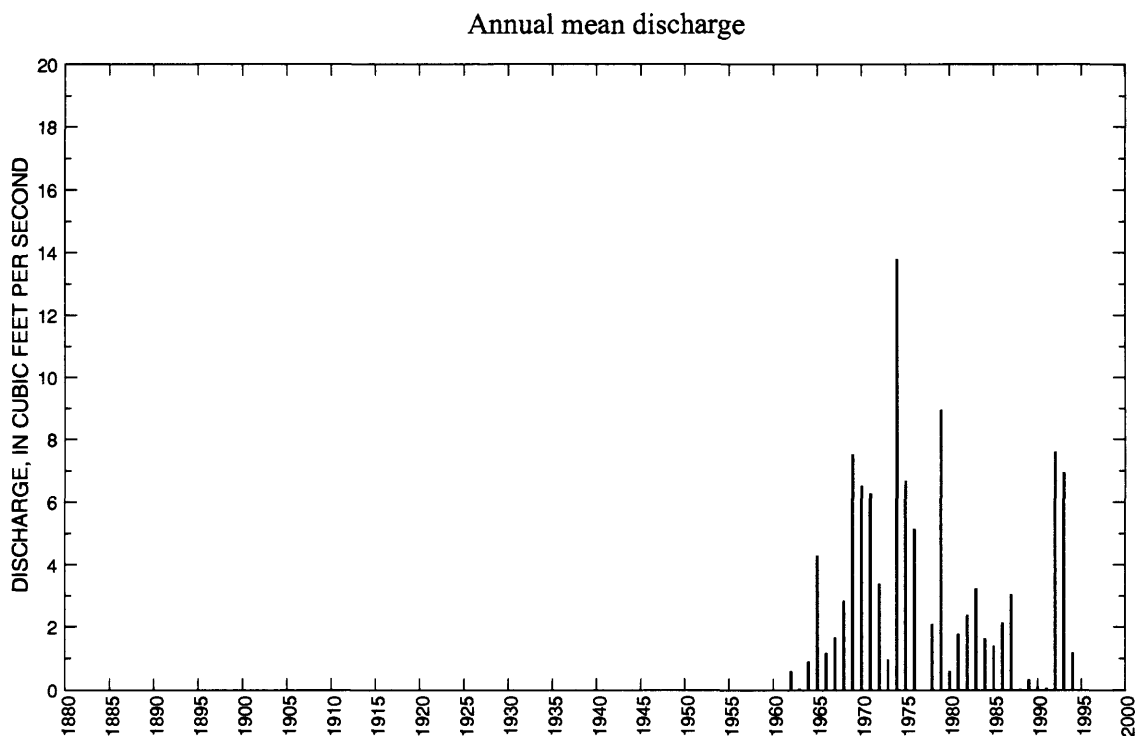
LOCATION.--Lat 48°57'10", long 99°25'35", in SE¹/₄SW¹/₄ sec.11, T.163 N., R.68 W., Towner County, Hydrologic Unit 09020313, on right bank 400 ft downstream from bridge on county highway, and 2.5 mi west of Hansboro.

DRAINAGE AREA.--38 mi², approximately.

PERIOD OF RECORD.--October 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,615 ft above sea level, from topographic map. Prior to May 20, 1962, nonrecording gage 400 ft upstream at same datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,200 ft³/s, Apr. 23, 1979, gage height, 10.50 ft, from floodmark, backwater from ice; no flow at times.



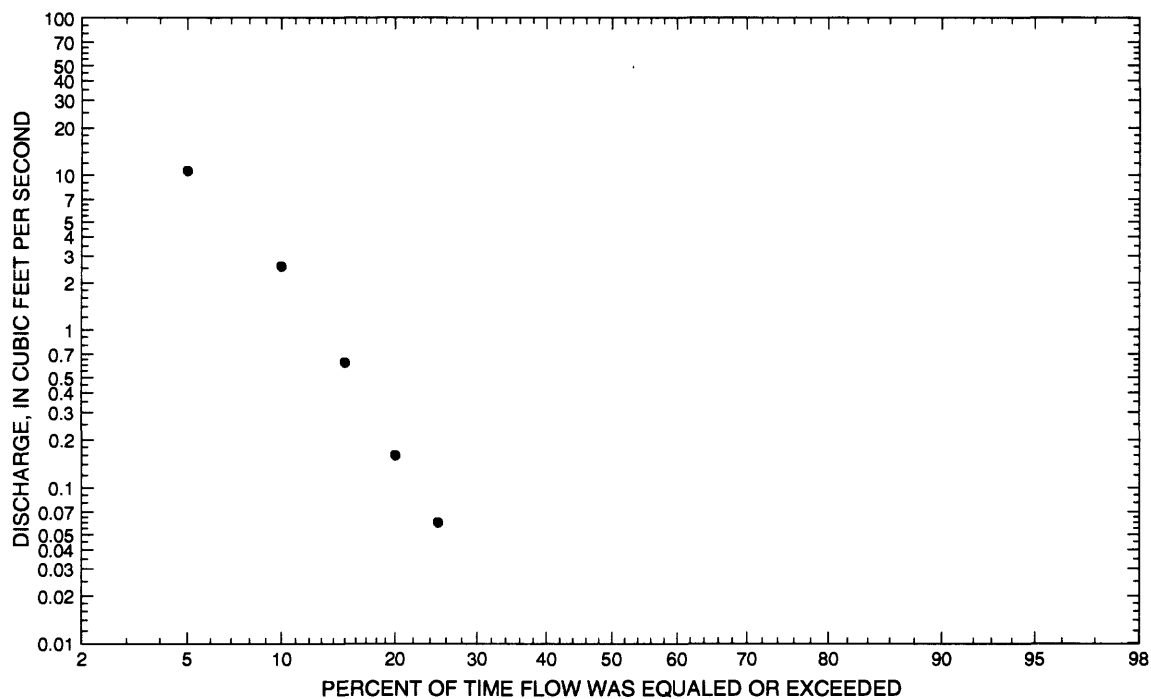
05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	1.05	1981	0	m	0.070	0.21	2.92	0.18
November	0.538	1981	0	m	0.030	0.10	3.34	0.08
December	1.02	1983	0	m	0.030	0.18	5.47	0.08
January	0.012	1994	0	m	0	0	5.74	0
February	11.4	1981	0	m	0.350	1.98	5.74	0.90
March	77.5	1992	0	m	5.56	14.0	2.51	14.4
April	117	1974	0.003	1963	22.0	30.7	1.39	57.3
May	43.9	1974	0	m	4.44	9.31	2.09	11.6
June	9.34	1986	0	m	1.14	2.35	2.06	2.97
July	57.4	1993	0	m	3.09	10.5	3.41	8.04
August	17.1	1968	0	m	1.07	3.49	3.26	2.78
September	16.7	1968	0	m	0.640	2.92	4.55	1.67
Annual	13.8	1974	0.003	1977	3.19	3.25	1.02	100

Annual flow duration



05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0.06	0.02	0	0	0	0	0	0	0	0
75	0	0	0	0.08	0.04	0	0	0	0	0	0	0	0
70	0	0	0	0.16	0.06	0	0	0	0	0	0	0	0
65	0	0	0	0.44	0.08	0	0	0	0	0	0	0	0
60	0	0	0	0.62	0.14	0	0	0	0	0	0	0	0
55	0	0	0	1.20	0.18	0	0	0	0	0	0	0	0
50	0	0	0	1.70	0.24	0.02	0	0	0	0	0	0	0
45	0	0	0	3.53	0.43	0.03	0	0	0	0	0	0	0
40	0	0	0	5.03	0.58	0.05	0	0	0	0	0	0	0
35	0	0	0	6.68	0.77	0.09	0	0	0	0	0	0	0
30	0	0	0	8.44	1.40	0.11	0.04	0	0	0	0	0	0
25	0	0	0.20	13.2	1.80	0.19	0.10	0	0	0	0	0	0.06
20	0	0	0.89	19.8	2.50	0.44	0.33	0	0	0	0	0	0.16
15	0	0	4.57	28.9	4.86	0.98	1.00	0	0	0.08	0.02	0	0.62
10	0	0	12.1	50.8	10.3	2.20	2.50	0.16	0.14	0.17	0.06	0	2.57
5	0	0	33.0	101	24.9	5.36	10.6	1.90	2.40	0.29	0.14	0	10.7

05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	0.069	0.064	0.041	0.021
0.95	1.05	7.40	1.03	0.834	0.540	0.295
0.90	1.11	15.4	3.44	2.66	1.72	0.963
0.80	1.25	35.2	12.1	8.92	5.74	3.31
0.50	2	140	75.2	52.6	33.4	20.0
0.20	5	433	238	165	103	62.6
0.10	10	715	349	243	150	91.8
0.04	25	1,140	461	323	197	121
0.02	50	1,500	520	368	223	137
0.01	100	1,870	563	400	242	149
0.005	200	2,250	593	424	255	157
0.002	500	2,760	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	ng	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	ng	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	ng	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	ng	0

05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	0	0	0
0.10	10	ng	ng	ng	ng	ng	0	0	0
0.20	5	ng	ng	ng	ng	ng	0	0	0
0.50	2	ng	ng	ng	ng	ng	0	0	0.033
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	ng	ng	ng	0	ng	ng	0	0
0.10	10	ng	ng	ng	0	ng	ng	0	0
0.20	5	ng	ng	ng	0	ng	ng	0	0
0.50	2	ng	ng	ng	0	ng	ng	0	0

05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1962	April 6	--	40.0	1979	April 23	10.50	1,200
1963	July 25	5.23	8.90	1980	April 3	7.51	90.0
1964	April 9	--	32.0	1981	February 21	7.65	95.0
1965	April 11	7.09	124	1982	March 30	8.01	214
1966	March 14	6.92	66.0	1983	April 2	7.99	155
1967	April 21	6.73	128	1984	March 24	7.70	264
1968	August 24	7.17	218	1985	March 17	7.69	60.0
1969	April 12	8.80	700	1986	June 21	7.45	276
1970	April 29	7.20	317	1987	April 5	8.14	281
1971	April 10	8.11	637	1988	April 4	6.12	4.60
1972	March 16	7.62	354	1989	April 8	6.23	66.0
1973	June 20	6.51	52.0	1990	April 3	5.79	5.10
1974	April 21	8.61	1,060	1991	August 6	--	6.00
1975	April 28	7.93	405	1992	March 29	--	264
1976	April 1	8.12	330	1993	July 19	8.30	355
1977	April 11	5.42	0.10	1994	March 24	--	224
1978	April 6	7.73	200				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 23	10.50	1,200	1983	April 2	7.99	155
1974	April 21	8.61	1,060	1967	April 21	6.73	128
1969	April 12	8.80	700	1965	April 11	7.09	124
1971	April 10	8.11	637	1981	February 21	7.65	95.0
1975	April 28	7.93	405	1980	April 3	7.51	90.0
1993	July 19	8.30	355	1966	March 14	6.92	66.0
1972	March 16	7.62	354	1989	April 8	6.23	66.0
1976	April 1	8.12	330	1985	March 17	7.69	60.0
1970	April 29	7.20	317	1973	June 20	6.51	52.0
1987	April 5	8.14	281	1962	April 6	--	40.0
1986	June 21	7.45	276	1964	April 9	--	32.0
1984	March 24	7.70	264	1963	July 25	5.23	8.90
1992	March 29	--	264	1991	August 6	--	6.00
1994	March 24	--	224	1990	April 3	5.79	5.10
1968	August 24	7.17	218	1988	April 4	6.12	4.60
1982	March 30	8.01	214	1977	April 11	5.42	0.100
1978	April 6	7.73	200				

05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1962	0	0	0	0	0	0	6.91	0.323	0.083	0	0	0	0.602
1963	0	0	0	0	0	0.023	0.003	0	0.457	0.016	0	0	0.041
1964	0	0	0	0	0	0	9.51	0.597	0.433	0.048	0.110	0.343	0.907
1965	0.248	0.010	0	0	0	0	26.4	16.9	2.78	4.95	0.071	0	4.29
1966	0	0	0	0	0	9.26	1.01	1.80	0.026	1.65	0.085	0	1.17
1967	0	0	0	0	0	2.58	14.6	2.83	0.008	0	0	0	1.66
1968	0	0	0	0	0	0.125	0.060	0.025	0.006	0	17.1	16.7	2.84
1969	0.505	0.184	0.046	0	0	0	88.4	1.51	0.037	0.788	0.002	0	7.53
1970	0	0	0	0	0	0.020	29.1	27.7	0.265	19.5	1.17	0.099	6.53
1971	0.009	0.013	0	0	0	0	57.5	1.91	3.70	12.4	0.325	0	6.27
1972	0.049	0.034	0	0	0	24.3	13.2	1.31	0.810	0.699	0.047	0	3.39
1973	0	0	0	0	0.004	0.940	0.032	0.076	8.17	1.81	0	0.690	0.971
1974	0.052	0.004	0	0	0	0	117.0	43.9	5.95	0	0.014	0	13.8
1975	0	0	0	0	0	0	71.1	9.15	0.653	0.047	0	0	6.68
1976	0	0	0	0	0	7.22	54.6	0.815	0.003	0	0	0	5.15
1977	0	0	0	0	0	0	0.031	0	0	0	0	0	0.003
1978	0	0	0	0	0	0	25.1	0.429	0.008	0	0	0	2.10
1979	0	0	0	0	0	0	92.0	15.8	0.661	0	0	0	8.96
1980	0	0	0	0	0	0	6.25	0.024	0	0	0.005	1.06	0.602
1981	1.05	0.538	0	0	11.4	4.82	0.291	2.19	1.89	0.038	0	0	1.78
1982	0	0	0	0	0	4.58	18.4	5.32	0.250	0.011	0	0	2.38
1983	0.096	0.117	1.02	0	0.002	2.84	30.7	2.91	0.173	1.30	0.001	0	3.24
1984	0	0	0	0	0	8.45	4.64	6.44	0.010	0	0	0	1.64
1985	0	0	0	0	0	15.1	1.28	0.053	0.021	0.012	0.006	0	1.40
1986	0.010	0	0	0	0	6.86	6.10	2.47	9.34	0.882	0.009	0	2.14
1987	0	0	0	0	0	5.68	23.6	0.087	0	0	7.31	0.008	3.05
1988	0	0	0	0	0	0	0.324	0.004	0	0	0	0	0.027
1989	0	0	0	0	0	0	4.00	0.064	0.009	0	0	0	0.335
1990	0	0	0	0	0	0.098	1.00	0.058	0.021	0	0	0	0.097
1991	0	0	0	0	0	0.116	0.180	0.242	0.034	0.103	0.082	0.028	0.066
1992	0.004	0.013	0.002	0	0	77.5	11.7	0.939	0.012	0	0	0	7.61
1993	0	0	0	0	0	4.47	6.95	0.423	1.81	57.4	8.90	2.23	6.95
1994	0.317	0.067	0.003	0.012	0	8.36	4.50	0.374	0.071	0.347	0.001	0	1.18

05098800 CYPRESS CREEK NEAR SARLES, ND

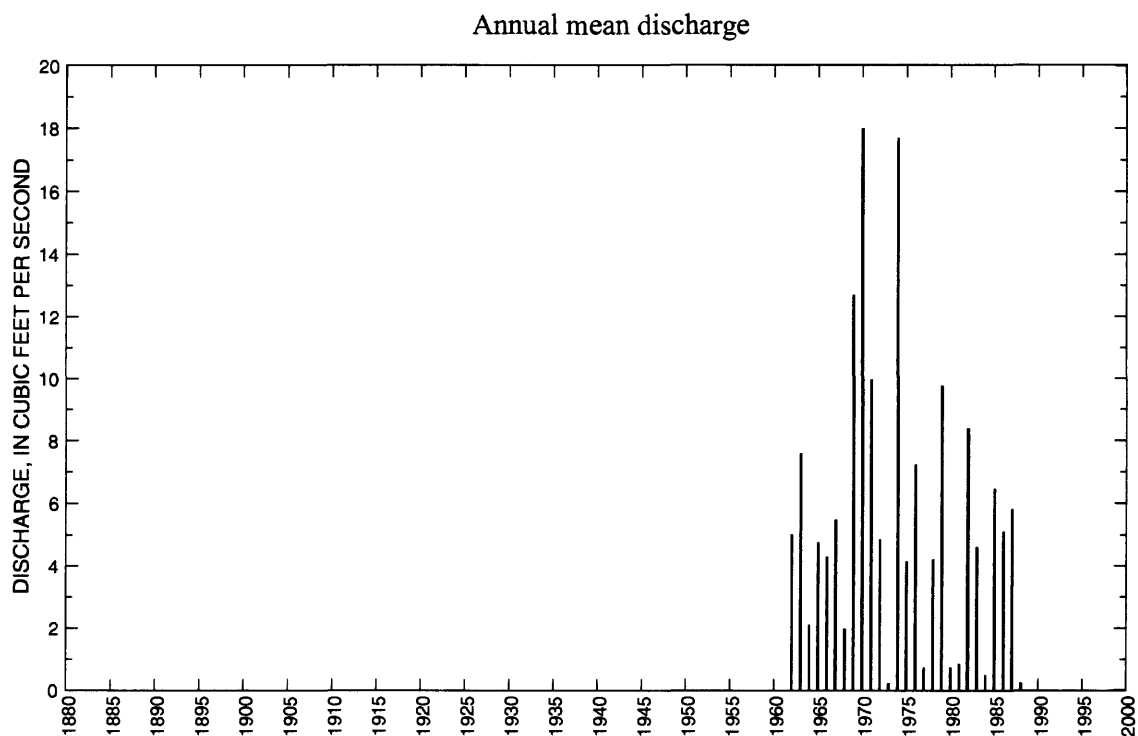
LOCATION.--Lat 48°56'35", long 98°57'05", in SW¹/₄SE¹/₄ sec.9, T.163 N., R.64 W., Cavalier County, Hydrologic Unit 09020313, on right bank 150 ft downstream from twin multiplate culverts on county highway, and 2.5 mi east of Sarles.

DRAINAGE AREA.--71 mi², approximately.

PERIOD OF RECORD.--May 1961 to September 1988. Prior to October 1973, published as Long River near Sarles.

GAGE.--Water-stage recorder. Datum of gage is 1,545 ft above sea level, from topographic map.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,000 ft³/s, Apr. 21, 1979; maximum gage height, 10.35 ft, Apr. 21, 1979, backwater from ice and snow; no flow for several months each year.



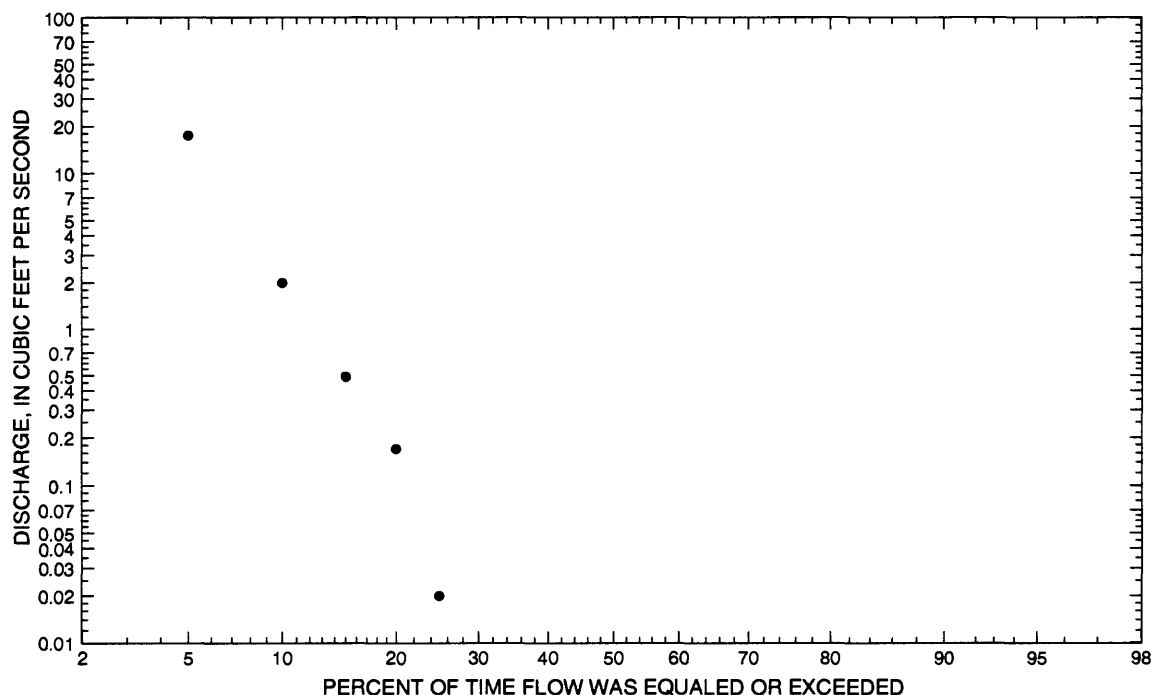
05098800 CYPRESS CREEK NEAR SARLES, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence; ng, statistic not given]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	2.25	1983	0	m	0.110	0.43	4.06	0.15
November	0.162	1983	0	m	0.010	0.03	4.20	0.01
December	0.337	1983	0	m	0.010	0.06	5.29	0.02
January	0	m	0	m	0	0	ng	0
February	4.71	1981	0	m	0.170	0.91	5.20	0.26
March	49.2	1985	0	m	7.28	13.6	1.87	10.7
April	171	1974	0.037	1973	42.2	48.8	1.16	61.9
May	42.6	1974	0	m	4.10	8.56	2.09	6.02
June	122	1970	0	m	9.79	25.9	2.64	14.4
July	30.4	1965	0	m	3.04	7.74	2.55	4.46
August	16.5	1963	0	m	1.04	3.44	3.30	1.53
September	11.9	1968	0	m	0.450	2.25	4.97	0.66
Annual	18.0	1970	0.219	1973	5.69	4.76	0.84	100

Annual flow duration



05098800 CYPRESS CREEK NEAR SARLES, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0	
85	0	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0.08	0	0	0	0	0	0	0	0	0
75	0	0	0	0.17	0	0	0	0	0	0	0	0	0
70	0	0	0	0.48	0	0	0	0	0	0	0	0	0
65	0	0	0	0.69	0.04	0	0	0	0	0	0	0	0
60	0	0	0	0.98	0.08	0	0	0	0	0	0	0	0
55	0	0	0	2.00	0.15	0	0	0	0	0	0	0	0
50	0	0	0	3.32	0.27	0	0	0	0	0	0	0	0
45	0	0	0	4.58	0.36	0	0	0	0	0	0	0	0
40	0	0	0	7.09	0.49	0.03	0	0	0	0	0	0	0
35	0	0	0	12.1	0.66	0.08	0	0	0	0	0	0	0
30	0	0	0	19.8	0.89	0.16	0	0	0	0	0	0	0
25	0	0	0.26	29.2	1.60	0.32	0.06	0	0	0	0	0	0.02
20	0	0	1.90	44.5	2.20	0.89	0.16	0	0	0	0	0	0.17
15	0	0	4.33	63.9	5.47	1.80	0.39	0.06	0	0	0	0	0.49
10	0	0	16.2	103	11.6	5.40	0.99	0.18	0.10	0.05	0	0	2.00
5	0	0	45.3	184	24.5	33.1	2.50	1.10	0.45	0.37	0	0	17.6

05098800 CYPRESS CREEK NEAR SARLES, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	3.55	2.99	2.02	1.15
0.95	1.05	30.8	13.2	10.4	6.93	3.97
0.90	1.11	53.9	25.0	19.1	12.5	7.18
0.80	1.25	103	51.3	37.7	24.1	13.8
0.50	2	323	173	118	70.8	39.7
0.20	5	903	478	300	167	91.2
0.10	10	1,480	755	455	242	130
0.04	25	2,410	1,160	672	340	178
0.02	50	3,250	1,500	842	412	212
0.01	100	4,200	1,850	1,010	480	244
0.005	200	5,260	2,210	1,180	545	273
0.002	500	6,840	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	ng	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	ng	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	ng	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	ng	0

05098800 CYPRESS CREEK NEAR SARLES, ND--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	ng	ng	0
0.10	10	ng	ng	ng	ng	ng	ng	ng	0
0.20	5	ng	ng	ng	ng	ng	ng	ng	0
0.50	2	ng	ng	ng	ng	ng	ng	ng	0
Non-exceedance probability	Recurrence interval (years)	June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	ng	ng	ng	0	ng	ng	ng	ng
0.10	10	ng	ng	ng	0	ng	ng	ng	ng
0.20	5	ng	ng	ng	0	ng	ng	ng	ng
0.50	2	ng	ng	ng	0	ng	ng	ng	ng

05098800 CYPRESS CREEK NEAR SARLES, ND--Continued

Annual peak discharge and corresponding gage height

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1962	July 8	4.37	393	1976	April 4	7.30	650
1963	June 2	4.70	572	1977	May 20	3.42	50.0
1964	April 10	3.03	132	1978	April 7	5.84	392
1965	July 22	5.00	360	1979	April 21	10.35	2,000
1966	March 17	6.18	670	1980	April 5	4.05	85.0
1967	April 21	4.57	310	1981	February 24	5.00	31.0
1968	August 25	3.08	98.0	1982	June 5	8.41	1,440
1969	April 12	7.90	1,130	1983	April 2	4.88	148
1970	June 11	8.55	1,740	1984	March 28	3.99	38.0
1971	April 10	8.56	1,920	1985	March 13	6.22	470
1972	March 19	4.98	245	1986	March 17	5.23	198
1973	March 12	3.40	40.0	1987	April 5	7.20	605
1974	April 17	7.62	1,260	1988	March 29	3.00	6.30
1975	April 13	5.75	389				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 21	10.35	2,000	1965	July 22	5.00	360
1971	April 10	8.56	1,920	1967	April 21	4.57	310
1970	June 11	8.55	1,740	1972	March 19	4.98	245
1982	June 5	8.41	1,440	1986	March 17	5.23	198
1974	April 17	7.62	1,260	1983	April 2	4.88	148
1969	April 12	7.90	1,130	1964	April 10	3.03	132
1966	March 17	6.18	670	1968	August 25	3.08	98.0
1976	April 4	7.30	650	1980	April 5	4.05	85.0
1987	April 5	7.20	605	1977	May 20	3.42	50.0
1963	June 2	4.70	572	1973	March 12	3.40	40.0
1985	March 13	6.22	470	1984	March 28	3.99	38.0
1962	July 8	4.37	393	1981	February 24	5.00	31.0
1978	April 7	5.84	392	1988	March 29	3.00	6.30
1975	April 13	5.75	389				

05098800 CYPRESS CREEK NEAR SARLES, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1961	--	--	--	--	--	--	--	--	0	0	0	0	--
1962	0	0	0	0	0	0	42.9	1.10	1.50	15.1	0	0.003	5.03
1963	0	0	0	0	0	1.06	0.823	0.023	46.9	25.6	16.5	0.023	7.59
1964	0	0	0	0	0	0	23.8	0.294	1.59	0.081	0	0	2.11
1965	0	0	0	0	0	0	19.1	2.21	0.873	30.4	3.74	0.567	4.77
1966	0.270	0.002	0	0	0	30.1	12.2	8.49	0.025	0	0	0	4.30
1967	0	0	0	0	0	13.0	45.2	7.84	0	0	0	0	5.48
1968	0	0	0	0	0	3.63	0.475	0	0	0	7.95	11.9	1.99
1969	0.381	0.029	0	0	0	0	152.8	0.661	0.080	0.162	0	0	12.7
1970	0	0	0	0	0	0	84.5	11.9	122.1	0.572	0	0	18.0
1971	0	0	0	0	0	0	119.8	0.450	0	0.873	0.015	0	9.96
1972	0	0	0	0	0	41.3	16.2	0.393	0.002	0	0	0	4.86
1973	0	0	0	0	0	2.54	0.037	0	0	0	0	0	0.219
1974	0	0	0	0	0	0	170.6	42.6	0.888	0.005	0	0	17.7
1975	0	0	0	0	0	0	34.2	3.99	10.5	1.60	0	0	4.15
1976	0	0	0	0	0	0	87.9	0.199	0.005	0	0.022	0	7.23
1977	0	0	0	0	0	0	0.074	8.44	0.157	0	0	0	0.736
1978	0	0	0	0	0	0	45.8	4.74	0.340	0.346	0	0	4.23
1979	0	0	0	0	0	0	106.2	11.9	0.424	0.002	0	0	9.77
1980	0	0	0	0	0	0	8.52	0.018	0.193	0.127	0.042	0.007	0.730
1981	0.018	0.013	0	0	4.71	4.71	0.638	0.496	0.016	0	0	0	0.860
1982	0	0	0	0	0	4.97	42.1	0.691	54.1	0.105	0.048	0	8.39
1983	2.25	0.162	0.337	0	0	12.6	39.1	0.678	0.048	0.320	0	0	4.61
1984	0	0	0	0	0	3.95	1.13	0.780	0.021	0	0	0	0.495
1985	0	0	0	0	0	49.2	1.16	0.006	18.6	7.75	0.064	0	6.47
1986	0.029	0	0	0	0	27.8	12.6	2.83	15.7	2.06	0.013	0	5.10
1987	0	0	0	0	0	0	70.0	0.028	0	0	0.695	0.163	5.83
1988	0.010	0	0	0	0	1.61	1.15	0.002	0	0	0	0	0.232
1989	0	0	0	--	--	--	--	--	--	--	--	--	--

05099100 SNOWFLAKE CREEK NEAR SNOWFLAKE, MB

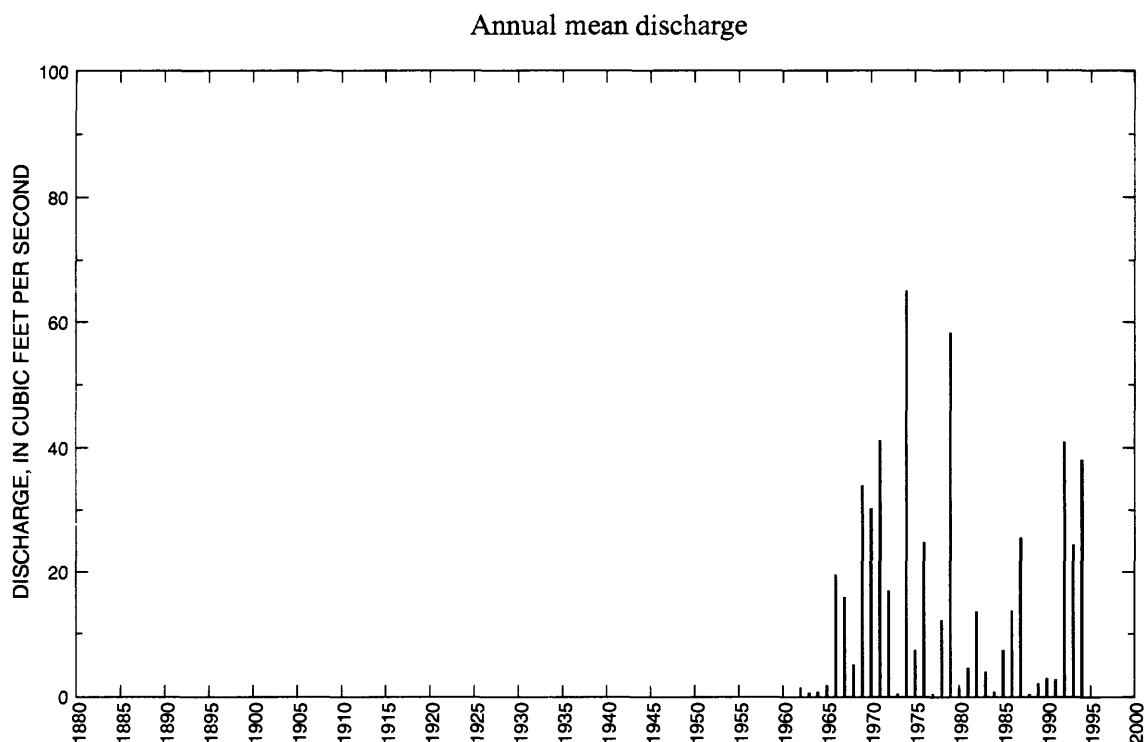
LOCATION.--Lat 49°01'17", long 98°36'13", in SW¹/₄ sec.10, T.1., R.9 W., first meridian, Hydrologic Unit 09020313, at traffic bridge, 2.5 mi east, and 1.5 mi south of Snowflake, Manitoba.

DRAINAGE AREA.--348 mi².

PERIOD OF RECORD.--March 1961 to current year.

GAGE.--Water-stage recorder since March 1968 and nonrecording gage prior thereto. Datum of gage is Geodetic Survey of Canada Datum of 1929. Prior to Jan. 1, 1987, recording gage at same site at datum of 1,221.66 ft above Geodetic Survey of Canada Datum of 1929. Prior to Apr. 2, 1964, nonrecording gage at present site and datum. Apr. 2, 1964, to May 10, 1965, nonrecording gage at site 0.5 mi downstream at present datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,130 ft³/s, Apr. 21, 1979, gage height, 1,229.94 ft; no flow at times.



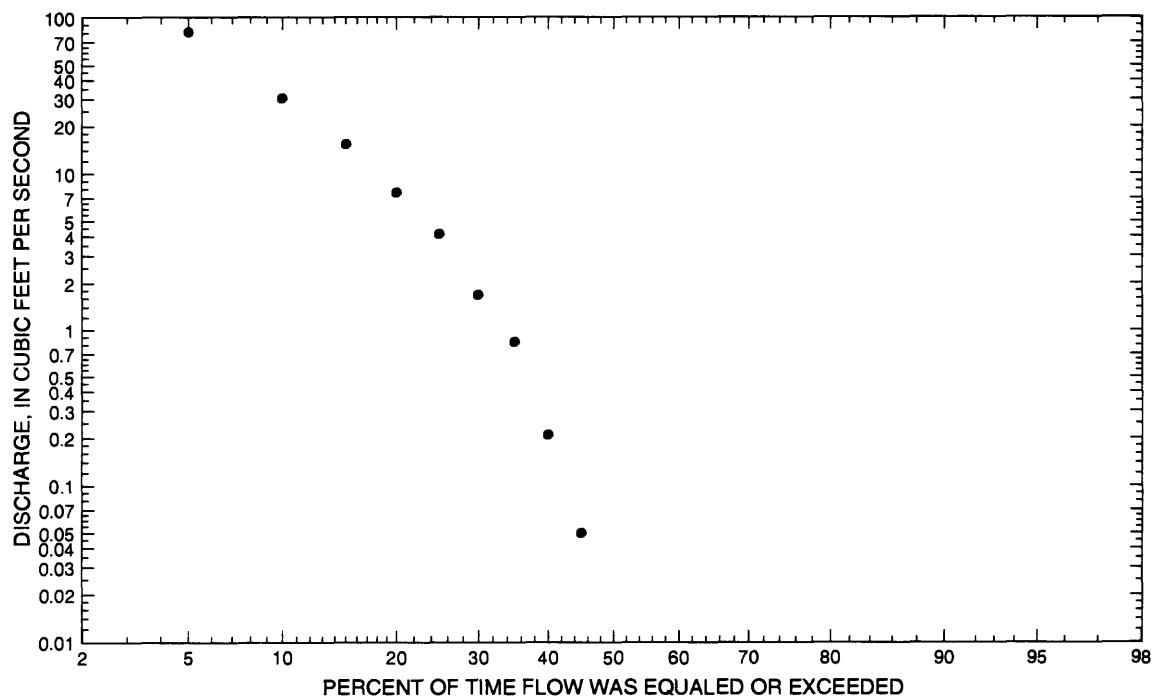
05099100 SNOWFLAKE CREEK NEAR SNOWFLAKE, MB--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	68.6	1994	0	m	3.04	12.0	3.94	1.66
November	25.7	1994	0	m	1.28	5.54	3.55	0.70
December	1.51	1994	0	m	0.090	0.30	3.14	0.05
January	0.078	1994	0	m	0	0.02	3.94	0
February	4.90	1981	0	m	0.150	0.85	5.61	0.08
March	42.5	1992	0	m	6.01	9.43	1.57	3.27
April	353	1992	0.225	1973	85.7	103	1.21	46.7
May	390	1979	0.061	1988	54.7	94.1	1.72	29.8
June	123	1974	0	m	17.2	27.3	1.59	9.40
July	35.7	1993	0	m	6.83	9.90	1.45	3.72
August	70.4	1993	0	m	4.08	12.2	2.98	2.22
September	99.7	1993	0	m	4.29	17.1	3.99	2.34
Annual	65.1	1974	0.378	1988	15.7	17.6	1.12	100

Annual flow duration



05099100 SNOWFLAKE CREEK NEAR SNOWFLAKE, MB--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equalled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0.40	0.10	0	0	0	0	0	0	0	0
85	0	0	0	0.57	0.18	0	0	0	0	0	0	0	0
80	0	0	0	1.10	0.47	0	0	0	0	0	0	0	0
75	0	0	0	2.20	0.65	0.05	0	0	0	0	0	0	0
70	0	0	0	4.49	1.20	0.32	0	0	0	0	0	0	0
65	0	0	0	7.00	1.70	1.10	0.03	0	0	0	0	0	0
60	0	0	0	10.7	3.66	1.60	0.10	0	0	0	0	0	0
55	0	0	0	15.8	7.01	3.35	0.31	0	0	0	0	0	0
50	0	0	0	20.6	15.0	4.80	0.73	0.02	0	0	0	0	0
45	0	0	0	26.4	21.4	8.52	1.70	0.13	0	0.03	0	0	0.05
40	0	0	0.07	34.3	29.1	11.7	3.70	0.39	0.05	0.05	0	0	0.21
35	0	0	0.35	48.2	38.8	14.5	5.53	0.89	0.17	0.09	0.04	0	0.84
30	0	0	1.00	66.9	48.8	16.6	7.36	1.60	0.40	0.26	0.10	0	1.70
25	0	0	1.80	91.6	62.1	18.7	8.63	2.70	0.92	0.45	0.23	0	4.16
20	0	0	4.61	161	80.6	21.9	10.9	4.57	1.60	1.30	0.30	0	7.61
15	0	0	7.45	225	105	26.7	14.4	5.64	3.87	2.30	1.10	0	15.5
10	0	0	12.4	302	149	38.3	19.1	8.68	6.78	4.14	2.40	0	30.6
5	0	0	33.0	421	270	73.1	29.2	13.4	10.4	7.64	4.91	0.29	81.5

05099100 SNOWFLAKE CREEK NEAR SNOWFLAKE, MB--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	4.40	3.15	2.18	1.51	0.962
0.95	1.05	14.1	9.57	6.81	4.83	3.20
0.90	1.11	25.1	16.8	12.2	8.80	5.97
0.80	1.25	48.8	32.5	24.2	17.9	12.5
0.50	2	156	106	83.5	65.6	48.5
0.20	5	432	314	265	224	176
0.10	10	698	533	467	415	338
0.04	25	1,120	911	836	784	662
0.02	50	1,490	1,270	1,200	1,170	1,010
0.01	100	1,910	1,690	1,650	1,660	1,470
0.005	200	2,360	2,180	2,190	2,280	2,060
0.002	500	3,010	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	0	0	0
0.10	10	ng	ng	ng	ng	ng	ng	0	0	0
0.20	5	ng	ng	ng	ng	ng	ng	0	0	0
0.50	2	ng	ng	ng	ng	ng	ng	0	0	0.024

05099100 SNOWFLAKE CREEK NEAR SNOWFLAKE, MB--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	0	0	0
0.10	10	ng	ng	ng	ng	ng	0	0	0
0.20	5	ng	ng	ng	ng	ng	0	0	0
0.50	2	ng	ng	ng	ng	ng	0	0	0.643
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0
0.50	2	0	0	0	0.116	0	0	0	0

05099100 SNOWFLAKE CREEK NEAR SNOWFLAKE, MB--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water years	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1961	March 27	1,224.21	13.6	1978	April 27	1,226.31	247
1962	April 18	1,226.41	101	1979	April 21	1,229.94	1,130
1963	March 21	1,226.39	9.90	1980	April 5	1,225.71	67.0
1964	April 9	1,224.18	21.7	1981	May 22	1,225.67	82.0
1965	April 11	1,225.12	44.0	1982	June 6	1,228.38	505
1966	April 14	1,226.36	227	1983	April 6	1,225.87	56.0
1967	April 20	1,226.54	310	1984	March 26	1,224.75	14.9
1968	August 25	1,224.01	79.4	1985	April 8	1,226.68	190
1969	April 11	1,227.39	653	1986	June 3	1,228.07	427
1970	April 25	1,226.27	279	1987	April 5	1,228.77	438
1971	April 12	--	658	1988	April 3	1,225.34	29.0
1972	April 16	--	402	1989	April 14	1,226.64	185
1973	March 18	--	21.2	1990	April 3	1,226.57	155
1974	May 21	1,227.64	823	1991	July 12	1,226.63	188
1975	April 28	1,224.64	158	1992	April 8	1,228.86	600
1976	April 8	--	344	1993	July 28	1,226.69	155
1977	May 19	1,225.43	29.0	1994	April 15	1,227.84	378
Annual peak discharge, from highest to lowest, and corresponding gage height							
1979	April 21	1,229.94	1,130	1989	April 14	1,226.64	185
1974	May 21	1,227.64	823	1975	April 28	1,224.64	158
1971	April 12	--	658	1990	April 3	1,226.57	155
1969	April 11	1,227.39	653	1993	July 28	1,226.69	155
1992	April 8	1,228.86	600	1962	April 18	1,226.41	101
1982	June 6	1,228.38	505	1981	May 22	1,225.67	82.0
1987	April 5	1,228.77	438	1968	August 25	1,224.01	79.4
1986	June 3	1,228.07	427	1980	April 5	1,225.71	67.0
1972	April 16	--	402	1983	April 6	1,225.87	56.0
1994	April 15	1,227.84	378	1965	April 11	1,225.12	44.0
1976	April 8	--	344	1977	May 19	1,225.43	29.0
1967	April 20	1,226.54	310	1988	April 3	1,225.34	29.0
1970	April 25	1,226.27	279	1964	April 9	1,224.18	21.7
1978	April 27	1,226.31	247	1973	March 18	--	21.2
1966	April 14	1,226.36	227	1984	March 26	1,224.75	14.9
1985	April 8	1,226.68	190	1961	March 27	1,224.21	13.6
1991	July 12	1,226.63	188	1963	March 21	1,226.39	9.90

05099100 SNOWFLAKE CREEK NEAR SNOWFLAKE, MB--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1961	--	--	--	--	--	2.04	2.65	0.955	0.400	0	0	0	--
1962	0	0	0	0	0	0	16.4	0.887	0	0	0	0	1.43
1963	0	0	0	0	0	2.36	0.677	0.603	3.01	0.594	0.035	0	0.608
1964	0	0	0	0	0	1.81	6.63	0.297	0.167	0.023	0	0	0.737
1965	0	0	0	0	0	0.284	12.6	2.95	2.80	0.826	0.074	1.73	1.76
1966	3.03	1.39	0	0	0	22.0	122.7	57.5	14.8	8.27	3.89	1.25	19.6
1967	0.345	0.067	0	0	0	6.32	46.4	97.7	24.9	9.50	2.07	1.46	15.8
1968	12.3	3.52	0.023	0	0	4.93	14.1	3.93	0.257	4.37	10.9	6.04	5.05
1969	0.737	0.078	0	0	0	0	266.9	103.7	22.1	12.1	4.14	0.183	34.0
1970	0.010	0	0	0	0	0	73.6	155.2	79.0	34.9	11.0	8.22	30.3
1971	2.37	0.859	0	0	0	0	295.6	139.4	22.5	25.8	5.86	2.97	41.2
1972	2.52	0.461	0.085	0	0	16.8	126.7	52.0	5.55	0.226	0	0	16.9
1973	0	0	0	0	0	5.25	0.225	0.081	0	0	0	0	0.471
1974	0	0	0	0	0	0	233.1	382.9	123.0	22.8	9.67	6.84	65.1
1975	4.78	3.17	0.442	0.008	0	4.15	26.0	36.5	11.8	0.981	0.086	0.166	7.37
1976	0.229	0.047	0	0	0	0.597	200.5	61.6	18.2	10.2	6.63	1.60	24.8
1977	0.039	0	0	0	0	0.281	2.62	1.65	0.273	0.001	0	0.096	0.413
1978	0.008	0	0	0	0	0.474	99.8	43.5	2.25	0.688	0.394	0.007	12.2
1979	0	0	0	0	0	0	222.1	390.5	59.7	18.8	1.75	2.50	58.3
1980	0.067	0.083	0.014	0	0	0.161	12.8	2.03	0.051	0	0.001	0.201	1.27
1981	2.61	5.24	0.308	0	4.90	5.92	21.1	10.7	4.07	0.573	0.112	0.023	4.59
1982	0.074	0.037	0	0	0	5.93	61.9	23.2	67.6	4.35	0.280	0	13.5
1983	0.205	0.152	0.746	0	0.005	7.36	23.6	7.41	0.341	5.16	2.22	0.011	3.94
1984	0.055	0.058	0.002	0	0.021	3.88	2.99	2.00	0.059	0	0	0	0.759
1985	0	0	0	0	0	22.1	56.5	3.94	4.23	2.22	0.112	0	7.40
1986	0.389	0.086	0	0	0	20.4	54.2	40.4	41.8	6.55	0.228	0	13.7
1987	0	0	0	0	0	0.016	251.6	48.9	7.99	0.077	1.63	0.072	25.6
1988	0.020	0.007	0	0	0.082	1.45	2.95	0.061	0	0	0	0	0.378
1989	0	0	0	0	0	0	24.4	1.03	0.010	0	0	0	2.09
1990	0	0	0	0	0.010	1.50	14.2	0.366	16.9	2.15	0.032	0.001	2.90
1991	0	0	0	0	0	5.86	4.57	1.30	5.85	14.0	0.528	0	2.70
1992	2.08	1.02	0	0.041	0	42.5	353.3	77.3	13.7	4.92	0.823	0.029	41.0
1993	0	0.254	0	0	0	0.309	41.2	29.2	15.0	35.7	70.4	99.7	24.4
1994	68.6	25.7	1.51	0.078	0	19.5	219.9	79.7	17.9	6.28	5.72	12.8	38.1

05099150 MOWBRAY CREEK NEAR MOWBRAY, MB

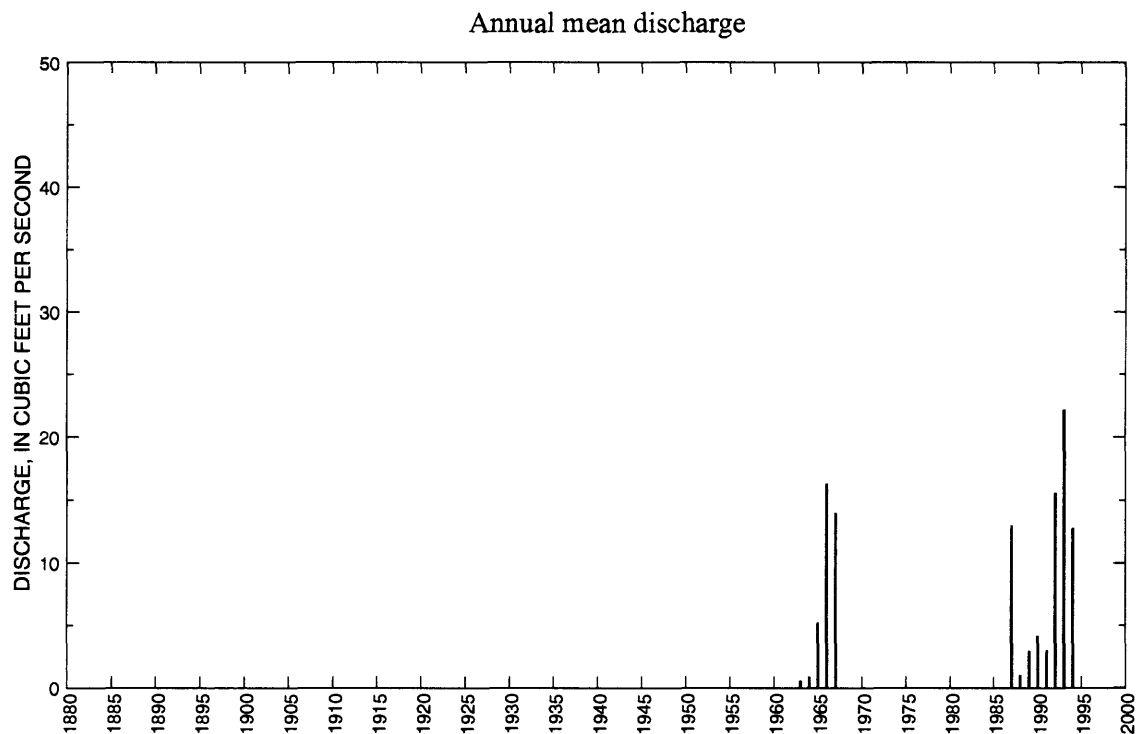
LOCATION.--Lat 49°00'00", long 98°27'15", in SE $\frac{1}{4}$ sec.3, T.1, R.8 W., first meridian, Hydrologic Unit 09020313, on downstream side of bridge on Municipal Road on international boundary, and 1.5 mi east of Mowbray, Manitoba.

DRAINAGE AREA.--93.9 mi².

PERIOD OF RECORD.--March 1962 to current year. Seasonal records only most years.

GAGE.--Water-stage recorder. Datum of gage is Geodetic Survey of Canada Datum of 1929.
Nonrecording gage prior to 1971.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 943 ft³/s, Apr. 6, 1987, gage height, 1,534.57 ft; no flow at times.



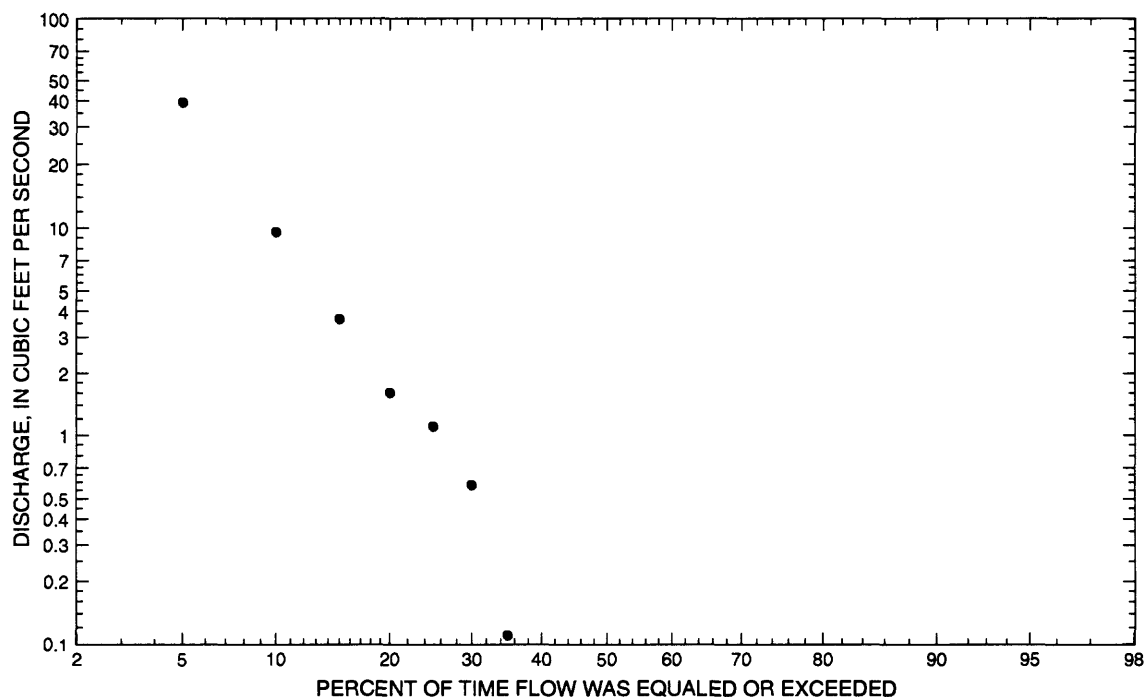
05099150 MOWBRAY CREEK NEAR MOWBRAY, MB--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence; ng, statistic not given]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coefficient of variation	Percentage of annual discharge
October	5.15	1981	0	m	0.600	1.36	2.27	0.56
November	0.634	1988	0	m	0.090	0.21	2.37	0.08
December	0.036	1988	0	m	0.010	0.01	2.44	0.01
January	0	m	0	m	0	0	ng	0
February	5.68	1981	0	m	0.390	1.46	3.80	0.36
March	62.0	1985	0	m	9.91	17.3	1.75	9.33
April	208	1974	1.05	1973	64.4	63.4	0.98	60.6
May	159	1974	0.009	1973	15.0	31.7	2.12	14.1
June	32.0	1986	0	m	5.45	7.86	1.44	5.13
July	55.6	1993	0	m	4.02	10.4	2.58	3.79
August	140	1993	0	m	5.09	24.4	4.79	4.80
September	16.9	1994	0	m	1.29	3.43	2.67	1.21
Annual	22.2	1993	0.589	1963	8.60	7.27	0.85	100

Annual flow duration



05099150 MOWBRAY CREEK NEAR MOWBRAY, MB--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0	0
85	0	0	0	0.37	0	0	0	0	0	0	0	0	0
80	0	0	0	1.10	0	0	0	0	0	0	0	0	0
75	0	0	0	1.50	0.19	0	0	0	0	0	0	0	0
70	0	0	0	2.70	0.37	0.08	0	0	0	0	0	0	0
65	0	0	0	4.46	0.71	0.37	0	0	0	0	0	0	0
60	0	0	0	6.16	0.99	0.50	0	0	0	0	0	0	0
55	0	0	0	9.44	1.40	0.92	0.04	0	0	0	0	0	0
50	0	0	0	14.6	1.90	1.30	0.20	0	0	0	0	0	0
45	0	0	0	19.8	1.90	1.70	0.26	0	0	0	0	0	0
40	0	0	0	25.6	3.40	1.70	0.48	0	0	0	0	0	0
35	0	0	0	33.1	4.29	2.30	0.87	0	0	0	0	0	0.11
30	0	0	0.12	45.3	6.05	3.14	1.60	0.31	0	0	0	0	0.58
25	0	0	0.65	61.9	8.04	3.84	2.10	0.80	0	0	0	0	1.10
20	0	0	2.00	88.6	12.6	4.92	3.39	1.10	0.37	0.28	0	0	1.60
15	0	0	5.45	130	20.9	7.63	4.56	1.50	0.90	0.96	0.11	0	3.67
10	0	0	16.9	199	37.4	12.2	8.03	2.10	2.20	1.80	0.13	0	9.55
5	0	0	40.9	343	72.6	28.2	20.3	8.57	8.74	4.10	0.55	0.04	39.2

05099150 MOWBRAY CREEK NEAR MOWBRAY, MB--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	6.70	2.86	2.67	1.94	1.37
0.95	1.05	22.5	11.7	9.88	6.77	4.60
0.90	1.11	40.3	23.0	18.6	12.5	8.36
0.80	1.25	77.4	48.4	38.1	25.1	16.5
0.50	2	230	163	126	82.3	52.5
0.20	5	564	428	340	227	141
0.10	10	837	645	528	360	222
0.04	25	1,210	936	800	563	343
0.02	50	1,500	1,150	1,020	732	444
0.01	100	1,790	1,360	1,240	912	551
0.005	200	2,070	1,560	1,470	1,100	662
0.002	500	2,430	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	ng	ng	ng
0.10	10	ng	ng	ng	ng	ng	ng	ng	ng	ng
0.20	5	ng	ng	ng	ng	ng	ng	ng	ng	ng
0.50	2	ng	ng	ng	ng	ng	ng	ng	ng	ng

05099150 MOWBRAY CREEK NEAR MOWBRAY, MB--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	ng	ng	ng	ng	ng	ng	0	0
0.10	10	ng	ng	ng	ng	ng	ng	0	0
0.20	5	ng	ng	ng	ng	ng	ng	0	0
0.50	2	ng	ng	ng	ng	ng	ng	0	0.096
		June-July-August				September-October-November			
		0	0	0	0	ng	ng	ng	ng
		0	0	0	0	ng	ng	ng	ng
		0	0	0	0	ng	ng	ng	ng
		0	0	0	0	ng	ng	ng	ng

05099150 MOWBRAY CREEK NEAR MOWBRAY, MB--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1962	April 20	1,531.73	305	1979	April 24	1,533.00	777
1963	June 25	1,528.95	9.20	1980	May 29	1,532.27	310
1964	April 16	1,529.57	22.8	1981	May 22	1,530.96	126
1965	April 13	1,531.36	202	1982	April 14	1,532.80	350
1966	March 29	1,533.86	305	1983	April 7	1,531.49	155
1967	April 24	1,532.42	392	1984	June 10	1,530.45	68.0
1968	April 9	1,529.33	17.6	1985	March 22	1,532.92	484
1969	April 15	1,532.23	377	1986	March 28	1,533.79	643
1970	April 27	1,532.23	372	1987	April 6	1,534.57	943
1971	April 12	1,532.93	630	1988	April 3	1,530.80	55.0
1972	March 21	1,531.35	138	1989	April 19	1,532.59	392
1973	March 18	--	67.0	1990	April 7	1,531.64	137
1974	April 21	1,533.00	670	1991	May 31	1,531.75	133
1975	April 15	1,530.47	59.0	1992	April 1	1,534.10	685
1976	April 7	1,532.47	455	1993	August 3	1,533.25	317
1977	September 8	1,529.91	29.0	1994	April 2	1,533.99	784
1978	April 11	1,532.44	378				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1987	April 6	1,534.57	943	1962	April 20	1,531.73	305
1994	April 2	1,533.99	784	1966	March 29	1,533.86	305
1979	April 24	1,533.00	777	1965	April 13	1,531.36	202
1992	April 1	1,534.10	685	1983	April 7	1,531.49	155
1974	April 21	1,533.00	670	1972	March 21	1,531.35	138
1986	March 28	1,533.79	643	1990	April 7	1,531.64	137
1971	April 12	1,532.93	630	1991	May 31	1,531.75	133
1985	March 22	1,532.92	484	1981	May 22	1,530.96	126
1976	April 7	1,532.47	455	1984	June 10	1,530.45	68.0
1967	April 24	1,532.42	392	1973	March 18	--	67.0
1989	April 19	1,532.59	392	1975	April 15	1,530.47	59.0
1978	April 11	1,532.44	378	1988	April 3	1,530.80	55.0
1969	April 15	1,532.23	377	1977	September 8	1,529.91	29.0
1970	April 27	1,532.23	372	1964	April 16	1,529.57	22.8
1982	April 14	1,532.80	350	1968	April 9	1,529.33	17.6
1993	August 3	1,533.25	317	1963	June 25	1,528.95	9.20
1980	May 29	1,532.27	310				

05099150 MOWBRAY CREEK NEAR MOWBRAY, MB--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1962	--	--	--	--	--	0	62.2	2.38	2.93	0.106	0	0	--
1963	0	0	0	0	0	0.361	1.06	0.084	3.82	1.43	0.313	0.020	0.589
1964	0	0	0	0	0	0	9.45	0.887	0.510	0.223	0	0	0.910
1965	0	0	0	0	0	0	49.7	11.7	1.89	0.032	0	0	5.24
1966	0	0	0	0	0	49.9	89.9	46.8	5.23	2.03	1.34	0.363	16.3
1967	0	0	0	0	0	1.84	103.6	60.1	2.38	0.068	0	0	14.0
1968	0	--	--	--	--	2.53	6.23	0.034	0	0	0	0	--
1969	0	--	--	--	--	--	129.3	6.37	13.0	5.29	1.19	--	--
1970	0	--	--	--	--	0	114.7	31.9	27.6	21.3	1.57	0.293	--
1971	--	--	--	--	--	0	206.2	12.8	3.23	1.17	0	0	--
1972	0	--	--	--	--	28.9	40.2	4.94	0.584	0	0	0	--
1973	0	--	--	--	--	10.6	1.05	0.009	0	0	0	0	--
1974	0	--	--	--	--	0	207.7	159.1	16.0	0.864	0	0	--
1975	0	--	--	--	--	0	18.6	10.3	0.170	0.079	0	0	--
1976	0	--	--	--	--	0	120.7	2.15	0.843	0.305	0.125	0	--
1977	0	--	--	--	--	0.018	2.79	0.061	0	0	0	3.55	--
1978	0.015	--	--	--	--	0.161	107.0	7.18	1.10	1.00	0.065	0	--
1979	0	--	--	--	--	0	177.9	80.5	0.844	8.83	3.98	8.03	--
1980	4.57	--	--	--	--	0.155	14.8	7.89	3.49	1.14	1.66	2.03	--
1981	5.15	--	--	--	5.68	12.9	4.17	2.08	1.11	0.419	0.913	0.197	--
1982	0.316	--	--	--	--	1.13	33.4	5.87	5.00	3.92	0.148	0.012	--
1983	2.55	--	--	--	--	17.7	35.9	2.94	0.971	0.391	0.168	0	--
1984	0	--	--	--	--	4.73	3.80	1.65	8.96	0.031	0	0	--
1985	0	--	--	--	--	62.0	18.4	0.827	7.50	15.0	8.92	3.15	--
1986	2.79	--	--	0	0	50.4	38.6	11.8	32.0	5.00	2.95	0.108	--
1987	0.037	0	0	0	0	0	155.2	0.384	1.01	0.015	1.74	0.075	13.0
1988	1.87	0.634	0.036	0	0.100	1.73	8.06	0.050	0	0	0	0	1.03
1989	0	0	0	0	0	0	33.9	2.04	0.056	0	0	0	2.96
1990	0	0	0	0	0	2.33	31.2	1.30	15.3	0.225	0.105	0.014	4.16
1991	0	0	0	0	0	6.89	2.38	4.76	14.0	6.99	0.998	0	3.01
1992	0.013	0.046	0	0	0	39.5	142.6	5.32	0.868	0.972	0	0	15.6
1993	0	0	0	0	0	0.789	46.0	6.49	8.08	55.6	140.5	6.40	22.2
1994	1.27	0.457	0.035	0	0	22.4	107.5	3.47	1.36	0.355	1.37	16.9	12.8

05099300 PEMBINA RIVER NEAR WINDYGATES, MB

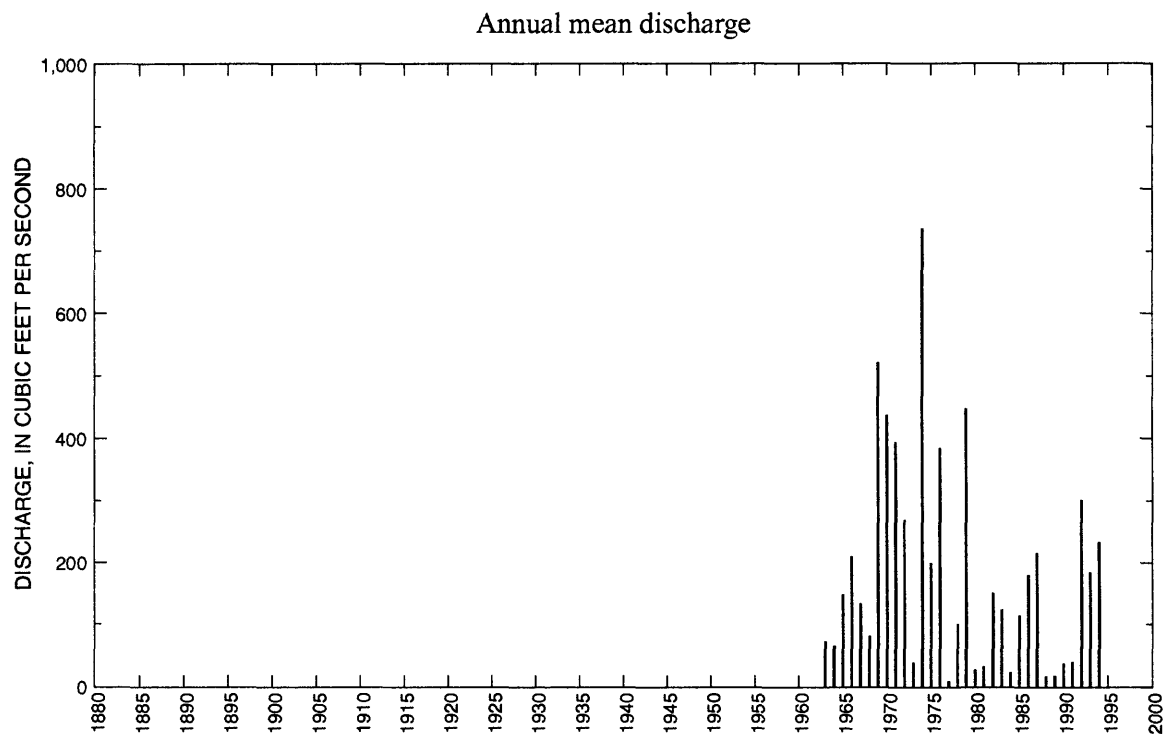
LOCATION.--Lat 49°01'53", long 98°16'40", in SE¹/₄ sec.13, T.1, R.7 W., first meridian, Hydrologic Unit 09020313, on left bank 0.2 mi downstream from bridge, and 3 mi northeast of Windygates, Manitoba.

DRAINAGE AREA.--3,020 mi².

PERIOD OF RECORD.--April 1962 to current year.

GAGE.--Water-stage recorder. Datum of gage is Geodetic Survey of Canada Datum of 1929. Prior to Jan. 1, 1985, datum of gage at 1,102.02 ft above Geodetic Survey of Canada Datum of 1929.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,500 ft³/s, Apr. 26, 1974, gage height, 1,121.52 ft; no flow at times.

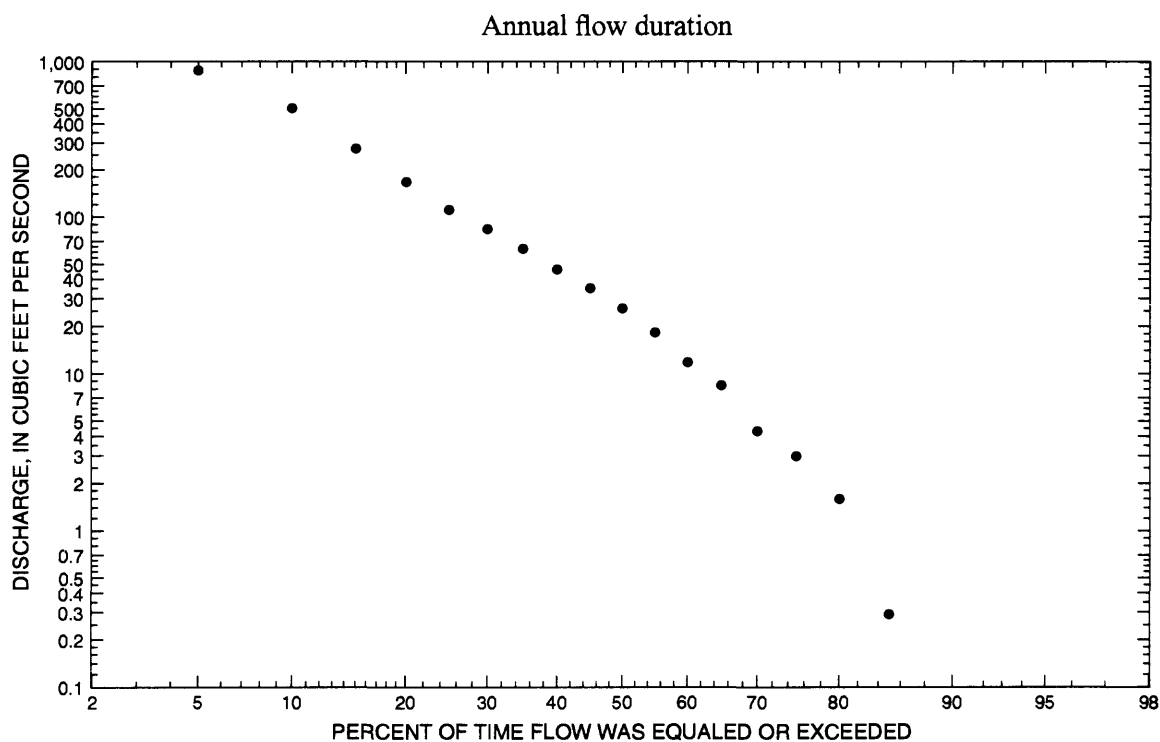


05099300 PEMBINA RIVER NEAR WINDYGATES, MB--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	343	1969	0	m	45.1	71.9	1.59	2.05
November	170	1969	0	m	24.5	36.0	1.47	1.11
December	56.9	1994	0	m	10.6	14.2	1.34	0.480
January	27.0	1994	0	m	5.30	6.90	1.30	0.240
February	44.5	1976	0	m	4.86	8.81	1.81	0.220
March	320	1985	0	m	70.5	107	1.51	3.20
April	3,110	1969	21.3	1977	821	890	1.08	37.3
May	3,620	1974	27.0	1988	669	830	1.24	30.4
June	1,510	1974	4.03	1988	274	322	1.18	12.5
July	633	1970	0.070	1988	124	135	1.09	5.62
August	719	1993	0	1988	86.1	134	1.55	3.91
September	544	1993	0	m	66.8	107	1.60	3.03
Annual	736	1974	9.61	1977	186	174	0.940	100



05099300 PEMBINA RIVER NEAR WINDYGATES, MB--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	7.15	29.2	12.1	0.62	0	0	0.05	0	0	0
90	0	0	0	23.3	46.8	22.3	2.59	0.32	0.04	0.05	0.39	0	0
85	0	0	0	45.7	62.3	31.4	7.84	0.91	0.30	1.70	2.00	0	0.29
80	0	0	0	70.8	74.8	42.3	17.8	3.20	1.10	2.40	3.00	0.50	1.60
75	0	0	0.15	96.8	90.1	68.1	28.2	7.46	3.25	4.73	3.60	1.00	2.99
70	0	0	0.56	122	120	83.8	35.8	18.6	5.24	9.10	4.95	1.60	4.32
65	0.25	0	1.50	148	175	100	43.9	28.8	18.2	13.0	5.87	2.00	8.45
60	0.58	0	3.51	187	226	118	52.4	38.3	24.5	17.3	7.03	2.50	11.9
55	1.30	0.35	5.67	248	292	138	64.7	45.3	31.1	21.8	8.52	3.20	18.4
50	1.60	0.92	8.25	320	387	162	77.9	51.3	37.1	26.1	11.4	4.39	26.1
45	3.00	1.50	10.5	457	466	188	90.7	57.3	42.7	30.4	14.1	5.18	35.3
40	3.70	1.90	12.7	580	554	216	103	67.2	48.4	35.1	17.8	6.64	46.3
35	4.59	3.10	14.5	658	634	252	121	77.7	58.0	39.8	22.2	8.93	62.8
30	5.80	3.10	19.9	786	710	297	142	89.0	67.6	45.2	25.9	11.3	84.0
25	8.48	4.80	33.4	981	829	348	164	101	80.7	52.0	30.7	14.8	112
20	10.3	8.93	50.5	1,230	993	404	190	113	93.9	58.7	36.2	20.2	167
15	13.0	12.2	79.6	1,720	1,260	502	216	140	114	70.0	40.8	23.6	276
10	17.7	14.5	142	2,410	1,700	669	317	192	137	83.4	56.5	29.8	500
5	21.7	16.8	504	3,240	2,450	978	426	304	292	244	95.3	43.5	884

05099300 PEMBINA RIVER NEAR WINDYGATES, MB--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	74.7	52.3	43.8	32.5	22.2
0.95	1.05	174	122	105	84.0	64.1
0.90	1.11	270	191	168	137	110
0.80	1.25	454	330	293	247	206
0.50	2	1,190	937	841	728	634
0.20	5	3,020	2,660	2,380	2,050	1,780
0.10	10	4,830	4,600	4,080	3,460	2,950
0.04	25	7,880	8,240	7,200	5,950	4,930
0.02	50	10,700	12,000	10,400	8,400	6,760
0.01	100	14,100	16,800	14,400	11,400	8,890
0.005	200	18,100	23,000	19,400	15,000	11,300
0.002	500	24,300	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0.030	0.192
0.20	5	0	0	0	0	0	0	0.048	0.472	1.32
0.50	2	0.139	0.146	0.168	0.441	0.646	0.983	1.93	3.18	10.5

05099300 PEMBINA RIVER NEAR WINDYGATES, MB--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0.246
0.20	5	0	0	0	0	0	0	0	2.37
0.50	2	0.284	0.356	0.459	0.715	1.35	2.15	2.82	15.2
		June-July-August				September-October-November			
		0	0	0	0	0	0	0	0
		0.006	0.035	0.076	0.755	0	0	0	0.012
		0.998	1.79	2.48	4.35	0.298	0.576	0.913	0.968
		21.6	23.1	25.9	33.2	5.33	6.70	7.78	11.5

05099300 PEMBINA RIVER NEAR WINDYGATES, MB--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1962	April 21	1,108.51	1,610	1979	May 2	1,116.63	5,440
1963	June 6	1,105.17	255	1980	April 6	--	327
1964	May 10	1,105.62	323	1981	May 22	1,107.31	526
1965	April 14	1,109.75	1,460	1982	June 6	1,110.89	1,920
1966	April 3	1,110.94	1,700	1983	April 8	1,109.29	1,160
1967	April 21	1,111.06	1,890	1984	June 16	1,103.63	491
1968	March 24	1,108.51	744	1985	April 5	1,108.93	1,220
1969	April 19	1,119.31	8,170	1986	March 28	1,109.49	1,230
1970	April 28	1,115.01	3,800	1987	April 8	1,111.90	2,540
1971	April 10	1,115.04	5,910	1988	April 4	1,106.75	178
1972	April 12	--	1,620	1989	April 16	1,106.79	441
1973	August 8	--	145	1990	April 3	1,108.50	794
1974	April 26	1,121.52	11,500	1991	July 12	1,107.33	487
1975	May 14	1,109.76	1,510	1992	April 8	1,113.73	3,080
1976	April 17	1,115.13	4,210	1993	July 28	1,109.73	1,140
1977	May 21	1,105.47	153	1994	April 13	1,109.94	1,380
1978	April 9	1,110.88	1,090				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1974	April 26	1,121.52	11,500	1985	April 5	1,108.93	1,220
1969	April 19	1,119.31	8,170	1983	April 8	1,109.29	1,160
1971	April 10	1,115.04	5,910	1993	July 28	1,109.73	1,140
1979	May 2	1,116.63	5,440	1978	April 9	1,110.88	1,090
1976	April 17	1,115.13	4,210	1990	April 3	1,108.50	794
1970	April 28	1,115.01	3,800	1968	March 24	1,108.51	744
1992	April 8	1,113.73	3,080	1981	May 22	1,107.31	526
1987	April 8	1,111.90	2,540	1984	June 16	1,103.63	491
1982	June 6	1,110.89	1,920	1991	July 12	1,107.33	487
1967	April 21	1,111.06	1,890	1989	April 16	1,106.79	441
1966	April 3	1,110.94	1,700	1980	April 6	--	327
1972	April 12	--	1,620	1964	May 10	1,105.62	323
1962	April 21	1,108.51	1,610	1963	June 6	1,105.17	255
1975	May 14	1,109.76	1,510	1988	April 4	1,106.75	178
1965	April 14	1,109.75	1,460	1977	May 21	1,105.47	153
1994	April 13	1,109.94	1,380	1973	August 8	--	145
1986	March 28	1,109.49	1,230				

05099300 PEMBINA RIVER NEAR WINDYGATES, MB--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1962	--	--	--	--	--	--	421.2	204.9	155.8	54.9	77.4	96.0	--
1963	38.5	16.9	23.4	9.85	0	40.9	135.0	166.3	182.4	96.3	97.9	60.8	72.6
1964	27.3	11.5	3.35	0.816	0	0	231.6	282.8	120.4	35.5	44.4	34.1	66.0
1965	23.1	8.05	1.13	0	0	0	460.4	646.1	382.4	125.1	56.4	80.4	148.9
1966	63.0	40.2	29.4	12.3	2.26	143.4	1,032	696.9	283.5	132.5	65.9	25.8	210.8
1967	10.7	6.41	2.69	4.71	3.46	31.0	596.7	654.7	214.2	63.5	16.4	0.587	134.0
1968	17.2	9.26	2.94	0.444	0	264.1	129.2	69.8	30.6	18.5	112.4	325.4	81.6
1969	343.0	170.5	45.3	19.1	14.1	15.6	3,112	1,538	476.4	289.5	153.9	88.8	521.6
1970	60.3	42.3	22.3	15.0	12.4	12.0	1,095	1,868	1,075	633.2	260.5	130.8	437.4
1971	76.0	42.8	14.4	9.42	9.60	11.4	2,026	1,299	465.6	343.7	292.0	141.4	394.4
1972	81.3	57.4	37.3	18.7	13.9	270.6	1,205	774.7	314.2	197.5	164.5	97.3	269.1
1973	72.3	28.5	5.05	2.86	3.01	56.3	74.4	49.4	33.0	45.8	50.9	45.1	39.1
1974	50.7	32.7	14.7	8.74	11.2	11.8	3,003	3,616	1,512	368.1	116.2	76.8	736.5
1975	44.1	33.3	13.2	6.51	3.72	6.87	256.9	1,175	547.4	190.5	72.2	35.2	200.1
1976	29.7	21.0	8.98	11.5	44.5	41.2	2,630	1,303	378.4	114.5	42.7	25.3	385.4
1977	19.4	8.78	0.223	0	0	2.90	21.3	34.7	18.9	4.96	0.312	3.30	9.61
1978	8.55	2.36	0.798	0.242	0	2.42	616.1	368.2	112.7	48.3	30.6	23.2	101.0
1979	12.1	5.32	2.68	0.953	0.235	1.06	1,352	2,934	743.7	194.5	50.4	45.4	447.9
1980	39.2	28.7	9.40	1.87	0.660	1.35	149.2	76.8	22.7	1.54	1.41	0.988	27.7
1981	1.84	4.65	2.56	0	6.04	51.8	189.9	98.4	26.9	10.8	3.26	1.19	33.1
1982	2.62	3.09	0.816	0	0	11.9	426.5	589.5	454.6	187.4	91.7	46.3	151.5
1983	42.0	19.2	7.05	3.58	0.933	45.0	686.7	427.5	175.2	61.6	13.9	4.88	123.9
1984	10.1	5.86	1.75	0.019	0.189	7.34	69.2	78.0	97.2	13.7	0.916	0.061	23.6
1985	0.712	0.769	0.187	0	0	320.2	666.7	198.5	94.7	49.0	18.1	24.1	114.5
1986	30.2	15.7	5.27	6.21	3.03	280.0	654.7	611.5	303.6	116.3	85.1	49.6	180.7
1987	24.6	9.73	4.83	4.16	2.95	5.22	1,552	685.3	175.2	51.1	36.9	53.8	216.4
1988	49.7	24.1	15.3	0.247	0.166	17.6	65.9	27.0	4.03	0.070	0	0	17.0
1989	0	0	0	0	0	0	119.4	72.7	25.7	1.25	0.004	0	18.2
1990	0	0	0	0	0	16.3	230.3	86.3	88.0	29.4	0.977	0.100	37.5
1991	0	0	0	0	0.084	14.4	49.0	29.9	108.1	196.9	70.1	10.2	40.2
1992	5.86	6.29	5.28	3.64	4.67	279.7	2,391	731.7	155.3	49.1	9.16	2.88	301.7
1993	3.27	3.32	1.76	1.87	1.17	18.6	393.9	196.8	94.7	233.1	719.1	543.5	184.9
1994	257.0	124.3	56.9	27.0	17.4	275.4	1,043	482.2	176.0	122.1	85.0	130.1	233.4

05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND

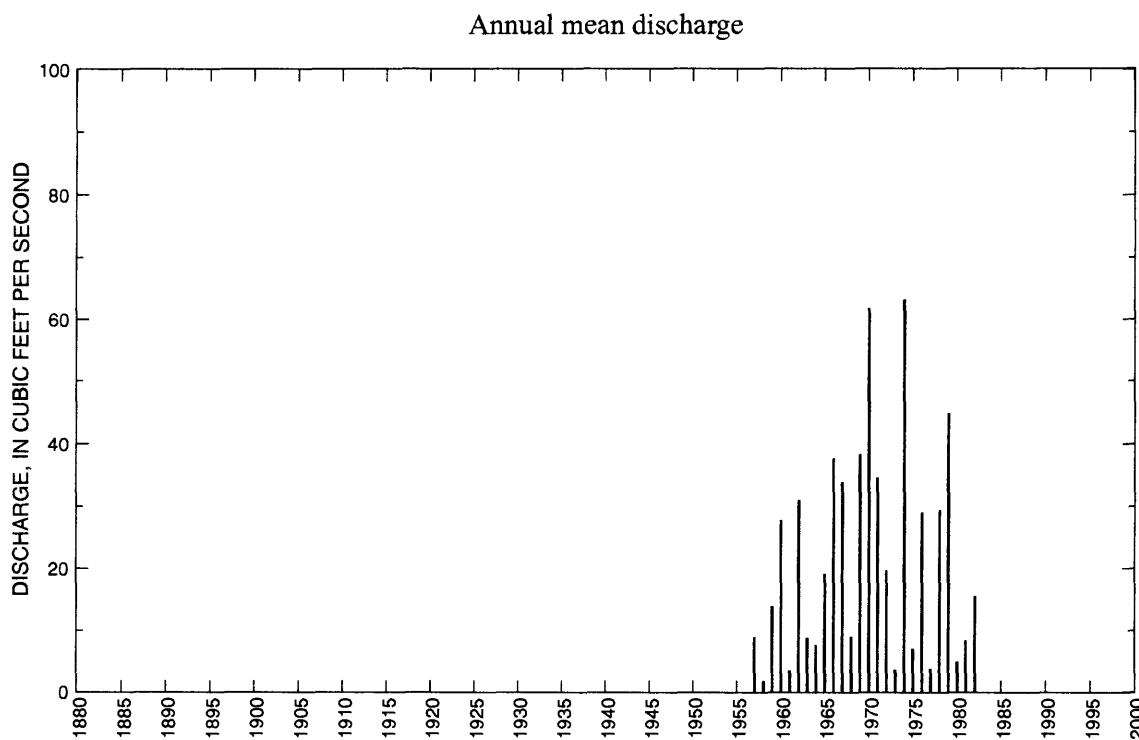
LOCATION.--Lat 48°51'55", long 98°00'20", in SW¹/₄ sec.10, T.162 N., R.57 W., Cavalier County, Hydrologic Unit 09020313, on right bank 25 ft upstream from county bridge, 3.5 mi above mouth, and 6 mi southwest of Walhalla.

DRAINAGE AREA.--182 mi², of which 10 mi² is noncontributing.

PERIOD OF RECORD.--April 1956 to September 1982. Prior to October 1973, published as Little Pembina River near Walhalla.

GAGE.--Water-stage recorder. Datum of gage is 1,099.48 ft above sea level. Prior to Sept. 10, 1956, nonrecording gage at bridge 25 ft downstream at same datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,600 ft³/s, Apr. 25, 1970, gage height, 13.95 ft; maximum gage height, 14.38 ft, Apr. 17, 1962, backwater from ice; no flow at times in some years.



05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

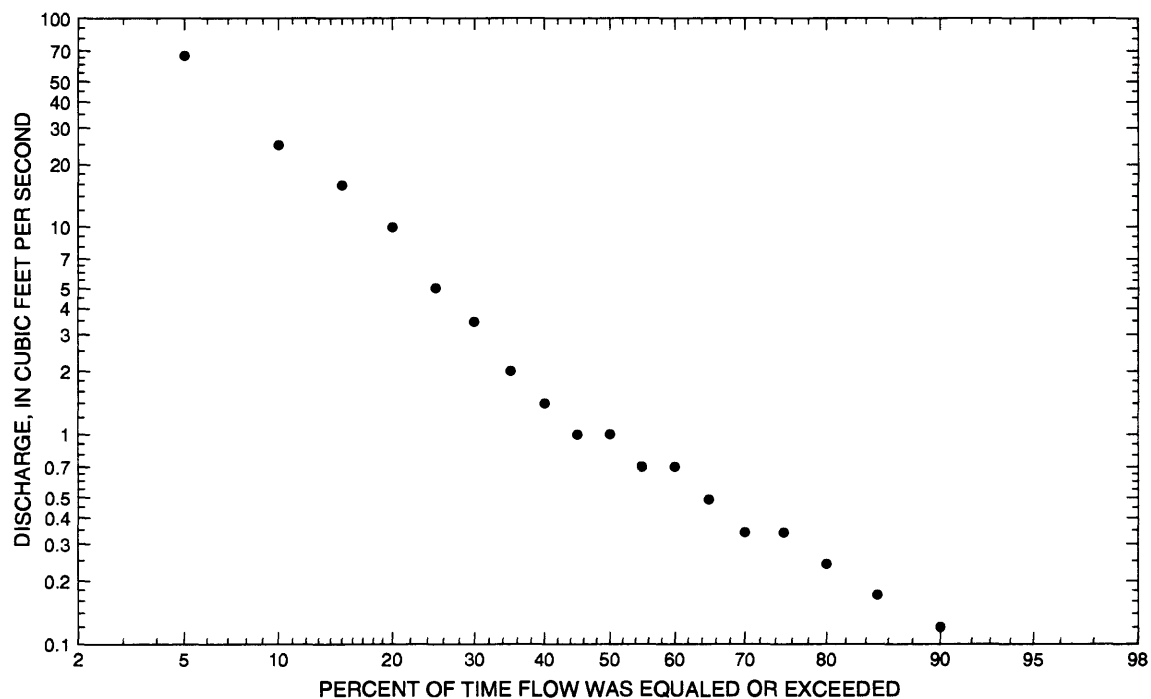
Pre-regulation period, 1956-70

Statistics of monthly and annual mean discharges, pre-regulation period

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	3.26	1969	0.177	1962	1.27	0.98	0.77	0.45
November	2.86	1957	0.177	1962	1.04	0.75	0.73	0.37
December	1.05	1966	0.229	1962	0.620	0.28	0.45	0.22
January	0.834	1967	0.016	1958	0.420	0.27	0.64	0.15
February	0.946	1969	0	m	0.340	0.28	0.83	0.12
March	139	1966	0	1962	25.7	38.6	1.50	9.07
April	461	1970	6.05	1958	172	162	0.94	60.6
May	150	1967	2.34	1958	43.5	50.0	1.15	15.3
June	102	1970	0.440	1958	19.6	24.8	1.27	6.90
July	62.6	1970	0.181	1961	11.8	18.9	1.60	4.16
August	21.6	1957	0.010	1961	4.26	5.76	1.35	1.50
September	17.0	1970	0.090	1961	3.15	5.11	1.62	1.11
Annual	61.8	1970	1.78	1958	21.6	17.3	0.80	100

Annual flow duration



05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

Monthly and annual flow duration, in cubic feet per second, pre-regulation period

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.89	1.80	0.28	0.17	0	0.10	0.20	0.20	0.20	0
90	0	0	0	2.50	2.30	1.30	0.36	0.10	0.10	0.29	0.29	0.20	0.12
85	0	0	0.17	4.37	2.90	1.70	0.61	0.19	0.10	0.29	0.29	0.30	0.17
80	0.10	0	0.29	5.75	4.67	2.90	1.00	0.19	0.18	0.37	0.33	0.30	0.24
75	0.19	0	0.29	7.45	6.03	4.00	1.30	0.36	0.26	0.37	0.37	0.30	0.34
70	0.19	0.09	0.38	10.0	7.99	4.80	1.30	0.44	0.26	0.42	0.37	0.40	0.34
65	0.19	0.09	0.38	12.5	11.5	5.59	1.70	0.55	0.32	0.47	0.52	0.40	0.49
60	0.28	0.20	0.50	15.6	14.4	6.77	2.20	0.68	0.32	0.67	0.59	0.40	0.70
55	0.28	0.20	0.50	19.1	16.2	7.95	2.20	0.83	0.39	0.76	0.74	0.52	0.70
50	0.28	0.30	0.50	24.5	18.1	9.33	2.20	1.00	0.57	0.96	0.84	0.60	1.00
45	0.37	0.30	0.65	32.4	20.1	11.4	2.90	1.30	0.69	1.20	0.84	0.68	1.00
40	0.37	0.34	0.65	42.0	22.2	12.7	2.90	1.60	0.69	1.20	0.94	0.68	1.40
35	0.55	0.38	0.65	55.0	26.2	14.1	4.04	1.90	1.20	1.40	0.94	0.78	2.00
30	0.55	0.49	0.85	73.7	32.6	16.2	4.85	2.40	1.80	1.50	1.20	0.78	3.44
25	0.63	0.56	1.10	101	40.2	18.6	5.60	2.40	2.20	1.70	1.30	0.90	5.03
20	0.63	0.56	4.40	156	51.4	22.1	7.11	3.70	3.20	2.20	1.30	0.90	9.97
15	0.72	0.64	19.1	250	69.4	27.2	9.58	7.87	6.20	2.50	1.70	1.00	15.8
10	0.72	0.72	44.8	466	93.5	35.7	14.8	13.1	9.07	2.80	1.90	1.00	24.9
5	0.94	0.93	169	1,050	179	59.5	33.5	17.8	14.6	3.20	2.40	1.10	66.3

05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

Probability of occurrence of annual high discharges, pre-regulation period

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	6.81	5.29	5.19	3.69
0.95	1.05	ng	36.2	26.1	20.0	13.0
0.90	1.11	283	78.3	54.7	37.8	23.6
0.80	1.25	514	179	120	75.8	45.9
0.50	2	1,470	640	407	230	136
0.20	5	3,720	1,590	965	536	323
0.10	10	5,780	2,250	1,340	758	468
0.04	25	8,940	2,990	1,760	1,030	655
0.02	50	11,600	3,450	2,020	1,210	790
0.01	100	14,600	3,840	2,230	1,380	918
0.005	200	17,800	4,160	2,400	1,520	1,040
0.002	500	22,300	ng	ng	ng	ng

Probability of occurrence of annual low discharges, pre-regulation period

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0.044	0.109	0.142
0.10	10	0	0	0	0	0	0	0.077	0.157	0.208
0.20	5	0	0	0	0	0	0.049	0.139	0.235	0.316
0.50	2	0.061	0.070	0.098	0.135	0.179	0.239	0.337	0.442	0.623

05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

Probability of occurrence of seasonal low discharges, pre-regulation period

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0.144
0.20	5	0	0	0	0	0	0	0	0.433
0.50	2	0.072	0.119	0.171	0.227	0.358	0.396	0.400	2.33
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		0	0	0	0	0	0	0.046	0.087
		0.071	0.083	0.100	0.115	0.058	0.064	0.081	0.130
		0.149	0.196	0.245	0.339	0.130	0.148	0.152	0.208
0.50	2	0.372	0.534	0.698	1.30	0.349	0.401	0.431	0.495

05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

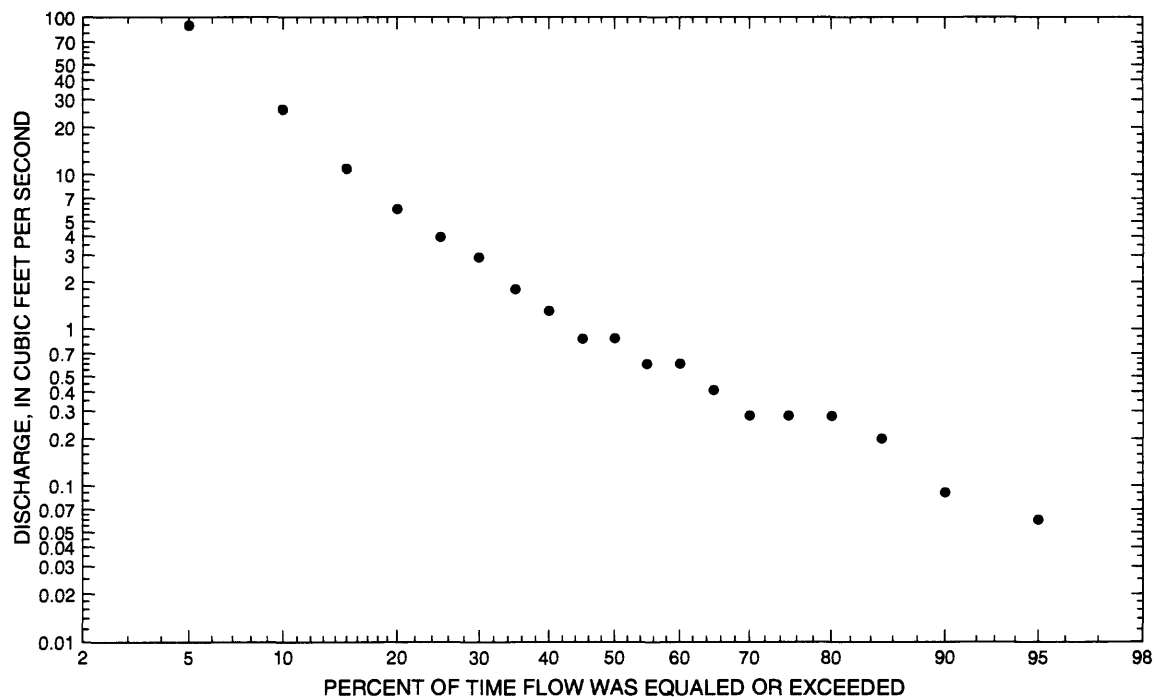
Post-regulation period, 1971-82

Statistics of monthly and annual mean discharges, post-regulation period

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	5.45	1981	0.356	1976	1.99	1.68	0.850	0.750
November	3.94	1971	0.283	1977	1.42	1.12	0.790	0.530
December	1.29	1971	0.053	1977	0.550	0.400	0.730	0.210
January	0.629	1971	0	1973	0.260	0.220	0.840	0.100
February	30.1	1981	0	m	2.73	8.62	3.16	1.03
March	93.4	1972	0.319	1975	20.2	28.4	1.41	7.60
April	457	1974	4.92	1973	176	169	0.960	66.2
May	255	1974	2.85	1973	41.6	72.2	1.74	15.7
June	37.6	1974	1.09	1980	10.9	11.4	1.05	4.10
July	35.8	1976	0.451	1973	6.50	10.1	1.55	2.45
August	6.25	1976	0.379	1981	1.69	1.63	0.960	0.640
September	6.84	1977	0.238	1972	1.98	2.22	1.12	0.750
Annual	63.2	1974	3.57	1973	22.0	18.8	0.860	100

Annual flow duration



05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

Monthly and annual flow duration, in cubic feet per second, post-regulation period

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0.10	0.39	1.40	0.72	0.21	0.08	0.09	0.33	0.28	0.03	0.06
90	0	0	0.21	2.00	1.80	1.00	0.28	0.09	0.11	0.33	0.34	0.05	0.09
85	0	0	0.28	3.40	2.20	1.30	0.37	0.12	0.18	0.38	0.34	0.10	0.20
80	0.08	0.04	0.36	3.40	3.40	1.50	0.49	0.22	0.22	0.44	0.38	0.20	0.28
75	0.08	0.07	0.36	5.13	4.52	2.20	0.49	0.28	0.28	0.58	0.59	0.28	0.28
70	0.10	0.10	0.46	6.72	5.44	2.20	0.66	0.35	0.34	0.76	0.66	0.28	0.28
65	0.11	0.10	0.46	11.4	6.74	2.70	0.88	0.35	0.34	0.88	0.74	0.34	0.41
60	0.11	0.10	0.59	16.1	8.15	3.20	0.88	0.43	0.43	1.00	0.83	0.34	0.60
55	0.19	0.13	0.59	26.7	10.3	3.20	1.20	0.53	0.53	1.10	0.92	0.34	0.60
50	0.22	0.17	0.59	36.9	12.4	3.90	1.20	0.53	0.67	1.30	0.92	0.34	0.87
45	0.25	0.22	0.76	57.5	14.0	4.94	1.60	0.66	0.67	1.50	1.00	0.40	0.87
40	0.25	0.22	0.98	79.1	16.1	5.56	2.10	0.82	0.83	1.50	1.10	0.55	1.30
35	0.29	0.29	1.30	95.9	18.8	6.28	2.10	0.82	0.83	1.70	1.10	0.55	1.80
30	0.33	0.29	2.70	111	25.2	7.40	3.24	1.00	1.00	1.70	1.40	0.66	2.90
25	0.33	0.39	4.70	151	34.2	9.07	3.93	1.00	1.30	2.30	1.60	0.66	3.94
20	0.43	0.39	13.9	190	47.9	13.0	4.55	1.30	1.60	2.60	2.20	0.77	5.97
15	0.50	0.39	28.2	273	69.7	16.8	5.80	1.90	2.00	3.00	2.70	0.92	10.9
10	0.57	0.52	54.1	426	116	24.0	10.2	3.00	3.10	3.50	3.00	1.10	26.1
5	0.74	0.69	99.6	1,030	175	37.0	23.4	5.15	6.77	6.10	3.40	1.30	89.6

05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

Probability of occurrence of annual high discharges, post-regulation period

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	37.5	23.5	16.9	11.0	6.78
0.95	1.05	94.6	52.4	39.0	25.6	17.4
0.90	1.11	153	80.9	61.0	40.0	28.0
0.80	1.25	272	138	105	68.5	48.8
0.50	2	786	389	298	189	132
0.20	5	2,180	1,130	848	518	329
0.10	10	3,660	1,990	1,470	872	512
0.04	25	6,280	3,680	2,650	1,510	802
0.02	50	8,850	5,490	3,870	2,160	1,060
0.01	100	12,000	7,900	5,450	2,960	1,340
0.005	200	15,800	11,000	7,470	3,960	1,660
0.002	500	21,800	ng	ng	ng	ng

Probability of occurrence of annual low discharges, post-regulation period

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0.015	0.087	0.199
0.10	10	0	0	0	0	0	0	0.033	0.126	0.256
0.20	5	0.006	0.012	0.013	0.015	0.035	0.067	0.074	0.190	0.350
0.50	2	0.050	0.057	0.070	0.092	0.131	0.175	0.241	0.387	0.646

05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

Probability of occurrence of seasonal low discharges, post-regulation period

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	0	0	0	0	0	0	0.128	0.299		
0.10	10	0	0	0	0	0.089	0.084	0.163	0.461		
0.20	5	0.013	0.023	0.023	0.044	0.137	0.156	0.227	0.781		
0.50	2	0.142	0.139	0.144	0.155	0.258	0.358	0.466	2.17		
		June-July-August				September-October-November					
		0.05	20	0.021	0.044	0.063	0.172	0.028	0.038	0.130	0.218
		0.10	10	0.035	0.066	0.099	0.224	0.044	0.062	0.161	0.265
		0.20	5	0.065	0.108	0.163	0.312	0.075	0.107	0.213	0.342
		0.50	2	0.190	0.267	0.385	0.610	0.196	0.272	0.377	0.597

05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

Annual peak discharge and corresponding gage height

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1956	April 21	10.15	2,800	1970	April 25	13.95	6,600
1957	August 1	7.73	447	1971	April 9	13.26	4,480
1958	July 5	6.75	20.0	1972	March 17	9.56	626
1959	April 3	9.38	996	1973	August 9	7.02	211
1960	April 11	13.28	4,160	1974	April 16	12.43	3,190
1961	March 25	7.46	300	1975	April 12	7.80	347
1962	April 18	12.79	3,100	1976	April 2	12.39	2,450
1963	July 26	10.11	1,310	1977	May 19	7.57	368
1964	April 9	7.90	337	1978	April 6	10.06	1,600
1965	April 10	13.36	2,770	1979	April 19	12.44	3,200
1966	April 1	11.62	2,380	1980	March 31	6.21	140
1967	May 6	11.47	2,230	1981	March 12	6.98	200
1968	March 25	7.82	270	1982	March 30	8.29	464
1969	April 9	12.76	6,000				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1970	April 25	13.95	6,600	1959	April 3	9.38	996
1969	April 9	12.76	6,000	1972	March 17	9.56	626
1971	April 9	13.26	4,480	1982	March 30	8.29	464
1960	April 11	13.28	4,160	1957	August 1	7.73	447
1979	April 19	12.44	3,200	1977	May 19	7.57	368
1974	April 16	12.43	3,190	1975	April 12	7.80	347
1962	April 18	12.79	3,100	1964	April 9	7.90	337
1956	April 21	10.15	2,800	1961	March 25	7.46	300
1965	April 10	13.36	2,770	1968	March 25	7.82	270
1976	April 2	12.39	2,450	1973	August 9	7.02	211
1966	April 1	11.62	2,380	1981	March 12	6.98	200
1967	May 6	11.47	2,230	1980	March 31	6.21	140
1978	April 6	10.06	1,600	1958	July 5	6.75	20.0
1963	July 26	10.11	1,310				

05099400 LITTLE SOUTH PEMBINA RIVER NEAR WALHALLA, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1956	--	--	--	--	--	--	404.3	137.5	21.7	6.46	2.08	2.42	--
1957	1.46	2.86	1.00	0.648	0.204	41.4	11.4	7.78	4.99	2.38	21.6	10.2	8.91
1958	2.75	1.62	0.784	0.016	0.293	3.20	6.05	2.34	0.440	3.46	0.165	0.190	1.78
1959	0.345	0.363	0.313	0.381	0.411	32.0	100.1	14.6	15.9	2.53	0.297	0.240	13.9
1960	1.76	1.57	0.735	0.681	0.600	0.739	307.9	18.2	4.46	0.819	0.268	0.107	27.8
1961	0.387	0.280	0.300	0.165	0	23.8	10.4	3.48	2.80	0.181	0.010	0.090	3.52
1962	0.177	0.177	0.229	0.084	0	0	284.5	42.6	25.1	13.9	7.39	1.09	31.0
1963	1.14	0.993	0.439	0.074	0	9.11	8.53	4.28	23.7	50.9	5.51	0.353	8.83
1964	0.345	0.397	0.342	0.268	0.410	0.290	57.6	13.0	13.3	2.86	0.810	2.55	7.60
1965	2.36	0.983	0.448	0.300	0.118	0.342	176.3	34.1	10.4	2.64	1.25	1.49	19.1
1966	1.59	1.20	1.05	0.559	0.186	139.0	172.6	92.6	16.3	15.0	9.29	0.682	37.7
1967	1.01	0.932	0.723	0.834	0.687	58.5	178.4	149.5	11.0	2.41	0.832	0.283	33.9
1968	0.471	0.447	0.535	0.671	0.377	50.2	11.6	14.7	6.11	3.99	7.86	10.2	9.00
1969	3.26	1.94	0.832	0.668	0.946	1.24	389.3	23.4	35.1	7.02	1.21	0.358	38.3
1970	0.663	0.778	0.885	0.503	0.514	0.556	461.0	94.6	102.2	62.6	5.34	17.0	61.8
1971	5.06	3.94	1.29	0.629	0.466	1.16	363.1	21.9	14.6	5.16	1.06	0.801	34.6
1972	2.32	2.40	0.400	0.241	0.053	93.4	117.9	15.1	3.15	0.536	0.485	0.238	19.7
1973	0.710	1.19	0.092	0	0	27.7	4.92	2.85	1.10	0.451	2.35	0.892	3.57
1974	1.86	0.929	0.736	0.521	0.416	0.538	457.4	255.1	37.6	2.54	2.06	0.953	63.2
1975	1.51	1.44	0.424	0.100	0.100	0.319	55.5	19.2	3.42	1.88	0.600	0.449	7.04
1976	0.356	0.360	0.360	0.360	0.638	1.68	267.0	11.2	27.1	35.8	6.25	0.507	29.0
1977	0.426	0.283	0.053	0.004	0	3.60	11.5	17.6	2.93	0.868	0.401	6.84	3.72
1978	2.51	0.765	1.25	0.602	0.348	14.8	284.2	34.7	8.27	3.44	0.971	3.41	29.4
1979	1.01	0.768	0.334	0.226	0.200	0.626	402.5	101.0	16.1	11.3	2.55	3.97	44.8
1980	1.71	1.02	0.584	0.278	0.221	9.80	32.2	3.02	1.09	2.40	1.94	4.90	4.90
1981	5.45	3.00	0.766	0.126	30.1	40.4	10.3	5.55	4.29	0.866	0.379	0.313	8.33
1982	0.899	0.911	0.273	0.080	0.231	47.8	99.6	12.3	10.9	12.7	1.25	0.517	15.6

05099600 PEMBINA RIVER AT WALHALLA, ND

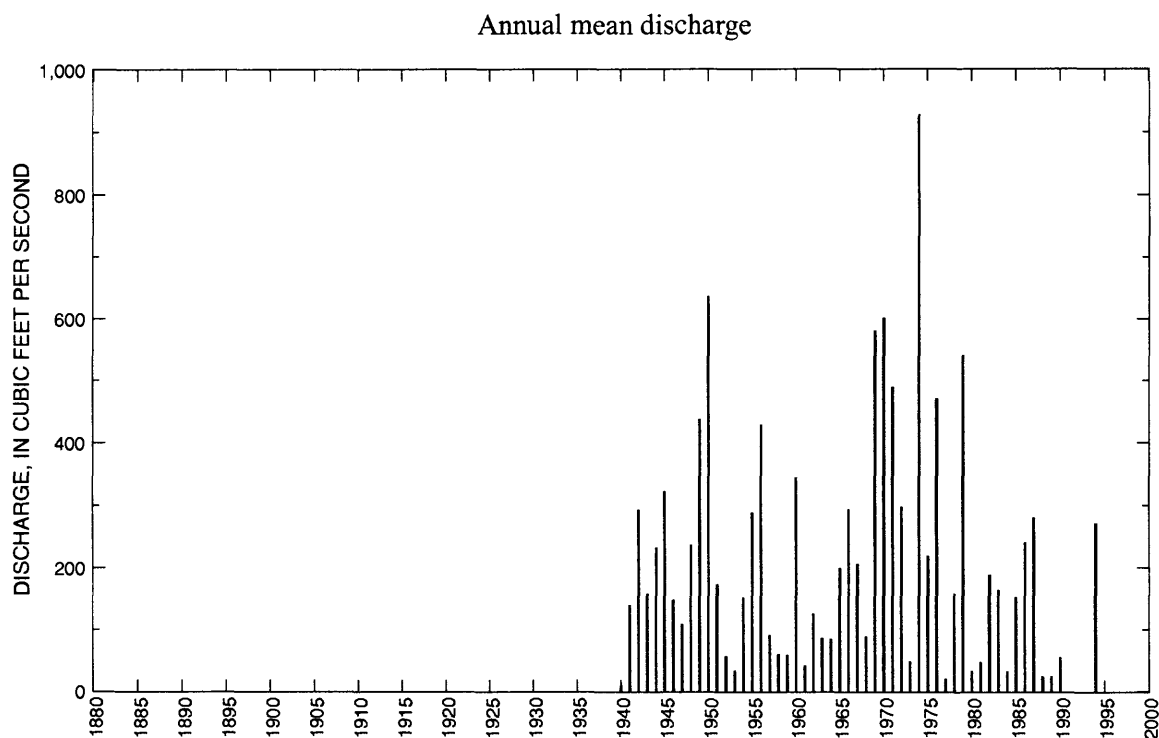
LOCATION.--Lat 48°54'50", long 97°55'00", in NE¹/₄NE¹/₄ sec.29, T.163 N., R.56 W., Pembina County, Hydrologic Unit 09020313, on left bank at downstream side of bridge on State Highway 32, at south edge of Walhalla, and 7 mi downstream from Little South Pembina River.

DRAINAGE AREA.--3,350 mi², approximately.

PERIOD OF RECORD.--October 1939 to September 1990, October 1993 to September 1994. Prior to October 1963, published as "near Walhalla."

GAGE.-- Water-stage recorder. Datum of gage is 934 ft above sea level, from topographic map. Prior to Nov. 10, 1943, nonrecording gage and Nov. 10, 1943, to Sept. 30, 1963, water-stage recorder at site 5.5 mi upstream at different datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,400 ft³/s, Apr. 18, 1950, gage height, 19.2 ft former site and datum, 16.2 ft present site and datum, from rating curve extended above 7,000 ft³/s on basis of contracted-opening measurement of peak flow; no flow at times in some years.



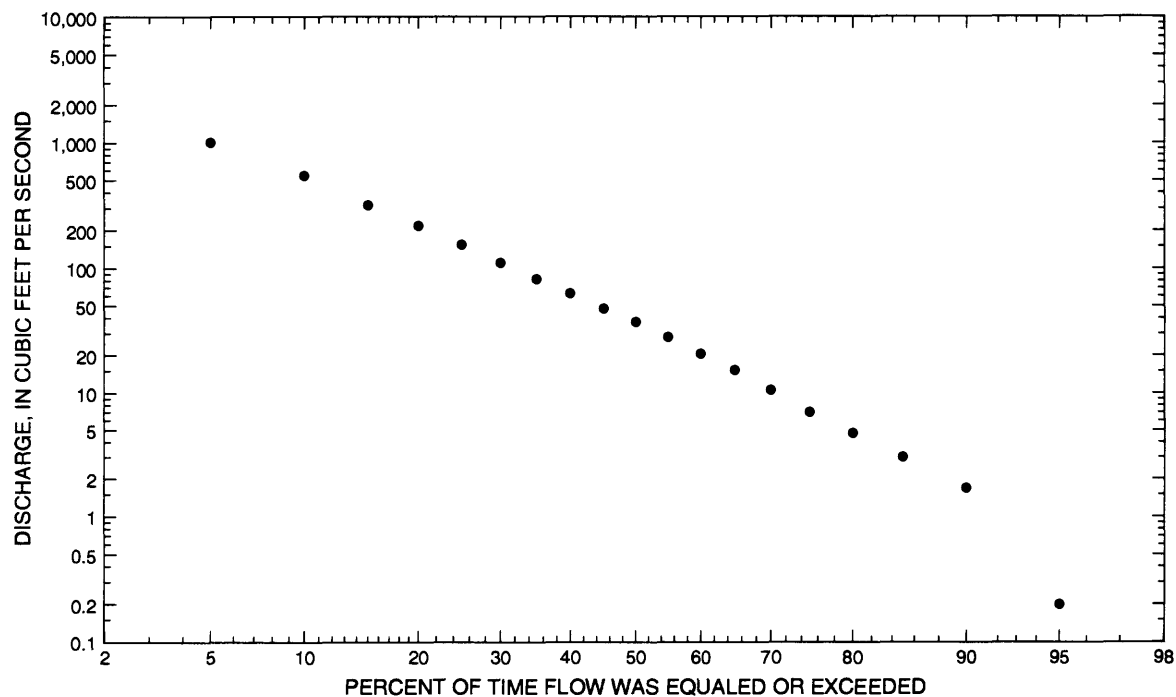
05099600 PEMBINA RIVER AT WALHALLA, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	369	1969	0.042	1940	56.3	67.4	1.20	2.13
November	213	1945	0.147	1941	36.6	43.8	1.20	1.38
December	91.8	1994	0	1941	17.6	21.3	1.21	0.67
January	51.2	1960	0	m	9.87	11.6	1.17	0.37
February	41.5	1945	0	m	8.03	9.63	1.20	0.30
March	804	1945	0	1940	106	179	1.69	4.01
April	3,700	1974	49.6	1977	985	960	0.97	37.3
May	4,670	1974	18.8	1940	748	935	1.25	28.4
June	1930	1974	2.83	1940	332	362	1.09	12.6
July	814	1970	0.735	1940	168	185	1.10	6.35
August	785	1944	0.103	1961	100	130	1.29	3.80
September	432	1944	0	1940	72.1	84.7	1.18	2.73
Annual	928	1974	9.77	1940	220	194	0.88	100

Annual flow duration



05099600 PEMBINA RIVER AT WALHALLA, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	10.9	40.0	16.4	2.20	0.54	0.16	0.17	0.28	0.10	0.20
90	0.19	0	0.25	29.6	64.3	33.2	6.83	1.70	0.96	1.60	2.80	1.70	1.70
85	0.94	0.19	1.20	61.5	81.0	47.4	16.5	4.24	3.17	2.70	4.57	2.10	2.99
80	1.60	0.43	1.60	92.1	98.8	65.5	27.6	8.43	4.44	9.30	6.70	2.60	4.74
75	2.10	0.97	3.17	131	134	85.8	36.5	18.3	8.65	16.1	9.43	4.29	7.01
70	2.10	1.50	3.71	170	166	108	44.9	26.2	18.7	19.0	11.7	5.41	10.5
65	2.70	2.20	4.42	208	199	132	53.6	37.7	27.4	22.8	14.2	6.39	15.3
60	3.67	2.70	5.68	254	240	158	63.8	46.6	34.3	28.1	17.2	7.05	20.6
55	4.23	2.70	7.87	322	299	186	76.7	55.1	41.0	33.2	20.2	8.28	28.1
50	4.97	3.40	9.23	408	386	216	94.3	63.4	47.5	38.0	23.3	10.4	37.2
45	6.16	4.66	11.7	538	486	250	115	72.5	53.9	42.6	26.5	12.6	47.9
40	8.48	5.60	14.5	665	580	287	139	81.9	60.2	47.9	30.0	14.3	63.5
35	10.3	7.03	18.1	800	681	329	164	93.2	71.3	53.6	34.0	16.2	82.2
30	11.9	8.34	23.1	958	793	371	190	108	83.2	61.0	38.8	18.5	111
25	13.6	10.8	31.0	1,180	912	431	221	127	96.7	70.9	45.9	21.5	155
20	16.1	14.1	57.0	1,500	1,090	492	258	152	110	83.6	55.3	24.7	219
15	19.9	16.9	121	2,030	1,360	595	318	185	137	100	66.7	28.4	322
10	26.9	22.3	243	2,810	1,940	740	412	236	172	131	80.4	42.0	550
5	39.0	31.1	720	3,980	2,810	1,110	639	339	243	197	127	74.6	1,010

05099600 PEMBINA RIVER AT WALHALLA, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)		Maximum mean discharge (ft ³ /s)			
		1940-63	¹ 1964-94	3-day period	7-day period	15-day period	30-day period
0.99	1.01	201	111	87.0	72.0	60.1	44.6
0.95	1.05	414	282	208	175	144	110
0.90	1.11	605	454	326	276	225	174
0.80	1.25	950	798	556	472	381	300
0.50	2	2,220	2,240	1,490	1,260	1,000	809
0.20	5	5,040	5,910	3,790	3,180	2,480	2,050
0.10	10	7,680	9,590	6,060	5,040	3,900	3,240
0.04	25	12,000	15,800	9,860	8,100	6,220	5,210
0.02	50	15,800	21,600	13,400	10,900	8,330	7,000
0.01	100	20,400	28,400	17,600	14,200	10,800	9,070
0.005	200	25,500	36,400	22,500	17,900	13,500	11,400
0.002	500	33,600	48,800	ng	ng	ng	ng

¹Historic adjustment made to Log Pearson Type III peak frequency.

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0.036	0.375	0.589
0.10	10	0	0	0	0	0	0.332	0.405	1.02	1.62
0.20	5	0.153	0.156	0.184	0.271	0.427	0.922	1.56	2.55	4.54
0.50	2	1.99	2.05	2.25	2.47	3.06	3.64	6.88	8.66	18.8

05099600 PEMBINA RIVER AT WALHALLA, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	0	0	0	0	0	0	0	0.304		
0.10	10	0	0	0	0	0	0	0	1.14		
0.20	5	0.238	0.265	0.305	0.587	0.721	0.837	0.903	4.12		
0.50	2	2.86	3.01	3.17	3.56	4.07	4.77	5.78	27.9		
		June-July-August				September-October-November					
		0.05	20	0.248	0.326	0.414	0.626	0.160	0.170	0.265	0.369
		0.10	10	1.08	1.36	1.68	2.22	0.612	0.672	0.931	1.30
		0.20	5	4.29	5.16	6.25	8.20	2.12	2.39	3.01	4.16
		0.50	2	29.5	33.2	38.5	52.5	11.4	13.4	15.4	20.4

05099600 PEMBINA RIVER AT WALHALLA, ND--Continued

Annual peak discharge and corresponding gage height

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1940	April 19	5.52	1,000	1966	March 31	14.82	4,700
1941	April 10	11.03	3,200	1967	April 21	12.10	4,530
1942	April 5	12.45	5,000	1968	March 18	9.40	1,400
1943	June 3	6.15	1,420	1969	April 20	14.58	8,440
1944	August 4	6.28	1,470	1970	April 26	15.08	10,200
1945	March 26	9.20	3,020	1971	April 11	14.56	10,200
1946	March 19	9.24	2,900	1972	April 9	9.81	3,160
1947	April 3	5.83	1,280	1973	August 9	3.79	358
1948	April 19	14.94	7,280	1974	April 27	15.19	13,800
1949	April 19	13.18	5,840	1975	May 17	13.38	1,470
1950	April 18	19.20	20,400	1976	April 17	9.81	4,530
1951	April 5	8.22	2,310	1977	May 19	4.31	610
1952	March 31	7.28	700	1978	April 6	9.97	3,800
1953	June 3	4.48	642	1979	April 20	13.32	9,130
1954	July 6	5.45	1,160	1980	April 7	3.83	400
1955	April 2	10.75	3,400	1981	April 1	3.16	260
1956	April 25	12.89	5,990	1982	June 7	6.96	2,100
1957	March 23	6.22	725	1983	April 8	6.32	1,660
1958	April 6	6.52	500	1984	June 16	3.23	374
1959	April 3	7.90	2,000	1985	March 19	8.57	1,860
1960	April 12	12.50	5,690	1986	March 22	9.31	2,800
1961	April 9	3.46	334	1987	April 5	10.39	5,300
1962	April 19	11.74	5,110	1988	April 4	2.98	321
1963	July 26	7.72	2,340	1989	April 16	6.67	1,000
1964	June 19	5.43	796	1990	April 1	7.64	1,200
1965	April 11	12.68	4,960	1994	March 22	7.03	1,800
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 18	19.20	20,400	1955	April 2	10.75	3,400
1974	April 27	15.19	13,800	1941	April 10	11.03	3,200
1970	April 26	15.08	10,200	1972	April 9	9.81	3,160
1971	April 11	14.56	10,200	1945	March 26	9.20	3,020
1979	April 20	13.32	9,130	1946	March 19	9.24	2,900
1969	April 20	14.58	8,440	1986	March 22	9.31	2,800
1948	April 19	14.94	7,280	1963	July 26	7.72	2,340
1956	April 25	12.89	5,990	1951	April 5	8.22	2,310
1949	April 19	13.18	5,840	1982	June 7	6.96	2,100
1960	April 12	12.50	5,690	1959	April 3	7.90	2,000
1987	April 5	10.39	5,300	1985	March 19	8.57	1,860
1962	April 19	11.74	5,110	1994	March 22	7.03	1,800
1942	April 5	12.45	5,000	1983	April 8	6.32	1,660
1965	April 11	12.68	4,960	1944	August 4	6.28	1,470
1966	March 31	14.82	4,700	1975	May 17	13.38	1,470
1967	April 21	12.10	4,530	1943	June 3	6.15	1,420
1976	April 17	9.81	4,530	1968	March 18	9.40	1,400
1978	April 6	9.97	3,800	1947	April 3	5.83	1,280

05099600 PEMBINA RIVER AT WALHALLA, ND--Continued

Annual peak discharge and corresponding gage height—Continued

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height—Continued							
1990	April 1	7.64	1,200	1977	May 19	4.31	610
1954	July 6	5.45	1,160	1958	April 6	6.52	500
1940	April 19	5.52	1,000	1980	April 7	3.83	400
1989	April 16	6.67	1,000	1984	June 16	3.23	374
1964	June 19	5.43	796	1973	August 9	3.79	358
1957	March 23	6.22	725	1961	April 9	3.46	334
1952	March 31	7.28	700	1988	April 4	2.98	321
1953	June 3	4.48	642	1981	April 1	3.16	260

05099600 PEMBINA RIVER AT WALHALLA, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1940	0.042	0.157	0.023	0	0	0	87.9	18.8	2.83	0.735	7.83	0	9.77
1941	0.106	0.147	0	0	0	0.045	1,006	346.6	143.2	39.0	21.5	143.3	140.9
1942	99.0	36.0	14.0	2.00	0.700	65.0	1,841	922.6	294.8	102.5	96.5	55.5	293.7
1943	42.0	29.6	8.58	4.79	5.00	141.9	499.1	284.5	291.8	213.6	203.2	174.7	158.5
1944	115.3	69.1	27.9	4.03	3.90	4.07	265.3	199.9	247.5	634.4	785.1	431.9	233.4
1945	181.0	213.0	89.3	41.9	41.5	803.7	1,006	691.6	372.9	224.6	118.2	80.0	323.2
1946	55.8	30.2	16.3	9.46	8.00	620.7	626.0	242.6	84.8	49.1	20.8	14.9	148.9
1947	21.5	20.1	9.32	4.87	2.78	12.1	565.3	257.9	170.4	67.9	128.2	55.7	109.5
1948	45.7	26.0	14.4	12.1	5.17	6.87	977.2	833.1	361.1	274.0	190.2	110.8	237.9
1949	60.9	37.3	19.3	16.5	9.21	5.61	2,703	1,409	602.3	230.8	119.8	58.3	438.3
1950	44.9	33.4	19.2	12.6	10.8	17.1	2,134	3,080	1,101	579.6	374.7	204.2	636.9
1951	129.1	74.8	26.1	24.7	21.6	81.4	816.5	470.2	256.0	104.1	53.5	31.4	174.1
1952	19.2	11.9	5.58	3.39	3.01	19.0	280.7	183.1	148.2	51.9	14.1	0.823	58.0
1953	0.581	3.22	1.11	0	0	1.87	65.5	50.6	148.2	76.6	49.5	8.35	33.8
1954	2.91	5.42	3.15	0.326	0.904	13.2	83.2	62.5	425.6	696.9	347.1	175.1	152.4
1955	114.2	61.9	27.3	15.2	16.6	22.7	1,584	763.3	511.1	247.4	75.0	39.0	289.2
1956	37.5	20.0	7.65	6.13	8.66	9.42	1,332	2,348	771.8	327.2	155.6	117.6	429.3
1957	91.4	51.3	10.1	6.74	1.07	170.7	260.3	175.0	108.4	44.2	67.2	114.0	92.0
1958	160.2	87.9	62.3	35.9	24.8	39.4	177.9	97.2	29.0	18.4	0.581	0.240	61.3
1959	0.352	2.48	2.12	1.01	0.325	47.2	416.1	125.2	91.9	20.5	9.92	3.43	59.8
1960	32.0	65.5	83.7	51.2	30.2	18.6	1,976	1,188	438.4	174.6	71.0	30.0	345.3
1961	17.9	7.83	2.56	2.06	0.079	49.7	249.7	142.4	37.0	2.07	0.103	0.143	42.6
1962	0.206	0.200	0.148	0	0	1.11	742.2	320.9	213.1	78.1	78.9	90.0	126.6
1963	47.3	26.2	16.5	8.65	0	64.7	134.7	180.7	241.3	160.4	100.5	54.9	86.7
1964	29.2	18.8	7.87	4.22	2.63	3.08	319.1	330.0	163.9	52.5	46.2	50.6	85.5
1965	29.9	18.4	11.2	3.88	2.50	2.04	849.2	738.0	429.1	154.4	72.7	93.7	200.4
1966	77.4	58.9	31.1	22.4	15.9	365.6	1,391	926.3	351.1	187.7	75.0	30.3	294.9
1967	16.0	10.6	6.66	7.65	7.36	110.9	947.8	975.1	285.1	81.5	24.3	6.40	207.1
1968	26.0	16.3	6.01	2.49	2.40	183.0	151.4	116.2	57.7	42.9	127.0	348.4	89.9
1969	369.4	173.6	42.3	23.7	14.0	20.6	3,596	1,632	561.2	319.9	147.9	96.8	582.0
1970	60.3	44.8	25.7	16.5	14.7	10.4	1,948	2,350	1,475	814.5	287.0	160.1	602.0
1971	94.5	66.7	21.4	13.2	10.1	12.0	2,731	1,590	587.8	353.2	262.3	141.4	489.9
1972	88.8	68.0	29.9	22.9	14.4	372.1	1,375	835.8	322.5	184.6	169.0	103.3	298.6
1973	62.0	37.8	6.98	2.74	2.85	97.1	84.5	68.5	36.7	58.8	64.8	65.7	49.3
1974	58.6	39.1	20.1	11.2	11.8	13.4	3,700	4,672	1,933	450.2	123.2	77.2	927.8

05099600 PEMBINA RIVER AT WALHALLA, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1975	53.8	34.3	18.4	9.76	5.44	7.28	357.3	1,172	585.4	241.1	91.5	44.1	219.7
1976	36.2	22.4	11.8	13.3	20.3	58.3	3,249	1,526	425.9	224.4	60.6	30.3	470.7
1977	17.9	9.86	2.72	2.50	2.82	21.2	49.6	77.9	37.2	10.6	2.66	15.9	21.0
1978	20.6	9.64	6.34	2.92	1.22	22.4	1,136	434.5	141.3	52.1	45.5	38.3	158.7
1979	17.5	11.4	4.92	4.00	3.55	4.05	2,155	3,182	758.4	227.6	54.6	44.7	541.2
1980	34.6	22.9	11.4	4.80	4.37	10.3	201.3	75.5	23.4	6.48	6.37	7.48	33.9
1981	14.0	18.3	3.49	.657	30.4	96.4	215.8	125.8	46.7	16.1	7.43	4.60	48.2
1982	9.29	8.27	3.48	.966	.303	66.1	626.2	663.0	500.1	225.5	109.4	56.5	189.4
1983	77.4	27.3	25.6	9.52	5.75	209.8	880.2	455.0	204.5	58.6	16.1	9.72	165.0
1984	15.9	11.0	6.91	3.73	4.07	40.0	89.5	86.0	110.7	18.1	4.32	3.88	32.8
1985	3.66	4.54	5.60	2.48	0.707	578.5	712.9	243.4	118.0	74.6	54.1	33.5	153.2
1986	43.8	30.3	14.7	11.2	4.91	488.7	880.4	728.0	364.8	160.1	108.3	56.7	241.9
1987	37.7	11.2	7.14	6.78	7.09	49.1	2,107	776.9	208.2	70.3	48.4	59.0	281.2
1988	53.2	31.3	18.4	1.37	0.345	44.4	88.7	40.8	9.42	3.06	1.15	2.49	24.6
1989	2.70	3.76	3.15	2.47	0.782	0.455	159.9	79.7	41.0	7.61	1.16	0.724	25.2
1990	2.82	2.83	1.87	2.45	1.94	21.1	336.6	98.5	164.1	38.4	3.89	1.35	56.0
1994	257.4	174.5	91.8	40.1	30.5	374.3	1,075	521.4	246.4	165.5	111.3	169.6	271.9

05100000 PEMBINA RIVER AT NECHE, ND

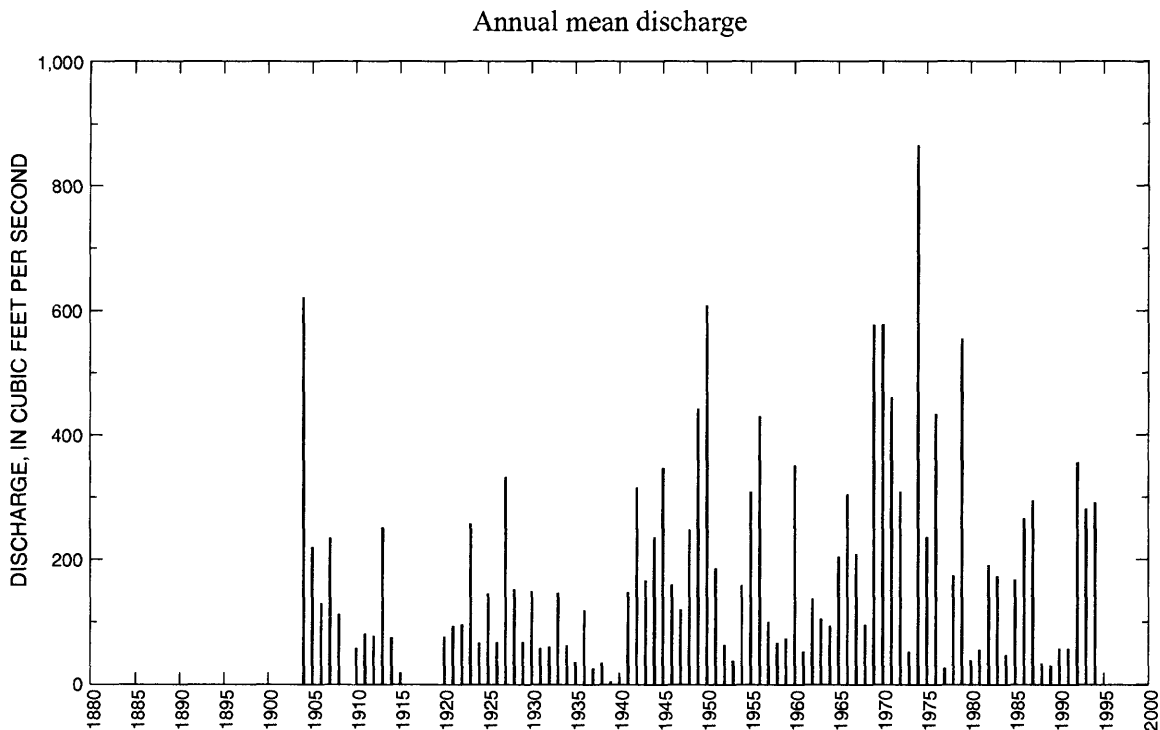
LOCATION.--Lat 48°59'20", long 97°33'05", in SE¹/₄NW¹/₄ sec.31, T.164 N., R.53 W., Pembina County, Hydrologic Unit 09020313, on right bank 0.3 mi east of State Highway 18, and at north edge of Neche.

DRAINAGE AREA.--3,410 mi², approximately.

PERIOD OF RECORD.--May 1903 to September 1908, June 1909 to September 1915, April 1919 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 809.69 ft above sea level. Prior to May 24, 1932, nonrecording gage at Burlington Northern Railway bridge 1 mi upstream, at same datum. May 25, 1932, to Apr. 17, 1939, nonrecording gage on bridge on State Highway 18, 500 ft downstream from railway bridge, at same datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s, Apr. 20, 1950, from rating curve extended above 5,300 ft³/s, gage height, 21.58 ft, backwater from ice; maximum gage height, 23.64 ft, Apr. 20, 1979, backwater from ice; no flow at times.

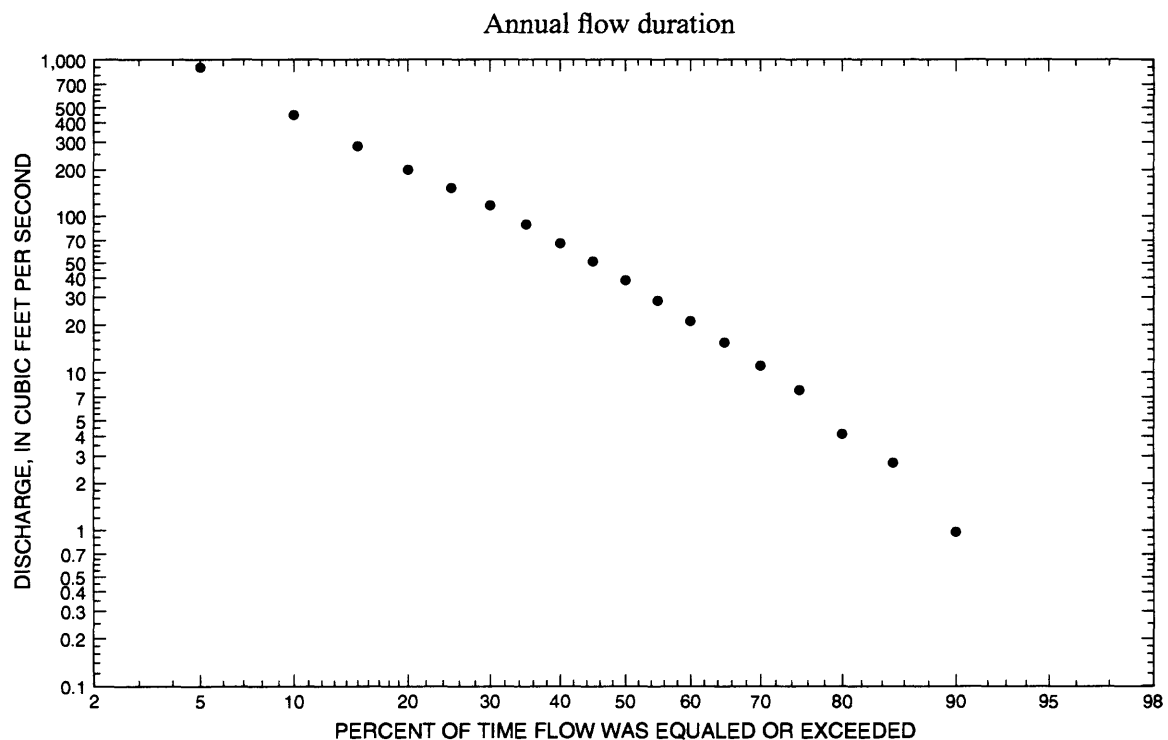


05100000 PEMBINA RIVER AT NECHE, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	378	1969	0	m	67.4	71.2	1.05	2.99
November	234	1945	0	m	43.3	45.5	1.05	1.92
December	130	1905	0	m	20.0	24.8	1.24	0.88
January	66.0	1960	0	m	10.3	13.0	1.26	0.46
February	49.5	1945	0	m	7.33	9.36	1.28	0.32
March	741	1945	0	m	88.6	152	1.72	3.92
April	3,150	1969	24.7	1939	766	749	0.98	33.9
May	4,620	1974	11.8	1939	619	800	1.29	27.4
June	1,780	1974	6.56	1940	304	333	1.10	13.5
July	839	1904	0	1940	161	179	1.11	7.12
August	946	1993	0	1939	96.5	149	1.54	4.27
September	648	1993	0	m	74.7	103	1.38	3.31
Annual	865	1974	3.96	1939	190	169	0.89	100



05100000 PEMBINA RIVER AT NECHE, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	69.9	58.8	49.6	40.0
0.95	1.05	264	172	146	120	95.6
0.90	1.11	391	272	231	188	149
0.80	1.25	623	463	396	317	252
0.50	2	1,470	1,210	1,040	820	656
0.20	5	3,360	2,950	2,530	1,980	1,600
0.10	10	5,100	4,550	3,890	3,050	2,490
0.04	25	7,860	7,070	6,030	4,730	3,910
0.02	50	10,300	9,280	7,910	6,220	5,190
0.01	100	13,200	11,800	10,000	7,900	6,650
0.005	200	16,400	14,500	12,300	9,780	8,300
0.002	500	21,300	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0.057	0.293
0.10	10	0	0	0	0	0	0	0.096	0.383	1.43
0.20	5	0	0	0	0	0.091	0.240	0.593	1.41	4.28
0.50	2	2.78	2.97	3.02	3.19	3.32	3.97	4.87	7.76	18.8

05100000 PEMBINA RIVER AT NECHE, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	8.29	45.8	24.1	6.08	0.51	0	0	0.51	0	0
90	0.02	0	0	26.4	67.9	41.1	13.1	3.08	0.49	0.95	2.60	0.41	0.98
85	0.20	0	0	67.9	93.5	56.6	20.2	5.30	2.30	4.95	5.07	1.80	2.72
80	0.80	0.10	0.90	106	115	75.3	27.9	10.1	5.10	10.1	7.49	2.20	4.15
75	1.40	0.70	1.90	141	142	94.4	37.9	14.3	9.53	15.5	10.4	3.95	7.82
70	1.80	1.20	2.90	169	165	113	48.3	19.1	13.8	24.6	14.4	5.07	11.1
65	2.40	1.60	3.56	199	186	131	58.9	25.5	18.8	29.8	16.6	6.32	15.6
60	4.15	2.20	4.52	236	204	149	69.0	31.3	25.6	35.0	20.8	8.24	21.2
55	4.81	2.90	6.06	275	232	167	79.7	37.1	34.1	41.4	26.2	9.91	28.6
50	5.84	3.90	7.29	329	276	192	92.5	47.8	43.5	47.8	30.4	13.1	38.7
45	7.45	4.34	9.77	382	344	219	106	58.9	52.8	54.4	34.4	15.6	51.7
40	8.48	4.78	12.1	493	412	252	122	70.1	59.7	61.0	39.0	17.9	67.2
35	10.0	6.00	16.4	612	500	288	139	84.1	66.5	69.8	43.8	20.2	89.0
30	12.2	8.01	22.1	736	624	329	171	100	76.7	82.3	50.2	22.9	118
25	14.2	9.88	30.7	925	759	379	205	120	93.5	96.5	57.8	25.8	152
20	16.3	12.0	47.3	1,170	909	437	240	142	113	114	69.9	29.7	202
15	19.6	14.8	111	1,500	1,150	532	291	175	139	135	84.0	35.3	283
10	26.3	18.4	207	2,090	1,580	672	369	217	191	162	102	45.6	450
5	42.3	25.7	462	3,070	2,360	1,010	572	359	278	220	140	69.2	900

05100000 PEMBINA RIVER AT NECHE, ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0.425
0.20	5	0.108	0.112	0.163	0.229	0.078	0.110	0.145	2.28
0.50	2	3.10	3.21	3.34	3.64	4.45	5.10	5.66	18.1
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0.128	0.330	0.636	0	0	0	0
0.10	10	1.10	¹ 1.40	1.80	2.60	0.032	0.154	0.332	0.521
0.20	5	4.31	4.86	6.31	9.19	1.39	1.93	2.56	3.50
0.50	2	25.1	32.8	34.6	48.9	12.3	15.6	18.7	26.1

¹Graphical interpretation.

05100000 PEMBINA RIVER AT NECHE, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1904	May 2	20.90	4,300	1952	April 3	8.18	550
1905	April 5	9.80	1,370	1953	June 10	6.74	250
1906	April 4	9.00	800	1954	July 7	7.97	846
1907	May 14	13.60	2,190	1955	April 5	20.11	2,700
1908	April 10	7.70	927	1956	April 27	20.90	5,200
1910	March 15	6.50	685	1957	March 27	7.63	661
1911	March 23	8.90	900	1958	April 7	7.17	442
1912	July 29	8.50	1,000	1959	April 5	14.40	1,800
1913	April 7	21.50	3,870	1960	April 14	21.00	4,040
1914	April 18	4.80	388	1961	April 3	9.49	372
1915	April 7	6.20	180	1962	April 21	20.97	3,650
1919	April 15	15.10	2,430	1963	July 28	10.55	1,150
1920	April 19	7.10	361	1964	April 17	10.07	1,080
1921	April 13	7.40	733	1965	April 13	19.21	3,600
1922	April 7	--	1,300	1966	April 3	21.20	4,300
1923	April 20	17.80	3,120	1967	April 23	16.83	2,900
1924	April 20	6.70	674	1968	March 28	9.34	734
1925	March 28	18.30	2,350	1969	April 21	21.32	7,360
1926	July 6	5.00	318	1970	April 27	21.47	7,070
1927	May 12	17.80	3,110	1971	April 12	22.22	7,350
1928	March 25	--	1,270	1972	April 16	15.87	2,550
1929	March 21	9.00	750	1973	March 27	8.27	224
1930	April 8	19.00	2,900	1974	April 28	22.92	10,300
1931	April 9	13.00	1,580	1975	May 18	11.03	1,500
1932	April 9	13.60	1,240	1976	April 19	19.87	4,430
1933	May 26	--	1,180	1977	May 21	9.26	261
1934	April 9	9.76	780	1978	April 11	19.31	3,800
1935	June 18	5.38	364	1979	April 20	23.64	9,500
1936	April 15	17.34	2,530	1980	April 7	8.85	435
1937	June 8	4.32	237	1981	April 1	9.28	285
1938	March 20	8.11	730	1982	June 8	11.68	1,520
1939	April 4	6.30	52.0	1983	April 9	11.86	1,630
1940	April 20	7.97	816	1984	April 7	9.35	312
1941	April 14	18.23	2,830	1985	March 20	13.97	1,750
1942	April 7	19.96	3,550	1986	March 24	14.83	2,390
1943	March 27	12.82	1,400	1987	April 7	21.41	5,510
1944	August 6	--	1,200	1988	April 6	8.74	420
1945	March 29	16.54	2,440	1989	April 17	10.08	1,000
1946	March 24	16.27	2,070	1990	April 3	10.50	1,000
1947	April 11	10.19	1,320	1991	June 16	10.22	888
1948	April 21	20.36	3,770	1992	April 1	19.59	3,900
1949	April 22	20.83	5,010	1993	July 30	18.10	3,580
1950	April 20	21.58	10,700	1994	April 2	13.24	2,040
1951	April 7	14.95	2,000				

05100000 PEMBINA RIVER AT NECHE, ND--Continued

Annual peak discharge and corresponding gage height—Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 20	21.58	10,700	1905	April 5	9.80	1,370
1974	April 28	22.92	10,300	1947	April 11	10.19	1,320
1979	April 20	23.64	9,500	1922	April 7	--	1,300
1969	April 21	21.32	7,360	1928	March 25	--	1,270
1971	April 12	22.22	7,350	1932	April 9	13.60	1,240
1970	April 27	21.47	7,070	1944	August 6	--	1,200
1987	April 7	21.41	5,510	1933	May 26	--	1,180
1956	April 27	20.90	5,200	1963	July 28	10.55	1,150
1949	April 22	20.83	5,010	1964	April 17	10.07	1,080
1976	April 19	19.87	4,430	1912	July 29	8.50	1,000
1904	May 2	20.90	4,300	1989	April 17	10.08	1,000
1966	April 3	21.20	4,300	1990	April 3	10.50	1,000
1960	April 14	21.00	4,040	1908	April 10	7.70	927
1992	April 1	19.59	3,900	1911	March 23	8.90	900
1913	April 7	21.50	3,870	1991	June 16	10.22	888
1978	April 11	19.31	3,800	1954	July 7	7.97	846
1948	April 21	20.36	3,770	1940	April 20	7.97	816
1962	April 21	20.97	3,650	1906	April 4	9.00	800
1965	April 13	19.21	3,600	1934	April 9	9.76	780
1993	July 30	18.10	3,580	1929	March 21	9.00	750
1942	April 7	19.96	3,550	1968	March 28	9.34	734
1923	April 20	17.80	3,120	1921	April 13	7.40	733
1927	May 12	17.80	3,110	1938	March 20	8.11	730
1930	April 8	19.00	2,900	1910	March 15	6.50	685
1967	April 23	16.83	2,900	1924	April 20	6.70	674
1941	April 14	18.23	2,830	1957	March 27	7.63	661
1955	April 5	20.11	2,700	1952	April 3	8.18	550
1972	April 16	15.87	2,550	1958	April 7	7.17	442
1936	April 15	17.34	2,530	1980	April 7	8.85	435
1945	March 29	16.54	2,440	1988	April 6	8.74	420
1919	April 15	15.10	2,430	1914	April 18	4.80	388
1986	March 24	14.83	2,390	1961	April 3	9.49	372
1925	March 28	18.30	2,350	1935	June 18	5.38	364
1907	May 14	13.60	2,190	1920	April 19	7.10	361
1946	March 24	16.27	2,070	1926	July 6	5.00	318
1994	April 2	13.24	2,040	1984	April 7	9.35	312
1951	April 7	14.95	2,000	1981	April 1	9.28	285
1959	April 5	14.40	1,800	1977	May 21	9.26	261
1985	March 20	13.97	1,750	1953	June 10	6.74	250
1983	April 9	11.86	1,630	1937	June 8	4.32	237
1931	April 9	13.00	1,580	1973	March 27	8.27	224
1982	June 8	11.68	1,520	1915	April 7	6.20	180
1975	May 18	11.03	1,500	1939	April 4	6.30	52.0
1943	March 27	12.82	1,400				

05100000 PEMBINA RIVER AT NECHE, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1903	--	--	--	--	--	--	--	201.7	149.0	60.3	33.0	33.0	--
1904	40.0	30.0	15.0	8.00	4.00	2.00	1,490	2,640	1,693	838.8	384.8	301.7	621.1
1905	235.0	170.0	130.0	59.0	20.0	200.0	480.0	447.4	485.3	206.1	97.0	93.9	219.3
1906	118.8	80.0	20.0	10.0	5.00	2.00	408.0	192.5	271.4	175.1	130.8	147.2	130.0
1907	143.9	97.0	15.0	5.00	2.00	3.00	170.0	1,601	507.2	155.8	54.3	34.8	234.7
1908	55.2	38.0	19.0	6.00	3.00	3.00	328.0	473.9	223.9	87.8	52.1	60.9	112.6
1909	--	--	--	--	--	--	--	--	329.0	129.0	48.3	27.7	--
1910	45.9	35.0	5.00	3.00	2.00	211.0	165.5	119.8	60.4	34.9	6.87	3.93	58.1
1911	6.39	3.00	2.00	1.00	0.500	198.0	293.7	230.6	153.9	49.2	24.1	5.73	81.0
1912	19.6	15.0	10.0	5.00	2.00	7.00	158.2	174.2	148.3	129.1	85.5	180.7	77.8
1913	191.1	120.0	50.0	20.0	10.0	5.00	1,674	529.5	191.1	106.5	69.5	61.8	251.5
1914	63.6	50.0	20.0	10.0	10.0	50.0	271.7	220.1	134.5	48.4	13.4	12.9	75.5
1915	31.7	21.1	9.00	6.00	5.00	9.00	45.7	25.3	24.6	20.3	8.74	7.77	17.9
1919	--	--	--	--	--	--	820.8	376.9	164.0	87.0	29.7	34.4	--
1920	88.5	65.0	30.0	20.0	15.0	28.0	178.5	228.2	148.6	76.7	17.6	18.3	76.2
1921	126.6	95.0	60.0	30.0	20.0	20.0	358.1	168.6	96.6	113.1	18.8	16.2	93.7
1922	106.2	53.6	30.0	8.00	4.50	40.9	449.8	242.9	139.5	26.5	9.35	38.5	95.7
1923	68.0	73.9	33.0	20.0	10.0	11.0	1,145	1,130	315.0	86.3	89.2	104.3	257.5
1924	113.9	90.3	23.0	4.00	3.00	7.00	219.5	156.5	98.5	54.0	14.4	20.5	67.0
1925	169.1	105.5	20.0	2.00	2.00	384.8	420.2	196.6	252.9	113.5	19.0	55.1	145.6
1926	143.1	67.0	25.0	12.0	3.00	58.5	145.2	100.5	96.0	93.0	13.3	47.6	67.3
1927	58.5	43.0	31.0	15.0	4.00	281.2	1,046	1,160	569.7	302.9	189.7	272.5	332.2
1928	230.0	123.2	50.0	40.0	25.0	322.5	357.2	208.6	180.8	152.0	59.4	71.6	152.0
1929	121.5	44.8	22.4	12.0	8.00	183.5	219.7	109.9	79.4	6.21	3.85	4.77	68.3
1930	19.0	45.8	8.00	2.00	1.00	1.00	928.0	458.0	215.8	85.7	15.9	11.9	148.9
1931	25.8	11.2	2.70	7.20	6.60	45.2	462.9	102.7	22.3	10.8	2.07	0.390	58.0
1932	0.635	4.92	1.04	0.132	3.45	14.1	422.9	185.7	71.2	21.1	6.10	1.84	60.7
1933	7.53	8.02	2.71	0	0	17.9	720.7	554.5	319.8	74.5	27.2	28.9	146.7
1934	47.2	24.1	9.60	4.74	4.81	75.2	343.3	153.5	67.7	19.9	1.37	0.100	62.6
1935	1.68	1.07	0.084	0	0	12.6	144.1	64.2	108.2	62.4	23.5	14.9	36.0
1936	14.0	5.01	2.19	0.568	0.038	0	681.3	428.4	196.5	57.0	20.7	25.3	118.7
1937	14.1	7.08	3.53	0.555	0	0	112.1	74.8	65.5	14.3	12.5	0.403	25.4
1938	0.813	0.363	0.168	0	0	179.4	101.0	78.3	36.6	12.5	0.052	0	34.4
1939	0	0	0	0	0	0	24.7	11.8	10.8	0.603	0	0	3.96
1940	0	0	0	0	0	0	94.0	35.5	6.56	0	7.06	0	11.8

05100000 PEMBINA RIVER AT NECHE, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1941	0	0	0	0	0	0	995.8	384.5	174.5	61.7	28.1	134.6	147.5
1942	121.8	51.8	26.3	3.53	1.09	45.7	1,900	977.1	365.0	129.2	100.1	68.4	315.4
1943	50.6	33.9	9.51	6.51	5.45	155.1	500.6	301.9	314.7	226.5	206.9	180.9	166.4
1944	122.9	72.0	39.7	7.37	3.65	3.74	273.9	203.7	255.2	563.8	810.9	463.0	235.9
1945	203.2	233.7	105.0	42.9	49.5	740.8	1,080	759.4	439.3	257.0	142.4	96.4	346.9
1946	66.8	35.6	21.7	8.98	8.96	568.4	674.0	290.2	113.4	67.5	32.0	20.3	159.7
1947	29.5	22.8	7.39	1.76	1.20	1.03	609.0	291.9	199.8	87.9	122.4	65.0	119.8
1948	53.5	28.1	15.4	14.1	5.48	5.03	930.2	888.5	412.9	312.0	197.0	117.2	248.3
1949	66.6	45.7	20.6	12.8	12.0	11.5	2,428	1,569	656.9	272.5	142.4	69.1	441.9
1950	56.6	41.7	17.8	8.81	7.04	9.58	1,804	2,887	1,211	598.4	408.3	222.5	608.7
1951	151.8	87.8	37.4	31.5	25.0	38.4	844.5	512.7	265.6	120.2	67.3	48.6	185.8
1952	28.9	15.7	7.29	1.29	1.00	1.28	283.5	204.4	123.0	70.5	20.6	4.52	63.4
1953	3.58	6.05	1.36	0.216	0.100	0.926	71.1	46.5	157.6	90.8	64.0	14.7	38.1
1954	8.82	9.57	3.65	1.06	0.318	9.25	94.6	80.6	389.8	686.6	401.2	205.7	158.7
1955	143.9	76.5	28.0	10.5	16.1	13.6	1,511	854.5	579.3	303.6	109.1	57.0	308.3
1956	53.3	25.0	14.5	8.84	8.55	12.1	1,180	2,264	881.2	377.2	182.5	139.7	429.8
1957	100.0	63.2	20.0	15.7	7.68	118.4	275.4	202.1	134.9	63.9	77.6	116.5	99.8
1958	165.2	86.7	61.5	35.1	21.1	24.2	205.5	125.5	38.8	31.9	5.19	2.31	67.1
1959	5.34	3.82	0.326	0.145	0.100	0.748	500.3	166.4	140.0	39.8	18.0	10.8	73.4
1960	31.9	61.7	100.3	66.0	39.7	23.0	1,833	1,252	480.5	203.3	94.3	44.0	351.4
1961	26.6	19.4	5.28	4.36	1.96	49.1	268.4	182.6	56.7	13.6	2.42	3.64	52.9
1962	4.23	3.09	0.958	0.403	0.132	1.03	672.8	377.5	296.5	114.6	83.1	99.8	137.6
1963	62.2	31.5	22.1	18.4	1.67	91.1	196.7	192.0	268.5	171.9	127.1	74.3	105.2
1964	45.4	22.0	6.60	3.29	3.22	2.74	328.8	328.5	203.4	73.1	49.6	57.3	93.5
1965	43.9	22.7	6.98	4.41	3.72	2.76	862.6	701.7	453.5	181.6	74.7	94.5	204.4
1966	85.0	51.0	34.1	21.5	16.4	139.1	1,547	964.9	389.5	241.8	113.3	44.7	304.2
1967	25.9	15.8	7.27	8.10	8.40	26.6	921.7	1,010	317.9	105.1	38.4	13.3	208.6
1968	22.1	19.2	6.26	2.60	1.80	155.8	204.9	143.6	70.0	43.7	138.4	342.8	95.7
1969	377.8	191.1	56.4	23.3	17.0	23.5	3,146	1,805	621.5	364.1	183.5	121.2	577.3
1970	80.8	58.4	29.3	17.4	15.2	11.8	1,613	2,313	1,465	809.9	322.4	180.1	578.2
1971	118.4	77.5	24.4	14.6	13.8	16.1	2,398	1,517	581.0	343.7	266.2	157.3	460.6
1972	104.6	69.9	34.5	17.3	10.9	395.6	1,330	891.7	356.6	198.9	178.0	110.8	308.2
1973	74.9	35.2	8.47	2.81	2.70	90.7	101.3	71.0	51.3	63.5	61.6	62.0	52.4
1974	60.8	38.5	20.8	10.6	6.20	11.7	3,028	4,618	1,777	529.9	149.6	99.0	865.4
1975	64.8	38.8	21.6	11.9	7.29	8.21	361.8	1,221	664.7	264.1	100.8	50.1	236.0

05100000 PEMBINA RIVER AT NECHE, ND--Continued

Monthly and annual mean discharges, in cubic feet per second—Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1976	44.0	28.2	12.0	13.2	15.0	30.7	2,766	1,450	502.5	251.7	85.2	41.2	434.6
1977	28.0	14.7	2.53	2.19	2.30	15.3	69.2	80.0	49.0	18.9	5.74	25.5	26.2
1978	29.1	10.9	6.01	3.01	0.429	0.063	1,170	519.0	194.6	68.1	46.8	49.8	174.3
1979	24.9	11.7	5.06	3.74	3.27	4.76	1,991	3,284	867.0	288.5	80.4	62.0	554.7
1980	45.8	27.5	13.2	6.45	5.03	5.83	205.0	84.3	36.6	11.2	11.5	12.9	38.6
1981	21.0	24.9	5.81	1.37	25.1	112.2	220.7	137.2	65.7	28.2	14.1	6.27	55.2
1982	13.9	11.1	3.65	0.989	0.019	33.4	605.2	644.5	520.8	261.5	133.8	61.2	191.2
1983	81.3	28.8	20.7	12.8	5.42	172.3	917.7	456.2	274.6	73.1	22.9	12.6	173.1
1984	24.4	19.0	2.39	0.534	0	25.6	148.1	164.0	138.3	32.9	6.99	2.31	47.0
1985	7.24	4.45	2.26	0.065	0	494.5	832.0	264.6	136.6	136.3	81.4	45.1	167.5
1986	56.5	42.1	17.8	15.2	8.41	571.4	927.2	771.6	382.5	179.2	133.4	65.4	265.4
1987	49.5	17.4	12.2	13.6	17.3	48.5	1,997	878.4	264.3	113.8	61.7	64.8	294.0
1988	65.8	36.1	18.3	4.23	2.17	44.4	145.9	53.9	16.5	3.27	0.439	0.101	32.6
1989	0.400	2.67	3.06	0.182	0	0	177.8	102.8	56.2	12.9	0.588	0	29.6
1990	0	4.25	0.003	0	0	0.823	316.1	122.3	185.1	60.0	6.16	0.194	57.6
1991	0.043	1.15	0.095	0.019	0	9.25	74.9	73.5	148.1	260.3	99.2	17.5	57.4
1992	12.1	11.2	8.48	8.17	8.06	438.1	2,554	889.2	230.7	90.4	29.0	11.9	355.8
1993	9.13	12.9	7.35	4.74	3.46	31.7	540.2	293.2	206.5	648.7	946.3	648.4	280.9
1994	319.0	187.6	105.1	46.6	36.2	395.4	1,146	543.6	234.3	176.8	114.8	187.1	291.5

05100500 HERZOG CREEK NEAR CONCRETE, ND

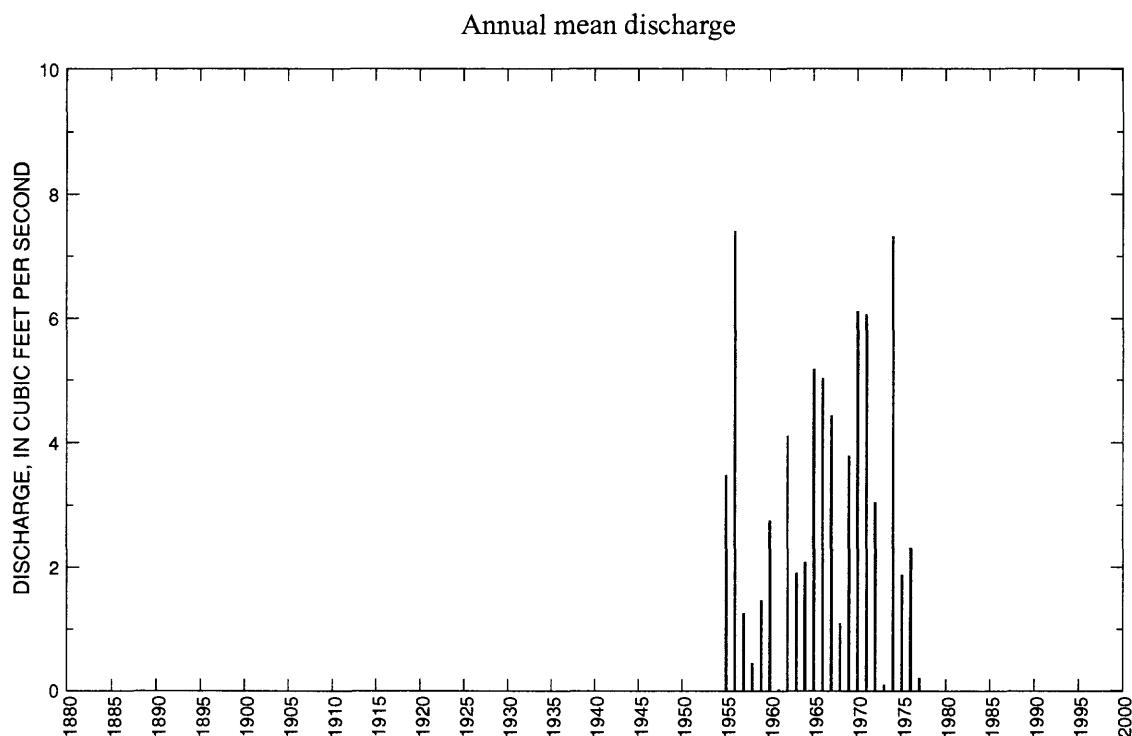
LOCATION.--Lat 48°45'13", long 97°54'22", in SE¹/₄ sec.20, T.161 N., R.56 W., Pembina County, Hydrologic Unit 09020313, on left bank 1.7 mi northeast of Concrete and 1.7 mi upstream from mouth.

DRAINAGE AREA.--18.9 mi².

PERIOD OF RECORD.--June 1954 to September 1977.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,108.95 ft above mean sea level (levels by Soil Conservation Service). Prior to Sept. 15, 1971, recording gage at site 0.5 mi downstream at same datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 260 ft³/s, Apr. 2, 1955, gage height, 9.74 ft, from floodmarks, backwater from ice; maximum gage height, 12.59 ft, Mar. 25, 1976, backwater from ice; no flow at times each year.



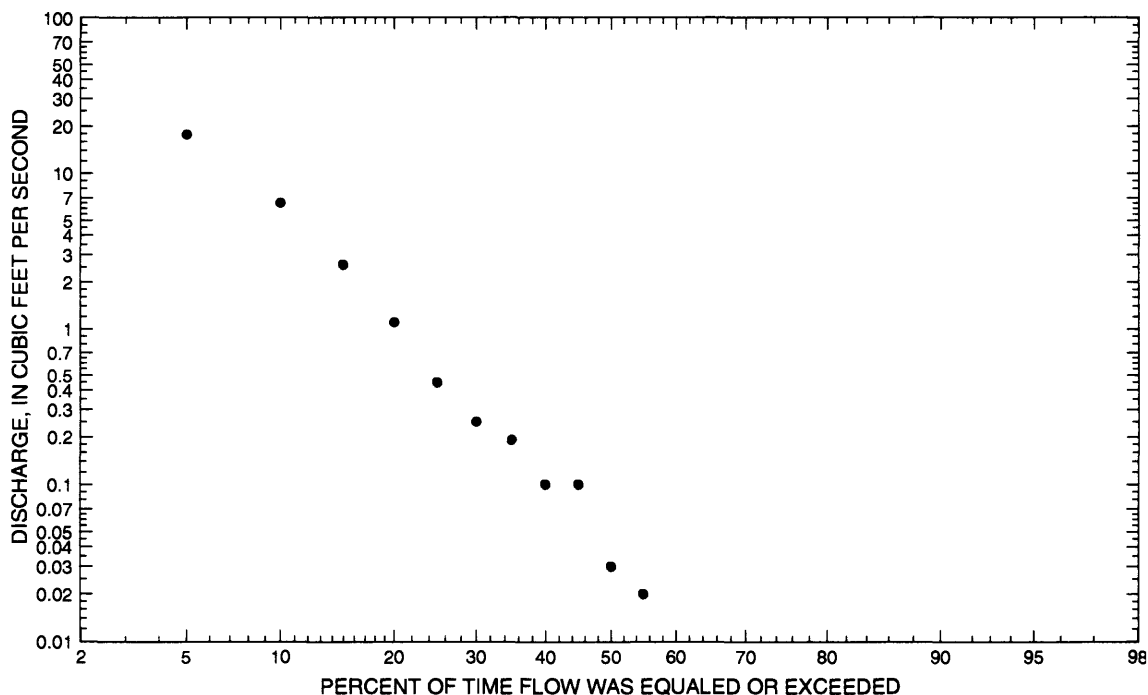
05100500 HERZOG CREEK NEAR CONCRETE, ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coefficient of variation	Percentage of annual discharge
October	8.80	1974	0	m	1.76	2.64	1.50	4.70
November	2.20	1972	0	m	0.550	0.69	1.25	1.48
December	1.80	1963	0	m	0.160	0.37	2.37	0.42
January	1.04	1963	0	m	0.060	0.22	3.76	0.15
February	0.343	1958	0	m	0.030	0.08	3.11	0.07
March	11.6	1966	0	m	1.38	2.83	2.05	3.69
April	48.6	1971	0.050	1973	19.4	16.6	0.86	51.7
May	37.7	1974	0	1961	8.94	11.4	1.27	23.9
June	10.2	1962	0	1961	2.83	3.09	1.09	7.55
July	5.48	1966	0	m	1.23	1.64	1.33	3.29
August	2.27	1964	0	m	0.240	0.52	2.17	0.64
September	6.73	1972	0	m	0.920	1.79	1.93	2.47
Annual	7.41	1956	0.018	1961	3.11	2.28	0.73	100

Annual flow duration



05100500 HERZOG CREEK NEAR CONCRETE, ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0.02	0	0	0	0	0	0	0	0
85	0	0	0	0.08	0.09	0.03	0	0	0	0	0	0	0
80	0	0	0	0.10	0.09	0.04	0	0	0	0	0	0	0
75	0	0	0	0.19	0.20	0.08	0	0	0	0	0	0	0
70	0	0	0	0.34	0.27	0.10	0.03	0	0	0	0.05	0	0
65	0	0	0	0.60	0.46	0.13	0.03	0	0	0	0.10	0	0
60	0	0	0	1.10	1.00	0.16	0.03	0	0	0.03	0.10	0	0
55	0	0	0	1.90	1.40	0.27	0.08	0	0	0.07	0.10	0	0.02
50	0	0	0	4.15	1.80	0.34	0.10	0	0	0.09	0.12	0.02	0.03
45	0	0	0	7.54	2.40	0.44	0.10	0	0	0.18	0.18	0.02	0.10
40	0	0	0	11.4	4.87	0.57	0.16	0.02	0.02	0.18	0.18	0.04	0.10
35	0	0	0	15.4	6.03	1.20	0.16	0.02	0.03	0.29	0.18	0.06	0.19
30	0	0	0.03	21.5	7.71	1.60	0.27	0.03	0.07	0.29	0.27	0.09	0.25
25	0	0	0.10	29.7	8.98	2.60	0.45	0.04	0.09	0.46	0.40	0.09	0.45
20	0.02	0	0.17	37.4	13.1	4.30	0.75	0.09	0.24	0.59	0.50	0.09	1.10
15	0.03	0.02	0.48	47.2	18.6	5.80	1.20	0.16	1.10	1.50	0.92	0.18	2.60
10	0.04	0.02	1.30	63.0	31.0	8.62	3.72	0.43	1.70	6.51	1.40	0.26	6.47
5	0.09	0.09	6.60	89.5	49.2	14.3	5.27	1.70	4.38	11.6	3.10	0.54	17.7

05100500 HERZOG CREEK NEAR CONCRETE, ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	0.248	0.182	0.124	0.095
0.95	1.05	13.3	2.21	1.57	1.03	0.688
0.90	1.11	20.1	5.71	4.05	2.64	1.69
0.80	1.25	32.0	14.9	10.7	7.05	4.38
0.50	2	70.5	54.9	41.7	29.0	18.1
0.20	5	137	112	92.2	69.8	46.9
0.10	10	185	135	117	93.0	65.8
0.04	25	247	152	137	114	85.5
0.02	50	293	158	146	124	96.7
0.01	100	337	162	151	132	105
0.005	200	379	164	154	136	112
0.002	500	434	ng	ng	ng	ng

Probability of occurrence of annual low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	ng	ng	ng	ng	ng	ng	0	0	0
0.10	10	ng	ng	ng	ng	ng	ng	0	0	0
0.20	5	ng	ng	ng	ng	ng	ng	0	0	0.034
0.50	2	ng	ng	ng	ng	ng	ng	0	0.016	0.203

05100500 HERZOG CREEK NEAR CONCRETE, ND--Continued

Probability of occurrence of seasonal low discharges

[ng, statistic not given]

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	ng	0	0	ng	0	0	0
0.10	10	0	ng	0	0	ng	0	0	0
0.20	5	0	ng	0	0	ng	0	0	0
0.50	2	0	ng	0	0	ng	0	0	0.036
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0
0.50	2	0	0	0	0.022	0	0	0	0

05100500 HERZOG CREEK NEAR CONCRETE, ND--Continued

Annual peak discharge and corresponding gage height

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1955	April 2	9.74	260	1967	May 7	6.52	94.0
1956	April 25	8.38	243	1968	June 25	3.61	8.60
1957	March 21	7.54	90.0	1969	April 10	7.29	129
1958	March 26	5.22	20.0	1970	April 25	6.65	106
1959	April 6	4.79	35.0	1971	April 9	7.92	128
1960	April 13	6.66	100	1972	April 14	10.29	94.0
1961	April 1	3.12	2.00	1973	August 9	9.89	16.0
1962	April 20	6.67	102	1974	April 20	10.85	122
1963	July 26	5.81	63.0	1975	April 29	10.27	53.0
1964	June 19	5.25	46.0	1976	April 6	10.64	44.0
1965	April 11	7.41	115	1977	October 26	9.83	36.0
1966	May 5	6.24	79.0				
Annual peak discharge, from highest to lowest, and corresponding gage height							
1955	April 2	9.74	260	1966	May 5	6.24	79.0
1956	April 25	8.38	243	1963	July 26	5.81	63.0
1969	April 10	7.29	129	1975	April 29	10.27	53.0
1971	April 9	7.92	128	1964	June 19	5.25	46.0
1974	April 20	10.85	122	1976	April 6	10.64	44.0
1965	April 11	7.41	115	1977	October 26	9.83	36.0
1970	April 25	6.65	106	1959	April 6	4.79	35.0
1962	April 20	6.67	102	1958	March 26	5.22	20.0
1960	April 13	6.66	100	1973	August 9	9.89	16.0
1967	May 7	6.52	94.0	1968	June 25	3.61	8.60
1972	April 14	10.29	94.0	1961	April 1	3.12	2.00
1957	March 21	7.54	90.0				

05100500 HERZOG CREEK NEAR CONCRETE, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1954	--	--	--	--	--	--	--	--	--	0.332	0.677	2.37	--
1955	0.348	0.110	0.103	0	0	0.274	31.6	--	3.69	4.25	0	0	3.49
1956	2.42	0.207	0.100	0.123	0.183	0.106	47.9	31.7	5.06	0.868	0.303	0.290	7.41
1957	0.200	0.880	0.103	0.010	0.007	7.61	3.01	1.83	1.22	0.123	0	0.010	1.26
1958	0	0	0.323	0.006	0.343	2.76	1.20	0.106	0.123	0.535	0.016	0	0.453
1959	0.052	0.060	0	0	0	0.468	10.9	4.29	1.41	0.506	0	0	1.47
1960	0	0.023	0	0	0	0.006	31.0	2.50	0.107	0	0	0	2.76
1961	0	0	0	0	0	0.023	0.197	0	0	0	0	0	0.018
1962	0	0	0	0	0	0	20.4	13.3	10.2	3.18	0.490	1.91	4.12
1963	1.65	2.02	1.80	1.04	0	1.23	0.223	0.103	5.39	3.77	0.074	5.58	1.91
1964	0.394	0.137	0.039	0	0	0.010	6.75	7.31	4.51	2.25	2.27	1.45	2.09
1965	3.86	0.270	0.268	0.023	0	0	34.8	12.5	7.53	2.19	0.148	0.850	5.18
1966	1.06	1.23	0.302	0.039	0	11.6	20.9	18.7	0.446	5.48	0.131	0.003	5.03
1967	2.69	1.88	0.022	0.020	0.020	2.53	21.6	23.9	0.207	0.029	0	0	4.43
1968	0.016	0.726	0.050	0	0	1.20	2.70	2.91	2.76	1.19	1.27	0.362	1.10
1969	0.492	0.455	0	0	0	0.052	40.2	4.40	0.104	0.208	0	0	3.79
1970	1.89	0.067	0.307	0	0	0	37.8	29.0	4.15	0.087	0.021	0.028	6.12
1971	6.13	0.582	0.011	0	0	0	48.6	5.04	9.39	3.58	0.030	0.028	6.07
1972	0.027	2.20	0.066	0.004	0	3.22	22.4	2.07	0.153	0.085	0.063	6.73	3.05
1973	0.209	0.139	0.002	0	0	0.455	0.050	0.029	0.042	0.014	0.130	0.010	0.091
1974	8.80	1.24	0.069	0.025	0.015	0.008	37.6	37.7	2.00	0.068	0.068	0.011	7.33
1975	8.37	0.273	0.018	0	0	0.002	6.39	4.38	2.08	0.811	0.046	0.003	1.88
1976	0.053	0.083	0.049	0.031	0.017	0.173	19.0	1.99	4.46	0.048	0.027	2.25	2.32
1977	1.82	0.167	0	0	0	0.043	0.095	0.017	0.002	0.002	0.001	0.287	0.205

05101000 TONGUE RIVER AT AKRA, ND

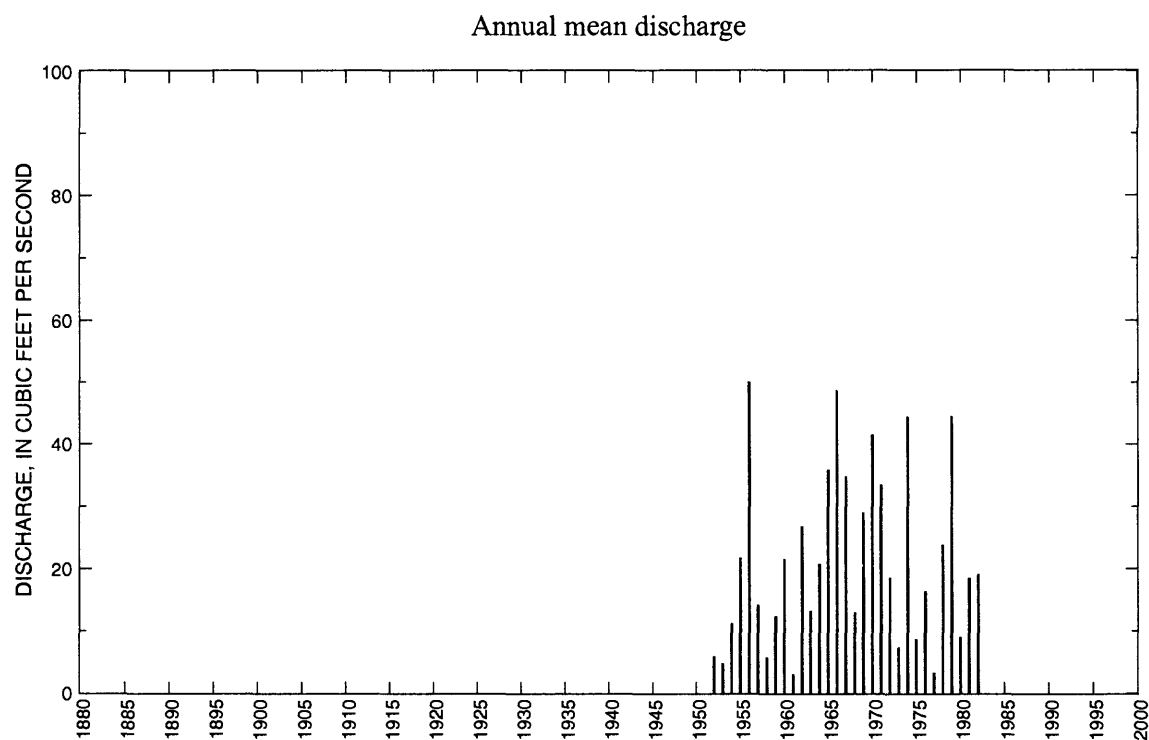
LOCATION.--Lat 48°46'42", long 97°44'43", in SW¹/₄ sec.10, T.161 N., R.55 W., Pembina County, Hydrologic Unit 09020313, on left bank 300 ft downstream from Renwick Dam, 0.9 mi northwest of Akra, and 6 mi west of Cavalier.

DRAINAGE AREA.--160 mi².

PERIOD OF RECORD.--April to June 1950 (WSP 1137-B), October 1951 to current year. Seasonal record since 1983.

GAGE.--Water-stage recorder. Datum of gage is 930.00 ft above sea level. Prior to July 10, 1954, nonrecording gage 1.2 mi downstream at datum 30.00 ft lower. July 23, 1954, to Dec. 19, 1973, water stage recorder 2.7 mi downstream at datum 9.10 ft lower.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,800 ft³/s, Apr. 18, 1950; gage height, 48.70 ft; no flow at times.



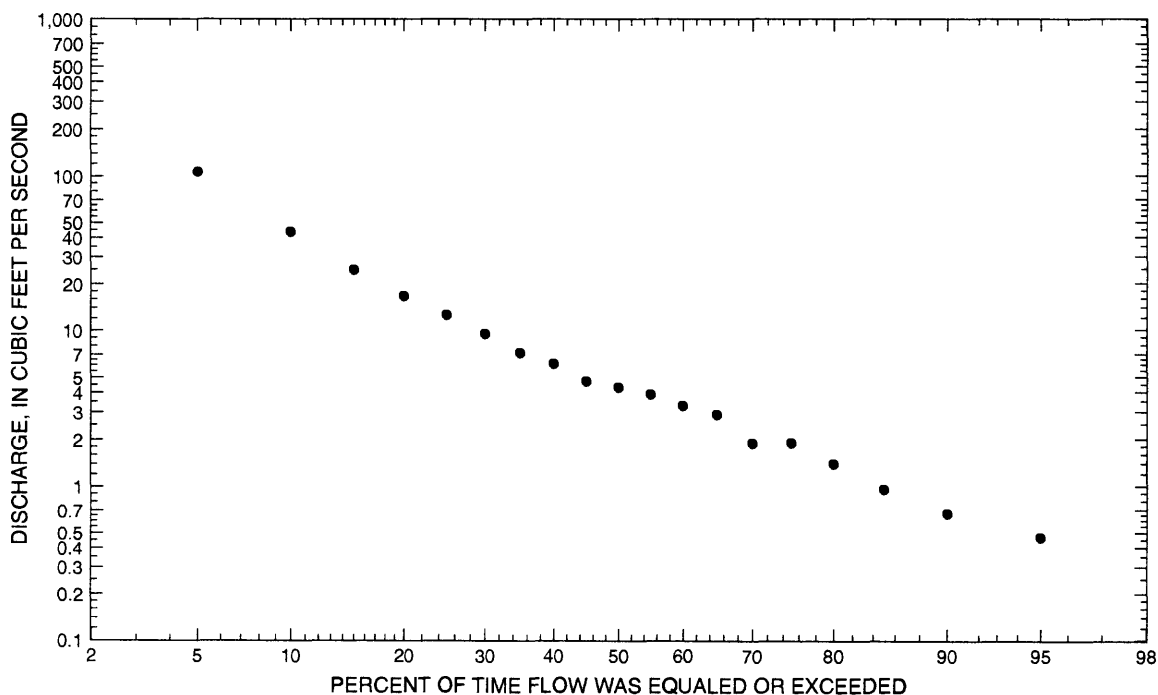
05101000 TONGUE RIVER AT AKRA, ND--Continued

Post-regulation period, 1955-94

Statistics of monthly and annual mean discharges, post-regulation period

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	30.1	1981	0.513	1962	6.70	6.60	0.98	2.69
November	22.7	1981	0.560	1976	7.26	5.17	0.71	2.92
December	12.9	1971	0.700	1976	4.82	3.25	0.68	1.94
January	7.27	1971	1.23	1955	3.42	1.70	0.50	1.37
February	18.7	1981	0.571	1962	3.91	3.58	0.92	1.57
March	135	1966	0.216	1964	21.5	27.6	1.28	8.65
April	294	1956	0.428	1991	108	93.2	0.86	43.3
May	225	1974	1.63	1980	49.2	63.9	1.30	19.8
June	78.7	1964	0.473	1988	18.2	19.5	1.07	7.33
July	107	1993	0.086	1978	11.5	17.6	1.53	4.63
August	144	1993	0.208	1988	7.99	22.6	2.83	3.21
September	28.3	1980	0.096	1989	6.51	7.56	1.16	2.62
Annual	50.1	1956	3.11	1961	22.9	14.1	0.62	100

Annual flow duration



05101000 TONGUE RIVER AT AKRA, ND--Continued

Monthly and annual flow duration, in cubic feet per second, post-regulation period

Percentage of days discharge equaled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0.97	0.60	0.16	0.33	2.10	0.30	0.12	0.16	0.14	0.47	1.10	0.64	0.47
90	1.20	0.70	0.43	1.90	3.97	1.00	0.42	0.40	0.24	0.69	1.40	1.20	0.67
85	1.30	1.10	1.10	6.00	5.32	1.90	1.10	0.54	0.33	1.00	1.80	1.30	0.96
80	1.60	1.30	1.40	9.34	6.43	2.99	1.40	0.73	0.58	1.20	2.20	1.70	1.40
75	1.80	1.50	1.40	12.2	7.85	3.51	1.90	0.98	0.78	1.50	2.20	1.90	1.90
70	2.00	1.80	1.80	15.7	9.32	4.05	2.64	0.98	0.78	1.80	2.80	2.40	1.90
65	2.00	1.80	2.30	19.9	11.8	4.60	3.06	1.30	1.00	2.20	2.80	2.80	2.89
60	2.40	1.80	3.00	24.5	14.3	5.40	3.48	1.80	1.40	2.70	3.60	3.10	3.30
55	2.40	2.10	4.05	29.8	16.6	5.89	3.93	1.80	1.90	3.30	4.70	3.10	3.90
50	3.00	2.50	4.70	39.3	19.1	7.79	4.38	2.40	2.50	3.30	5.13	3.50	4.32
45	3.30	2.90	5.35	52.6	21.6	9.67	5.17	2.40	3.37	4.00	5.77	4.00	4.75
40	3.30	3.40	6.67	66.8	25.3	11.7	5.71	2.40	3.92	5.17	6.30	4.50	6.14
35	3.70	3.40	11.2	85.0	29.5	13.9	7.33	3.57	4.68	5.84	7.41	4.50	7.15
30	4.10	4.00	17.0	108	36.8	16.1	8.47	3.99	6.12	6.55	7.89	5.70	9.49
25	4.50	4.00	22.6	134	47.7	20.1	10.5	4.84	7.46	7.74	9.43	5.70	12.6
20	4.50	4.00	30.1	170	63.7	26.1	12.7	6.60	9.64	9.93	11.0	6.50	16.8
15	5.00	5.90	38.8	232	82.7	34.0	17.1	9.05	13.0	12.8	13.9	7.30	24.7
10	5.50	6.91	53.8	343	128	50.2	25.0	12.7	17.5	15.7	16.6	9.57	43.8
5	6.80	11.4	104	488	228	77.0	37.9	24.0	25.9	21.3	21.3	13.3	108

05101000 TONGUE RIVER AT AKRA, ND--Continued

Probability of occurrence of annual high discharges, post-regulation period

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	11.7	15.4	10.9	8.45	5.87
0.95	1.05	32.2	43.4	32.3	23.9	16.4
0.90	1.11	52.8	71.1	54.2	39.6	27.1
0.80	1.25	92.8	122	95.8	69.4	47.3
0.50	2	244	296	242	177	121
0.20	5	556	590	502	380	261
0.10	10	811	789	682	532	368
0.04	25	1,170	1,030	900	727	507
0.02	50	1,450	1,190	1,050	870	610
0.01	100	1,740	1,330	1,190	1,010	711
0.005	200	2,030	1,460	1,310	1,140	808
0.002	500	2,410	ng	ng	ng	ng

Probability of occurrence of annual low discharges, post-regulation period

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0.037	0.056	0.065	0.076	0.151	0.336	0.484	0.633	1.18
0.10	10	0.063	0.088	0.102	0.126	0.231	0.467	0.673	0.942	1.58
0.20	5	0.114	0.149	0.172	0.226	0.373	0.683	0.980	1.44	2.20
0.50	2	0.331	0.392	0.448	0.611	0.855	1.33	1.88	2.72	3.87

05101000 TONGUE RIVER AT AKRA, ND--Continued

Probability of occurrence of seasonal low discharges, post-regulation period

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)									
		Number of consecutive days									
		1	7	14	30	1	7	14	30		
		December-January-February				March-April-May					
0.05	20	0.396	0.414	0.509	0.704	0.037	0.064	0.103	0.423		
0.10	10	0.555	0.579	0.667	0.906	0.087	0.139	0.225	0.834		
0.20	5	0.819	0.852	0.950	1.22	0.229	0.335	0.543	1.79		
0.50	2	1.63	1.69	1.77	2.10	1.11	1.48	2.44	6.52		
		June-July-August				September-October-November					
		0.05	20	0.047	0.067	0.094	0.207	0.067	0.142	0.174	0.270
		0.10	10	0.096	0.137	0.188	0.378	0.123	0.218	0.264	0.424
		0.20	5	0.209	0.296	0.400	0.738	0.243	0.368	0.440	0.728
		0.50	2	0.720	1.00	1.36	2.24	0.775	1.01	1.20	2.01

05101000 TONGUE RIVER AT AKRA, ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1950	April 18	48.70	11,800	1973	March 24	9.85	118
1952	April 1	38.48	260	1974	April 22	15.61	595
1953	May 31	35.86	178	1975	April 25	10.38	76.0
1954	June 12	35.53	187	1976	April 9	13.31	313
1955	April 2	13.23	700	1977	July 18	10.40	64.0
1956	April 19	14.23	1,350	1978	April 10	14.28	429
1957	March 22	6.12	340	1979	April 22	16.75	900
1958	July 5	2.38	78.0	1980	April 6	11.86	180
1959	April 5	9.04	485	1981	March 25	10.73	76.0
1960	April 14	8.67	654	1982	April 14	12.95	308
1961	March 27	4.56	60.0	1983	April 8	12.89	354
1962	April 23	7.03	473	1984	April 14	12.89	33.0
1963	June 12	4.57	210	1985	March 20	12.13	243
1964	June 20	5.38	286	1986	March 25	12.35	275
1965	April 14	8.10	580	1987	April 8	13.79	480
1966	April 2	7.35	492	1988	April 6	8.71	38.0
1967	May 9	6.28	412	1989	April 24	9.48	49.0
1968	March 27	5.55	160	1990	April 24	8.82	15.0
1969	April 14	7.85	606	1991	June 19	9.45	35.0
1970	April 29	7.99	567	1992	March 9	10.77	80.0
1971	April 12	7.75	568	1993	July 29	14.11	492
1972	April 16	5.79	325	1994	April 12	14.11	138
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	April 18	48.70	11,800	1976	April 9	13.31	313
1956	April 19	14.23	1,350	1982	April 14	12.95	308
1979	April 22	16.75	900	1964	June 20	5.38	286
1955	April 2	13.23	700	1986	March 25	12.35	275
1960	April 14	8.67	654	1952	April 1	38.48	260
1969	April 14	7.85	606	1985	March 20	12.13	243
1974	April 22	15.61	595	1963	June 12	4.57	210
1965	April 14	8.10	580	1954	June 12	35.53	187
1971	April 12	7.75	568	1980	April 6	11.86	180
1970	April 29	7.99	567	1953	May 31	35.86	178
1966	April 2	7.35	492	1968	March 27	5.55	160
1993	July 29	14.11	492	1994	April 12	14.11	138
1959	April 5	9.04	485	1973	March 24	9.85	118
1987	April 8	13.79	480	1992	March 9	10.77	80.0
1962	April 23	7.03	473	1958	July 5	2.38	78.0
1978	April 10	14.28	429	1975	April 25	10.38	76.0
1967	May 9	6.28	412	1981	March 25	10.73	76.0
1983	April 8	12.89	354	1977	July 18	10.40	64.0
1957	March 22	6.12	340	1961	March 27	4.56	60.0
1972	April 16	5.79	325	1989	April 24	9.48	49.0

05101000 TONGUE RIVER AT AKRA, ND--Continued

Annual peak discharge and corresponding gage height--Continued

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height--Continued							
1988	April 6	8.71	38.0	1984	April 14	12.89	33.0
1991	June 19	9.45	35.0	1990	April 24	8.82	15.0

05101000 TONGUE RIVER AT AKRA, ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1951	--	--	--	--	--	--	450.9	586.9	40.7	--	--	--	--
1952	3.54	2.81	2.07	1.25	1.00	4.57	46.8	5.90	1.91	1.24	0.542	0.583	5.97
1953	1.25	0.880	0.065	0.506	0.236	2.03	9.84	18.9	15.5	2.41	4.64	1.68	4.84
1954	2.59	2.52	1.24	0.635	1.09	7.06	36.0	18.5	51.7	4.13	3.09	7.32	11.3
1955	5.54	4.68	1.92	1.23	1.60	1.61	167.5	18.1	22.5	34.9	2.01	1.95	21.8
1956	17.4	4.39	3.03	3.40	4.23	3.92	294.2	208.8	32.7	13.9	4.69	11.8	50.1
1957	5.77	15.8	5.90	2.88	1.50	40.1	28.5	21.5	13.2	6.25	7.78	20.6	14.2
1958	6.21	5.53	3.34	2.21	2.38	9.41	15.6	6.38	3.95	11.9	1.12	0.953	5.77
1959	2.70	2.21	1.70	2.10	1.86	5.54	100.0	20.2	7.91	2.65	0.994	2.45	12.4
1960	3.71	3.06	3.37	2.64	2.03	1.85	196.6	38.2	6.22	2.23	1.09	1.00	21.6
1961	1.76	3.14	1.26	1.37	0.829	13.7	9.20	3.93	0.733	0.465	0.477	0.277	3.11
1962	0.513	2.51	2.00	1.28	0.571	0.494	128.9	81.7	66.8	21.3	9.92	7.42	26.9
1963	9.45	12.8	1.51	4.86	5.22	5.16	11.4	9.50	67.4	17.0	8.44	7.34	13.3
1964	6.18	3.82	6.55	2.01	1.43	0.216	83.2	35.6	78.7	17.8	4.38	11.0	20.8
1965	19.0	10.5	5.41	4.46	2.59	5.58	214.6	107.1	36.4	10.6	5.91	9.67	35.9
1966	14.1	8.21	9.74	5.15	3.04	134.9	206.1	143.9	13.3	31.4	8.20	3.52	48.7
1967	7.71	13.2	4.77	3.05	2.88	35.1	159.0	181.2	1.91	2.94	0.871	3.21	34.8
1968	1.14	4.85	10.2	6.12	5.12	19.9	26.3	38.4	15.9	14.3	7.98	5.27	13.0
1969	7.19	9.02	9.03	2.34	3.25	6.34	256.4	37.3	10.8	7.66	1.17	0.561	29.0
1970	0.783	5.40	7.60	6.40	6.37	5.52	215.6	190.8	46.5	6.45	4.25	3.18	41.6
1971	7.75	14.3	12.9	7.27	2.11	1.88	253.1	39.8	46.7	15.2	2.16	1.09	33.5
1972	2.45	12.3	3.53	2.16	3.45	50.9	110.1	22.6	5.36	5.29	2.50	3.02	18.6
1973	5.73	3.88	3.14	3.43	3.80	36.0	13.7	8.53	4.03	3.51	1.28	0.883	7.37
1974	3.07	3.52	4.37	4.29	3.20	11.4	246.9	224.8	27.3	2.77	0.972	0.653	44.5
1975	4.10	9.31	6.75	5.37	4.52	3.67	31.2	27.6	3.17	3.02	3.34	2.67	8.73
1976	1.46	0.560	0.700	3.99	4.56	4.73	141.8	5.45	30.8	1.79	2.00	1.62	16.4
1977	1.22	2.23	1.95	1.72	1.66	7.09	4.03	4.26	4.30	7.67	1.60	2.08	3.33
1978	3.54	8.24	10.3	3.65	9.07	13.7	205.6	30.8	3.48	0.086	0.805	0.206	23.9
1979	2.87	2.29	1.31	1.65	8.35	19.2	249.7	184.1	23.3	18.2	4.06	20.2	44.6
1980	5.19	5.39	4.90	4.74	4.21	7.27	37.1	1.63	0.828	0.741	9.62	28.3	9.09
1981	30.1	22.7	5.08	4.60	18.7	28.8	47.3	19.9	19.6	6.28	6.63	13.6	18.5
1982	11.0	9.38	2.74	1.29	0.834	12.7	97.9	37.6	27.6	14.8	6.04	7.77	19.1
1983	--	--	--	--	--	54.6	111.5	18.6	7.82	3.51	1.56	2.85	--
1984	--	--	--	--	--	2.67	22.1	9.32	7.83	7.86	0.900	3.26	--
1985	--	--	--	--	--	76.9	56.0	13.0	11.0	12.0	28.9	17.9	--

05101000 TONGUE RIVER AT AKRA, ND--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1986	--	--	--	--	--	82.3	124.9	68.0	10.8	22.8	10.9	19.6	--
1987	--	--	--	--	--	39.6	269.7	20.5	7.61	3.28	0.821	1.64	--
1988	--	--	--	--	--	5.27	14.1	6.81	0.473	0.453	0.208	0.244	--
1989	--	--	--	--	--	15.5	14.4	4.96	5.04	0.936	1.54	0.096	--
1990	--	--	--	--	--	1.55	6.27	6.76	6.12	1.95	1.43	1.41	--
1991	--	--	--	--	--	0.734	0.428	10.5	17.4	6.10	6.29	3.69	--
1992	--	--	--	--	--	34.4	21.3	15.6	7.66	8.52	3.45	7.19	--
1993	--	--	--	--	--	20.8	48.0	32.1	23.6	107.3	143.7	25.9	--
1994	--	--	--	--	--	40.2	71.7	12.5	3.13	5.16	9.67	4.39	--

05101500 TONGUE RIVER AT CAVALIER, ND

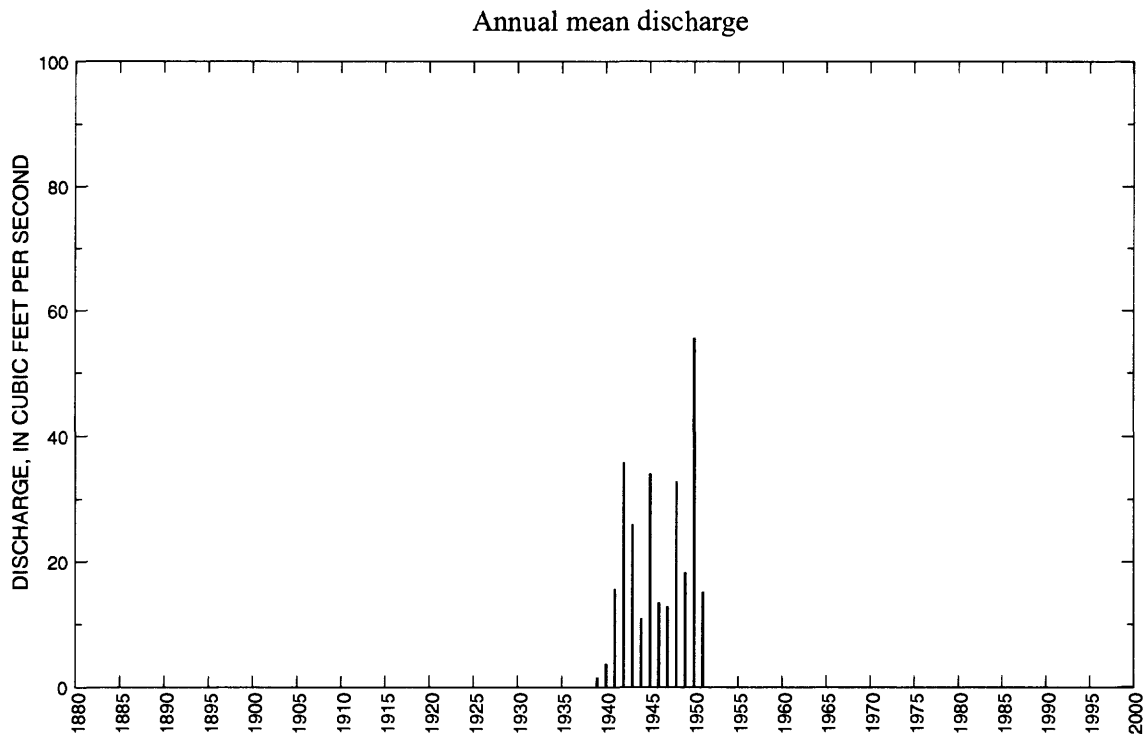
LOCATION.--Lat 48°47'55", long 97°37'35", in SE¹/₄NE¹/₄ sec.4, T.161 N., R.54 W., on left abutment of dam 0.5 mi upstream from State Highway 5 in Cavalier.

DRAINAGE AREA.--167 mi².

PERIOD OF RECORD.--October 1938 to October 1951.

GAGE.--Staff gage and concrete control. Datum of gage is 880.98 ft above mean sea level, datum of 1929, Emerson-Crookston supplementary adjustment of 1941. Prior to July 21, 1946, wire-weight or chain gage at site 0.5 mi downstream at datum 11.74 ft lower.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge (not including bypass flow), 1,340 ft³/s, May 8, 1950, gage height, 4.58 ft; no flow for several months in some years. During the floods of April and May 1950 and probably during flood of April 1948, large amounts of water bypassed the gage and are not included in the records. Maximum discharge including bypass flow, 11,800 ft³/s, Apr. 18, 1950, on basis of contracted-opening measurement of peak flow at site about 5 mi upstream.



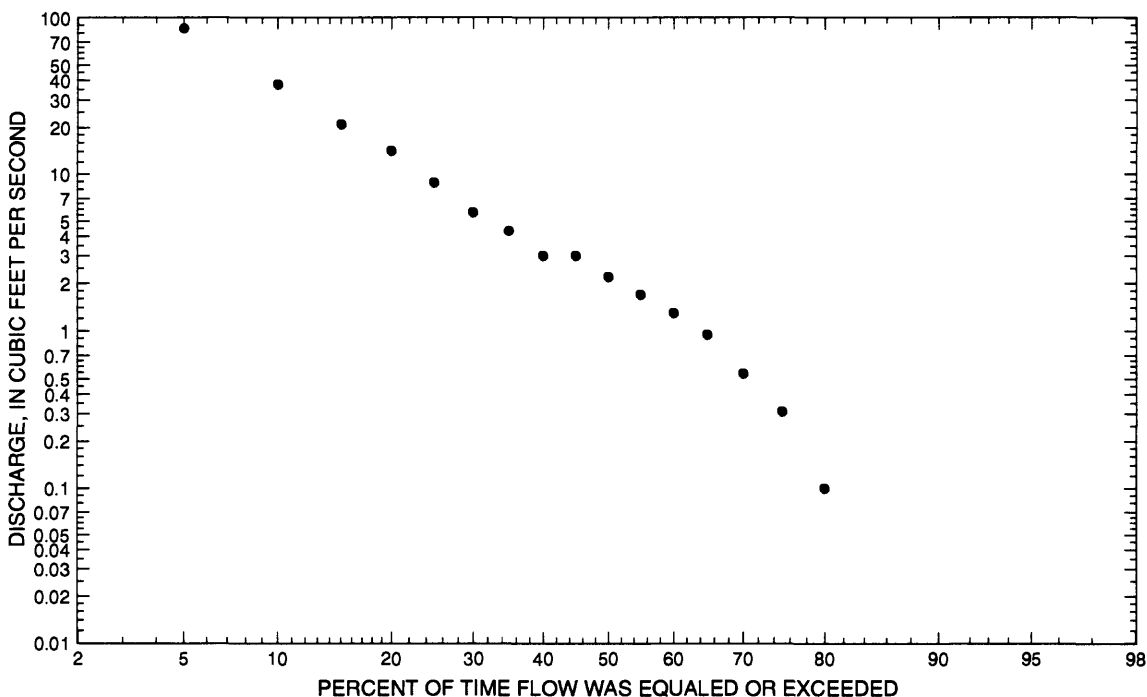
05101500 TONGUE RIVER AT CAVALIER ND--Continued

Statistics of monthly and annual mean discharges

[m, more than 1 year of occurrence]

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	14.3	1942	0	m	3.62	3.76	1.04	1.42
November	45.3	1945	0	m	5.90	12.0	2.03	2.31
December	10.0	1945	0	m	1.98	2.64	1.33	0.78
January	3.65	1945	0	m	0.970	1.10	1.13	0.38
February	2.83	1945	0	m	0.510	0.81	1.57	0.20
March	184	1945	0	m	30.2	54.4	1.80	11.8
April	273	1948	14.2	1939	117	85.2	0.73	45.9
May	406	1950	2.87	1939	53.7	108	2.00	21.0
June	98.2	1943	1.24	1940	22.8	26.3	1.15	8.92
July	30.9	1943	0.087	1939	8.57	9.41	1.10	3.35
August	20.9	1942	0	1939	4.39	5.82	1.33	1.72
September	23.5	1944	0	1939	5.58	7.41	1.33	2.19
Annual	55.6	1950	1.57	1939	21.3	15.1	0.71	100

Annual flow duration



05101500 TONGUE RIVER AT CAVALIER ND--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equalled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	0	0	0	0.67	2.00	0.61	0	0	0	0	0.05	0	0
90	0	0	0	1.90	3.10	1.40	0.20	0	0	0	0.05	0	0
85	0	0	0	3.50	4.74	2.70	0.39	0	0.10	0	0.05	0	0
80	0	0	0	11.5	7.15	3.30	0.62	0.10	0.19	0	0.05	0	0.10
75	0	0	0	16.4	9.43	4.10	0.97	0.36	0.36	0.10	1.30	0.19	0.31
70	0.10	0	0	21.3	11.3	5.73	1.50	0.69	0.68	1.10	1.60	0.35	0.54
65	0.10	0	0	26.0	12.7	7.79	1.90	1.10	1.00	1.80	1.60	0.55	0.95
60	0.28	0.10	0.10	31.4	14.1	8.51	2.40	1.10	1.00	2.40	2.10	0.65	1.30
55	0.49	0.10	0.17	37.2	15.5	10.4	3.00	1.30	1.30	2.40	2.60	1.00	1.70
50	0.49	0.19	0.38	42.8	17.3	12.3	4.02	2.00	2.00	2.80	2.60	1.00	2.20
45	0.69	0.29	0.49	49.7	19.6	14.5	4.53	2.00	2.00	2.80	3.30	1.20	3.00
40	0.87	0.29	0.49	59.6	25.9	16.4	5.55	3.10	2.40	3.30	3.30	1.90	3.00
35	1.20	0.29	0.83	74.0	30.7	18.5	7.56	3.10	3.00	3.80	3.30	1.90	4.37
30	1.50	0.48	0.83	92.1	36.2	21.5	9.73	3.90	3.70	3.80	3.30	2.30	5.70
25	1.50	0.60	1.10	120	40.7	25.9	11.3	3.90	4.71	4.40	3.30	2.60	8.87
20	1.70	1.00	1.80	164	47.0	30.8	13.5	5.21	5.56	5.20	4.47	2.60	14.1
15	1.90	1.20	7.52	216	62.9	36.8	15.0	6.23	6.48	6.56	4.86	3.10	21.0
10	2.70	1.20	131	354	96.7	48.7	18.6	7.39	11.7	7.72	5.51	3.60	37.7
5	3.40	2.60	212	574	194	79.8	24.2	15.9	22.5	10.4	7.55	7.13	85.9

05101500 TONGUE RIVER AT CAVALIER ND--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	ng	13.9	12.0	7.39	7.75
0.95	1.05	ng	58.6	44.1	28.9	21.9
0.90	1.11	327	110	79.2	53.2	35.8
0.80	1.25	436	208	146	100	61.1
0.50	2	720	500	353	251	144
0.20	5	1,120	813	617	446	275
0.10	10	1,370	933	742	538	359
0.04	25	1,680	1,020	848	616	454
0.02	50	1,900	1,050	900	653	514
0.01	100	2,110	1,070	935	678	567
0.005	200	2,300	1,080	958	695	613
0.002	500	2,550	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	0	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0.014	0.229	0.750
0.50	2	0	0	0	0.121	0.145	0.310	0.497	0.699	1.77

05101500 TONGUE RIVER AT CAVALIER ND--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	0	0	0	0	0	0	0	0
0.10	10	0	0	0	0	0	0	0	0
0.20	5	0	0	0	0	0	0	0	0
0.50	2	0.170	0.179	0.183	0.226	0.179	0.183	¹ 0.800	1.43
		June-July-August				September-October-November			
		0	0	0	0	0	0	0	0
		0	0	0	0.028	0	0	0	0
		0	0	0	0.233	0.055	0.090	0.119	0.260
		0.659	1.04	1.31	1.65	0.269	0.702	1.28	2.24

¹Graphical interpretation.

05101500 TONGUE RIVER AT CAVALIER ND--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet)	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
1939	April 1	4.10	35.0	1945	March 27	--	934
1940	April 20	6.77	288	1946	March 22	10.02	700
1941	April 11	12.26	1,080	1948	April 21	4.38	1,300
1942	April 14	--	1,080	1949	April 10	--	990
1943	March 27	--	500	1950	May 8	4.58	1,340
1944	April 12	--	450	1951	April 5	2.60	420
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	May 8	4.58	1,340	1946	March 22	10.02	700
1948	April 21	4.38	1,300	1943	March 27	--	500
1941	April 11	12.26	1,080	1944	April 12	--	450
1942	April 14	--	1,080	1951	April 5	2.60	420
1949	April 10	--	990	1940	April 20	6.77	288
1945	March 27	--	934	1939	April 1	4.10	35.0

05101500 TONGUE RIVER AT CAVALIER ND--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1939	0	0	0	0	0	0.484	14.2	2.87	1.28	0.087	0	0	1.57
1940	0	0	0	0	0	0	37.8	5.41	1.24	0.261	0.155	0.007	3.70
1941	0	0.007	0	0	0	0	145.5	9.60	17.7	1.40	0.074	16.8	15.7
1942	14.3	5.07	3.02	1.51	0.300	26.4	267.4	59.6	17.8	3.32	20.9	13.2	35.9
1943	2.54	2.79	0.529	0.665	0.325	59.5	85.8	29.6	98.2	30.9	1.70	0.593	26.1
1944	0.845	2.01	1.26	0.535	0	0	65.0	10.9	10.8	7.96	10.1	23.5	11.0
1945	3.64	45.3	10.0	3.65	2.83	184.4	60.3	42.5	30.0	17.1	3.45	4.24	34.2
1946	3.45	3.85	2.45	1.56	1.30	91.2	32.7	11.9	6.15	2.80	0.448	2.40	13.5
1947	3.81	2.79	0.932	0.032	0	0.484	82.2	13.5	35.9	9.11	4.49	2.06	12.9
1948	5.09	4.01	3.03	2.25	0.586	0.868	273.0	64.4	15.3	19.8	7.63	2.05	32.9
1949	3.01	3.07	1.00	0.500	0.100	1.47	175.9	22.5	8.78	2.50	1.30	1.45	18.3
1950	5.13	3.82	1.30	0.348	0.254	0.526	178.1	405.9	45.5	14.2	2.91	3.75	55.6
1951	5.28	3.92	2.28	1.60	1.00	27.0	106.0	19.5	7.65	1.97	3.96	2.54	15.2

05102500 RED RIVER OF THE NORTH AT EMERSON, MB

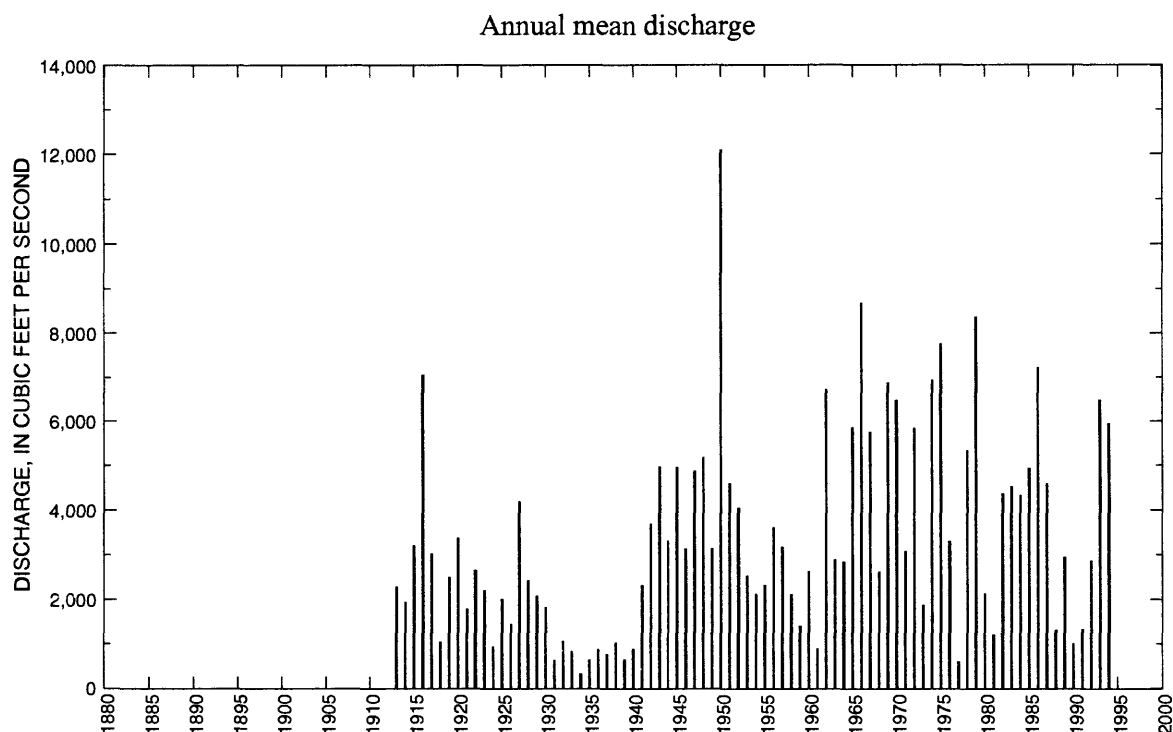
LOCATION.--Lat 49°00'30", long 97°12'40", in sec.2, T.1, R.2 E., Hydrologic Unit 09020311, on right bank 1,500 ft downstream from Canadian National Railway bridge in Emerson, 0.8 mi downstream from international boundary, 3.6 mi downstream from Pembina River, and at mile 154.3.

DRAINAGE AREA.--40,200 mi², approximately, includes 3,800 mi² in closed basins.

PERIOD OF RECORD.--March to November 1902 (gage heights only), May 1912 to September 1929 (monthly discharge only, published in WSP 1308), October 1929 to current year.

GAGE.--Water-stage recorder. Datum of gage is Geodetic Survey of Canada Datum of 1929. See WSP 1728 or 1913 for history of changes prior to Apr. 10, 1953.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 95,500 ft³/s, May 13, 1950, gage height, 90.89 ft; maximum gage height, 91.19 ft, May 1, 1979; minimum daily discharge, 0.9 ft³/s, Feb. 6-8, 1937.

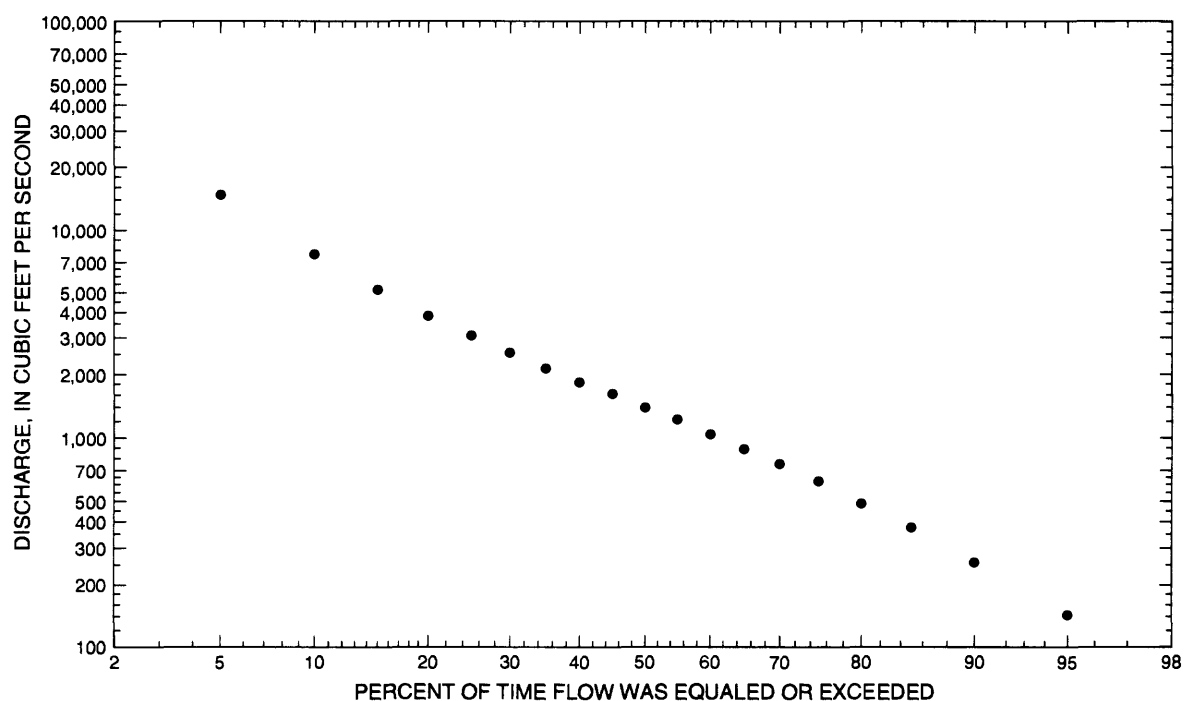


05102500 RED RIVER OF THE NORTH AT EMERSON, MB--Continued

Statistics of monthly and annual mean discharges

Month	Maximum		Minimum		Mean			
	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Water year of occurrence	Discharge (ft ³ /s)	Standard deviation (ft ³ /s)	Coeffi- cient of variation	Percentage of annual discharge
October	4,530	1986	28.6	1937	1,460	1,190	0.81	3.59
November	5,160	1972	23.7	1937	1,290	967	0.75	3.17
December	2,760	1966	33.3	1937	949	691	0.73	2.34
January	2,050	1951	7.05	1937	786	564	0.72	1.94
February	1,910	1952	1.21	1937	749	518	0.69	1.85
March	9,360	1983	2.25	1937	2,060	2,130	1.03	5.06
April	45,800	1966	1,280	1938	12,600	9,070	0.72	30.9
May	72,800	1950	663	1934	8,300	11,000	1.32	20.4
June	25,400	1962	196	1934	4,910	4,470	0.91	12.1
July	28,000	1975	121	1936	3,920	4,190	1.07	9.66
August	27,000	1993	46.6	1934	2,040	3,170	1.55	5.02
September	10,000	1993	23.6	1934	1,610	1,620	1.00	3.97
Annual	12,100	1950	333	1934	3,390	2,300	0.68	100

Annual flow duration



05102500 RED RIVER OF THE NORTH AT EMERSON, MB--Continued

Monthly and annual flow duration, in cubic feet per second

Percentage of days discharge equalled or exceeded	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
95	56.2	50.0	162	986	1,030	574	289	122	77.1	81.1	112	65.4	142
90	148	158	260	1,570	1,410	886	471	242	208	233	263	183	256
85	182	207	344	2,050	1,700	1,270	679	360	321	343	342	228	376
80	230	254	426	2,580	2,050	1,490	905	458	431	419	448	293	488
75	300	314	502	3,150	2,400	1,750	1,150	575	527	505	550	369	620
70	386	378	597	3,660	2,660	2,070	1,400	728	644	628	658	491	753
65	453	442	700	4,470	2,950	2,300	1,710	889	799	747	764	583	888
60	522	504	797	5,430	3,310	2,550	2,000	1,040	926	858	846	649	1,040
55	599	578	893	6,400	3,680	2,850	2,310	1,180	1,040	977	938	704	1,210
50	686	657	999	7,660	4,040	3,200	2,650	1,320	1,160	1,110	1,040	782	1,390
45	774	738	1,150	9,190	4,500	3,620	3,020	1,460	1,290	1,290	1,180	888	1,620
40	863	818	1,300	11,100	5,060	4,140	3,400	1,640	1,430	1,450	1,340	986	1,840
35	967	908	1,480	13,500	5,840	4,770	3,800	1,820	1,620	1,610	1,470	1,090	2,140
30	1,080	999	1,670	16,200	6,970	5,450	4,270	2,080	1,840	1,760	1,630	1,200	2,530
25	1,200	1,120	1,890	19,100	8,220	6,220	4,810	2,380	2,090	1,940	1,800	1,370	3,060
20	1,340	1,290	2,190	22,400	10,500	7,210	5,500	2,730	2,380	2,240	2,010	1,560	3,830
15	1,480	1,430	2,660	26,000	14,200	8,820	6,550	3,270	2,730	2,650	2,240	1,780	5,170
10	1,640	1,560	4,460	30,000	21,100	10,900	8,650	4,010	3,250	3,360	2,550	2,010	7,680
5	1,860	1,690	9,580	38,900	31,400	15,400	12,700	5,370	4,560	4,150	3,140	2,300	14,800

05102500 RED RIVER OF THE NORTH AT EMERSON, MB--Continued

Probability of occurrence of annual high discharges

[ng, statistic not given]

Exceedance probability	Recurrence interval (years)	Maximum instantaneous (ft ³ /s)	Maximum mean discharge (ft ³ /s)			
			3-day period	7-day period	15-day period	30-day period
0.99	1.01	3,040	2,890	2,630	2,150	1,670
0.95	1.05	5,530	5,330	4,900	4,030	3,050
0.90	1.11	7,500	7,260	6,720	5,560	4,180
0.80	1.25	10,700	10,400	9,710	8,110	6,090
0.50	2	20,100	19,700	18,800	16,100	12,300
0.20	5	35,900	35,400	34,300	30,700	24,200
0.10	10	47,500	46,900	45,900	42,100	34,200
0.04	25	63,200	62,400	61,700	58,400	49,200
0.02	50	75,300	74,400	74,000	71,600	61,900
0.01	100	87,700	86,600	86,700	85,700	76,000
0.005	200	100,000	99,000	99,700	100,000	91,500
0.002	500	118,000	ng	ng	ng	ng

Probability of occurrence of annual low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)								
		Number of consecutive days								
		1	3	7	14	30	60	90	120	183
0.05	20	27.6	29.4	31.6	33.8	37.5	43.8	57.5	80.1	97.9
0.10	10	66.0	69.8	74.3	78.8	87.4	101	118	147	179
0.20	5	159	167	175	185	204	231	248	280	340
0.50	2	520	535	554	582	627	685	696	729	886

05102500 RED RIVER OF THE NORTH AT EMERSON, MB--Continued

Probability of occurrence of seasonal low discharges

Non-exceedance probability	Recurrence interval (years)	Minimum mean discharge (ft ³ /s)							
		Number of consecutive days							
		1	7	14	30	1	7	14	30
		December-January-February				March-April-May			
0.05	20	34.2	35.9	38.0	41.2	53.9	59.0	63.1	115
0.10	10	82.0	85.6	89.6	96.6	126	138	146	261
0.20	5	197	204	211	225	288	314	332	583
0.50	2	621	638	653	684	784	839	918	1,600
		June-July-August				September-October-November			
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
		1	7	14	30	1	7	14	30
0.05	20	90.9	104	115	146	59.2	66.1	71.9	85.8
0.10	10	167	187	204	253	113	126	137	163
0.20	5	324	352	382	462	224	249	273	321
0.50	2	918	968	1,050	1,240	640	704	773	890

05102500 RED RIVER OF THE NORTH AT EMERSON, MB--Continued

Annual peak discharge and corresponding gage height

[--, no data]

Water year	Date	Gage height (feet) ¹	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet) ¹	Peak discharge (ft ³ /s)
Annual peak discharge, by year, and corresponding gage height							
² 1861	--	95.00	--	1953	June 28	63.70	14,500
² 1882	--	90.00	--	1954	April 17	--	11,500
² 1897	--	91.00	--	1955	April 10	72.25	24,000
1913	April 11	74.52	25,600	1956	April 27	81.02	33,800
1914	June 19	58.36	7,260	1957	July 4	65.37	15,300
1915	July 9	69.06	20,100	1958	July 12	57.17	7,940
1916	April 24	85.74	46,200	1959	April 10	--	15,700
1917	April 12	--	25,900	1960	April 13	77.65	30,500
1918	April 3	--	4,990	1961	March 31	57.26	4,320
1919	July 12	--	13,400	1962	April 25	81.93	33,400
1920	April 16	--	26,700	1963	April 13	64.14	13,800
1921	April 15	--	12,800	1964	June 25	66.82	17,500
1922	April 14	69.40	18,900	1965	April 26	85.19	46,200
1923	April 25	74.98	26,000	1966	April 11	89.15	66,800
1924	April 28	57.25	6,320	1967	April 9	80.79	33,600
1925	June 21	--	17,500	1968	July 24	64.12	13,900
1926	April 1	61.02	8,000	1969	April 26	87.52	54,700
1927	May 16	71.58	20,500	1970	April 29	84.67	39,600
1928	April 6	67.91	16,800	1971	April 16	--	26,600
1929	April 1	--	19,200	1972	April 24	78.16	30,700
1930	April 10	72.51	20,800	1973	March 27	--	14,700
1931	April 10	59.29	7,940	1974	April 28	86.51	43,500
1932	April 15	71.64	18,900	1975	May 8	84.32	42,800
1933	April 9	--	11,000	1976	April 6	79.06	32,900
1934	April 13	--	4,800	1977	April 10	53.75	4,590
1935	April 3	59.65	5,470	1978	April 18	86.89	50,600
1936	April 21	68.16	18,000	1979	May 1	91.19	92,700
1937	May 7	56.55	5,840	1980	April 10	73.54	21,700
1938	May 20	--	7,530	1981	July 4	55.19	6,150
1939	April 10	60.77	6,700	1982	April 18	81.15	34,000
1940	April 21	66.84	14,600	1983	April 9	77.29	25,800
1941	April 16	76.94	27,800	1984	April 8	--	30,200
1942	April 10	78.77	27,900	1985	March 29	--	16,700
1943	April 20	77.54	29,500	1986	April 7	--	34,200
1944	April 19	66.82	12,300	1987	April 9	--	37,400
1945	April 4	--	29,400	1988	April 8	64.89	15,700
1946	April 5	--	24,100	1989	April 23	84.30	42,700
1947	April 28	76.07	28,400	1990	April 10	60.90	5,510
1948	April 27	87.62	51,800	1991	July 12	56.15	5,690
1949	April 15	77.13	29,200	1992	April 4	74.19	15,800
1950	May 13	90.89	95,500	1993	August 16	79.02	31,900
1951	April 15	74.55	26,600	1994	April 9	75.90	26,900
1952	April 24	--	24,200				

05102500 RED RIVER OF THE NORTH AT EMERSON, MB--Continued

Annual peak discharge and corresponding gage height—Continued

[--, no data]

Water year	Date	Gage height (feet) ¹	Peak discharge (ft ³ /s)	Water year	Date	Gage height (feet) ¹	Peak discharge (ft ³ /s)
Annual peak discharge, from highest to lowest, and corresponding gage height							
1950	May 13	90.89	95,500	1915	July 9	69.06	20,100
1979	May 1	91.19	92,700	1929	April 1	--	19,200
1966	April 11	89.15	66,800	1922	April 14	69.40	18,900
1969	April 26	87.52	54,700	1932	April 15	71.64	18,900
1948	April 27	87.62	51,800	1936	April 21	68.16	18,000
1978	April 18	86.89	50,600	1925	June 21	--	17,500
1916	April 24	85.74	46,200	1964	June 25	66.82	17,500
1965	April 26	85.19	46,200	1928	April 6	67.91	16,800
1974	April 28	86.51	43,500	1985	March 29	--	16,700
1975	May 8	84.32	42,800	1992	April 4	74.19	15,800
1989	April 23	84.30	42,700	1959	April 10	--	15,700
1970	April 29	84.67	39,600	1988	April 8	64.89	15,700
1987	April 9	--	37,400	1957	July 4	65.37	15,300
1986	April 7	--	34,200	1973	March 27	--	14,700
1982	April 18	81.15	34,000	1940	April 21	66.84	14,600
1956	April 27	81.02	33,800	1953	June 28	63.70	14,500
1967	April 9	80.79	33,600	1968	July 24	64.12	13,900
1962	April 25	81.93	33,400	1963	April 13	64.14	13,800
1976	April 6	79.06	32,900	1919	July 12	--	13,400
1993	August 16	79.02	31,900	1921	April 15	--	12,800
1972	April 24	78.16	30,700	1944	April 19	66.82	12,300
1960	April 13	77.65	30,500	1954	April 17	--	11,500
1984	April 8	--	30,200	1933	April 9	--	11,000
1943	April 20	77.54	29,500	1926	April 1	61.02	8,000
1945	April 4	--	29,400	1931	April 10	59.29	7,940
1949	April 15	77.13	29,200	1958	July 12	57.17	7,940
1947	April 28	76.07	28,400	1938	May 20	--	7,530
1942	April 10	78.77	27,900	1914	June 19	58.36	7,260
1941	April 16	76.94	27,800	1939	April 10	60.77	6,700
1994	April 9	75.90	26,900	1924	April 28	57.25	6,320
1920	April 16	--	26,700	1981	July 4	55.19	6,150
1951	April 15	74.55	26,600	1937	May 7	56.55	5,840
1971	April 16	--	26,600	1991	July 12	56.15	5,690
1923	April 25	74.98	26,000	1990	April 10	60.90	5,510
1917	April 12	--	25,900	1935	April 3	59.65	5,470
1983	April 9	77.29	25,800	1918	April 3	--	4,990
1913	April 11	74.52	25,600	1934	April 13	--	4,800
1952	April 24	--	24,200	1977	April 10	53.75	4,590
1946	April 5	--	24,100	1961	March 31	57.26	4,320
1955	April 10	72.25	24,000	² 1861	--	95.00	--
1980	April 10	73.54	21,700	² 1882	--	90.00	--
1930	April 10	72.51	20,800	² 1897	--	91.00	--
1927	May 16	71.58	20,500				

¹Datum is 700 feet Geodetic Survey of Canada Datum of 1929.

²Data source unknown. Not used in statistics.

05102500 RED RIVER OF THE NORTH AT EMERSON, MB--Continued

Monthly and annual mean discharges, in cubic feet per second

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1912	--	--	--	--	--	--	--	--	1,754	1,209	1,052	1,140	--
1913	2,280	1,407	786.5	498.7	301.8	399.0	13,360	3,180	1,756	1,338	956.7	1,210	2,282
1914	1,188	1,353	990.3	536.0	500.7	788.5	4,147	3,246	4,414	3,488	1,379	1,334	1,949
1915	1,378	1,395	1,006	894.2	867.7	992.7	5,100	3,743	5,020	13,150	2,947	1,797	3,208
1916	1,816	1,602	1,146	896.2	789.3	921.1	28,940	20,740	7,936	10,740	5,107	4,220	7,066
1917	3,211	2,804	1,996	1,258	1,043	1,138	14,000	5,783	2,585	1,467	643.8	465.4	3,028
1918	678.9	900.5	566.8	238.4	221.6	1,072	2,428	1,810	2,296	991.0	729.8	665.6	1,051
1919	408.6	675.3	577.3	469.8	423.5	594.7	7,721	3,961	2,148	7,789	3,645	1,525	2,506
1920	1,165	798.7	726.5	812.3	903.1	2,926	18,360	4,216	4,863	3,358	1,543	1,134	3,382
1921	1,210	1,241	1,015	811.2	782.1	1,140	6,393	2,610	2,762	1,782	880.8	839.0	1,786
1922	836.3	721.6	659.9	467.1	379.1	1,977	12,740	8,011	3,375	1,494	640.7	597.8	2,658
1923	500.3	730.1	375.5	305.2	327.1	396.2	10,120	7,735	2,014	2,457	816.0	598.7	2,201
1924	609.6	611.1	400.4	225.3	237.1	306.3	4,832	3,089	1,342	897.3	406.8	356.1	942.9
1925	707.0	529.1	208.8	140.8	185.3	1,073	4,830	1,649	10,540	3,399	519.2	559.1	2,021
1926	936.1	888.8	656.8	466.9	518.9	1,688	5,316	1,344	2,574	2,107	486.5	451.6	1,451
1927	973.4	816.0	493.3	416.5	390.5	3,996	13,400	14,670	8,721	3,312	1,592	1,484	4,199
1928	1,369	1,102	803.8	602.7	670.6	1,951	7,582	2,848	3,295	4,534	1,920	2,457	2,425
1929	1,823	1,600	1,092	1,050	884.1	5,880	6,780	2,650	1,696	754.1	423.2	322.8	2,084
1930	453.5	479.5	294.1	200.1	179.2	2,893	8,703	5,164	1,923	1,063	362.9	215.4	1,830
1931	231.7	267.3	235.9	176.0	199.6	959.6	3,385	881.0	660.1	356.4	157.5	81.0	631.0
1932	84.8	220.5	187.0	166.5	138.0	1,364	7,809	1,925	586.0	256.1	62.5	40.0	1,063
1933	46.0	121.4	89.0	54.0	49.4	861.9	5,839	1,548	1,026	253.4	73.1	45.9	830.2
1934	48.8	84.8	46.0	54.3	32.5	491.8	2,178	662.6	196.1	138.2	46.6	23.6	333.0
1935	47.0	77.2	41.7	14.0	26.9	749.0	3,325	1,173	438.2	1,082	514.1	268.7	647.3
1936	116.8	77.8	59.2	56.8	54.0	58.2	6,739	2,602	583.3	120.6	79.3	66.8	878.3
1937	28.6	23.7	33.3	7.05	1.21	2.25	2,025	2,886	1,059	830.4	1,565	818.3	777.4
1938	401.7	280.8	72.5	53.3	75.9	1,453	1,282	4,870	2,584	854.8	217.5	193.4	1,035
1939	199.8	207.2	181.9	197.6	255.4	2,59.9	3,717	1,193	658.7	565.8	187.5	230.3	651.8
1940	357.0	384.5	278.0	135.3	148.2	224.2	5,085	2,232	1,053	357.2	255.1	186.8	886.8
1941	236.1	392.4	296.0	312.0	348.0	361.7	13,650	3,120	5,284	1,426	755.4	1,853	2,320
1942	3,065	1,389	887.5	565.1	635.1	1,962	16,530	8,966	4,187	1,809	1,254	3,110	3,694
1943	1,643	1,135	775.0	797.7	699.7	1,207	23,130	7,258	12,440	6,497	2,584	1,818	4,984
1944	1,473	1,432	926.1	662.6	736.1	767.8	4,349	3,776	6,947	6,806	6,003	5,909	3,315
1945	2,906	4,026	2,733	1,294	1,365	9,121	20,150	8,646	4,043	2,187	1,309	1,776	4,965
1946	1,975	1,398	988.1	944.9	790.9	5,738	14,640	4,119	2,223	2,442	1,273	1,167	3,142

05102500 RED RIVER OF THE NORTH AT EMERSON, MB--Continued

Monthly and annual mean discharges, in cubic feet per second—Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1947	1,661	1,617	1,169	1,031	897.2	1,057	17,830	11,940	12,050	5,785	2,029	1,571	4,882
1948	1,865	1,653	1,346	1,084	844.6	851.0	24,890	20,050	3,858	3,139	1,661	1,009	5,182
1949	673.7	711.9	556.5	449.0	453.9	596.5	14,720	5,092	6,070	3,414	3,289	1,806	3,146
1950	1,146	1,387	1,066	827.3	747.9	926.8	26,540	72,820	22,300	10,110	3,805	2,617	12,100
1951	3,330	2,073	2,160	2,053	1,800	2,287	19,650	10,860	4,941	2,742	1,461	1,955	4,605
1952	1,581	1,413	1,906	1,788	1,914	2,009	17,150	7,663	3,815	5,878	2,285	1,376	4,056
1953	945.3	863.9	697.9	609.6	610.6	1,365	4,064	3,151	8,890	5,531	2,301	1,317	2,531
1954	892.9	961.2	935.6	834.4	847.3	1,376	5,823	4,230	4,283	2,958	1,436	895.4	2,124
1955	816.1	828.9	717.8	731.7	652.1	653.5	10,600	3,226	4,286	2,741	1,815	941.9	2,328
1956	941.9	604.1	449.8	431.5	455.4	509.3	12,750	14,560	5,427	4,092	1,156	2,028	3,617
1957	682.2	1,325	613.7	442.7	407.6	1,445	5,882	4,537	4,202	9,284	2,880	6,388	3,183
1958	3,776	3,381	1,714	1,383	1,305	1,867	3,330	1,648	1,424	4,055	1,005	458.9	2,118
1959	430.0	488.6	358.1	348.2	342.6	632.7	6049	2,110	2,747	2,067	758.6	543.9	1,404
1960	563.7	587.6	627.5	617.8	556.6	471.0	16,530	5,206	3,110	2,283	589.4	619.2	2,630
1961	341.9	555.3	379.2	344.7	292.7	1,721	2,592	2,400	1,111	441.4	274.5	266.7	895.7
1962	593.9	410.8	262.5	197.8	199.9	225.1	14,750	12,010	25,430	16,060	7,212	3,368	6,734
1963	2,450	2,177	1,636	1,246	1,074	1,515	7,847	3,739	7,490	3,049	1,315	1,213	2,891
1964	1,395	966.3	696.8	767.1	754.5	685.7	8,474	5,455	9,511	3,625	1,321	671.8	2,849
1965	1,701	1,390	910.0	909.8	890.4	950.2	24,980	18,580	10,030	5,632	2,345	2,096	5,867
1966	4,417	3,337	2,760	1,879	1,648	5,841	45,820	20,250	7,007	4,752	3,785	2,894	8,690
1967	1,992	2,132	1,824	1,632	1,477	2,086	25,420	20,000	6,548	3,588	1,487	951.1	5,763
1968	905.8	963.3	672.9	491.5	493.4	1,434	4,883	2,502	6,037	6,866	3,292	2,994	2,628
1969	2,204	2,143	1,956	1,696	1,613	2,173	29,160	27,410	6,454	4,023	2,076	1,656	6,891
1970	2,084	2,043	1,571	1,454	1,411	1,578	19,180	22,960	16,950	5,515	1,614	1,400	6,484
1971	1,282	1,667	1,094	1,033	998.7	1,960	14,470	5,486	3,252	2,909	1,462	1,499	3,086
1972	4,021	5,163	2,681	1,963	1,598	6,832	23,910	10,890	6,367	2,482	2,479	2,058	5,855
1973	1,834	1,709	1,153	1,112	1,116	5,817	2,707	1,716	1,311	622.0	779.5	2,567	1,874
1974	4,152	2,613	2,079	1,713	1,688	2,022	19,340	29,660	10,760	3,744	3,262	2,051	6,948
1975	1,937	2,141	1,358	1,314	1,412	1,651	12,950	27,310	6,923	28,020	4,713	2,560	7,760
1976	2,429	2,409	1,564	1,523	1,643	2,794	17,430	4,398	2,375	1,554	1,119	728.1	3,313
1977	387.3	313.7	176.9	180.4	189.8	400.2	2,101	1,202	861.5	636.0	260.7	533.7	603.2
1978	1,423	1,126	1,293	1,226	987.4	1,737	36,030	10,240	3,870	3,615	1,730	1,118	5,345
1979	957.7	872.4	646.8	562.3	578.9	774.6	26,080	49,220	8,093	6,432	3,371	2,227	8,370
1980	1,750	1,955	1,526	1,351	1,331	1,479	10,140	2,399	1,630	860.9	484.5	837.0	2,133
1981	550.6	656.9	358.6	292.1	296.4	1,471	1,807	1,386	1,582	2,737	1,517	1,808	1,210

05102500 RED RIVER OF THE NORTH AT EMERSON, MB--Continued

Monthly and annual mean discharges, in cubic feet per second--Continued

[Data were not rounded in accordance with U.S. Geological Survey publication standards; --, no data]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Annual
1982	2,402	1,963	1,104	1,151	1,055	1,754	22,080	8,865	4,261	4,090	2,465	1,346	4,372
1983	4,332	2,535	1,935	1,614	1,377	9,361	12,530	3,948	4,835	6,393	2,500	2,794	4,526
1984	2,138	2,107	1,723	1,380	1,274	2,896	19,140	4,253	11,580	3,399	1,531	959.1	4,337
1985	1,850	1,862	1,444	1,207	1,154	6,461	7,385	9,120	7,935	7,374	7,342	5,858	4,938
1986	4,533	2,808	2,098	2,014	1,812	6,091	26,820	22,310	7,367	5,014	2,845	2,917	7,233
1987	3,596	2,084	1,983	1,804	1,616	6,895	22,500	4,242	3,682	3,109	2,612	1,109	4,597
1988	831.1	838.2	702.9	471.3	510.2	2,258	6,623	1,444	1,088	463.5	281.7	332.3	1,315
1989	337.3	309.9	256.6	262.9	379.8	396.8	21,480	6,886	2,692	1,138	430.9	1,045	2,952
1990	451.3	375.1	258.0	172.5	261.1	1,147	3,531	1,661	2,178	1,191	464.8	365.8	1,004
1991	298.6	314.6	232.1	177.1	245.6	594.4	2,097	2,821	2,306	3,971	1,295	1,578	1,334
1992	861.3	888.0	572.4	552.0	553.0	7,055	10,130	4,510	2,509	2,976	1,276	2,617	2,875
1993	1,213	852.0	930.8	858.4	1,016	1,310	15,000	4,136	4,630	10,530	27,000	10,010	6,489
1994	4,231	2,786	2,048	1,495	1,503	5,415	17,570	7,549	6,099	13,320	4,416	4,772	5,950