

# SMALL-STREAM FLOOD INVESTIGATIONS IN MINNESOTA

October 1958 to September 1975



UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Open-File Report 77-39

*in cooperation with the*

MINNESOTA DEPARTMENT OF HIGHWAYS

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GEOLOGICAL SURVEY

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FLOOD INVESTIGATIONS  
IN MINNESOTA

October 1958 to September 1975

by

Lowell C. Guetzkow and Kurt T. Gunard

Prepared under the direction of  
Charles R. Collier, District Chief  
Water Resources Division  
St. Paul, Minnesota

In cooperation with the  
MINNESOTA DEPARTMENT OF HIGHWAYS

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#### INTRODUCTION

##### Purpose and Scope

The first consideration in the hydraulic design of drainage structures is the magnitude and frequency of the design flood or maximum peak flow the structure is intended to discharge safely and economically. Studies of flood frequency in Minnesota, based on analyses of available streamflow records, have provided information generally applicable to streams with drainage areas greater than 50 square miles. The results of these studies are contained in U.S. Geological Survey Water-Supply Papers 1677, 1678, 1679, and 1680, titled "Magnitude and Frequency of Floods in the United States". The areas to which these reports are applicable are divided, according to major drainage basins, as follows: St. Lawrence River Basin (Part 4) in Water-Supply Paper 1677; Hudson Bay and Upper Mississippi River Basins (Part 5) in Water-Supply Paper 1678; Missouri River Basin above Sioux City, Iowa (Part 6-A) in Water-Supply Paper 1679; and Missouri River Basin below Sioux City, Iowa (Part 6-B) in Water-Supply Paper 1680. However, few flood records have been available for small watersheds, and the determination of reliable flood-frequency characteristics for these small basins, particularly for use in the design of highway drainage structures, has not been possible.

To fill this need, a small-stream flood-investigation program for Minnesota was initiated in August 1958. This program was designed to provide flood data on streams having drainage areas generally less than 50 square miles, placing particular emphasis on those less than 10 square miles. Present effort is oriented toward the collection of hydrologic data that will form the basis for

defining flood-frequency characteristics and provide information for detailed hydrologic studies.

The program is being administered under the general supervision of Charles R. Collier, District Chief, and is operated under the direct supervision of Lowell C. Guetzkow.

This report, which is the sixth of a biennial series, has been prepared to inform the cooperators and other interested parties of the status of the program and to make available the hydrologic data collected since the inception of the program through the 1975 water year. Included in the report are a general description of the program, methods of operation, and a presentation of the basic data.

#### Cooperation

The small-stream flood investigations in Minnesota are financed under a cooperative agreement between the Minnesota Department of Highways and the U.S. Geological Survey. The original cooperative agreement was initiated in August 1958 and has been renewed annually since that time.

#### DESCRIPTION OF PROGRAM

The ideal basis for selection of design discharge is from frequency-discharge relationships defined for each stream under consideration. However, installation of gages on the vast number of small streams is impractical, and so it becomes necessary to confine the investigation to a sampling process. Flood data collected from a small number of sampling stations can be made applicable to a region by analyzing the flood data and relating them to measurable basin characteristics. In this way, regionalized flood-magnitude and frequency data for the entire State can be developed.

The program is planned so as to obtain hydrologic data to supplement that contained in previously published flood-frequency reports. The data available at the time these reports were prepared were inadequate to define reliable flood-frequency characteristics for small watersheds in Minnesota. In general, streams with drainage areas of less than about 50 square miles fall in this category. To provide hydrologic data for small basins, gaging-station sites have been selected on watersheds ranging in size from 0.05 to 65 square miles.

Gages were installed at selected sites over a period of 8 years. Site selection and gage installation began in August 1958 upon the consummation of the cooperative agreement with the Minnesota Highway Department. Progress in the installation of gages has been as follows:

<u>Calendar year</u>	<u>Gage installations completed</u>
1958	36
1959	46
1960	39
1961	14
1962	1
1963	14
1964	1
1965	<u>8</u>
Total	159

Data collection has been discontinued at 35 sites because of unstable control conditions or highway relocation. Present plans are to maintain the existing network of 124 stations until sufficient data are obtained to define regionalized flood-frequency characteristics. The program could then be reduced to a smaller network of stations, which could provide data to determine long-term trends and improve on the regionalized frequency relations. Figure 1 shows the location of gaging stations for which data are tabulated in this report.

Hydrologic data obtained under this program consist primarily of the annual peak gage height and discharge occurring at each active gaging station. The annual peak data are determined on a water-year basis. The water year is defined as the period beginning October 1 and ending September 30. Each station is equipped with a crest-stage gage, which records the peak stage. Discharge measurements are made throughout the range in stage to establish a stage-discharge relation.

To supplement the record of instantaneous peak discharges, 11 stations have also been equipped with recording gages, from which discharge hydrographs can be derived to show the total volume of runoff during floods. Most stations equipped with continuous recorders have had automatic tipping-bucket rain gages installed, so as to obtain simultaneous records of water stage and precipitation. The recording equipment is not installed permanently but will be operated at a site for

a period long enough to establish a basis for a study of rainfall-runoff relationships. The period of operation at any one site will vary in length, dependent on the number of storms annually. In this way, discharge hydrographs and rainfall records will be obtained at a maximum number of locations with a minimum amount of equipment. The crest-stage gage will remain as the permanent gage at each location.

Approximately 30 manually read rain gages are used to supplement the recording gage network. These gages are located near the crest-stage sites and are read by local volunteer observers.

Included in the program are provisions for the investigation of outstanding floods on ungaged areas. These investigations are confined to present or proposed highway crossings.

A determination and tabulation of many basin characteristics that may affect the magnitude of floods have been made, as a part of this program. The basin characteristics selected for evaluation are:

- |                         |                              |
|-------------------------|------------------------------|
| 1. Drainage area.       | 4. Mean basin altitude.      |
| 2. Main-channel length. | 5. Forest area.              |
| 3. Main-channel slope.  | 6. Area of lakes and swamps. |

#### PROGRAM OPERATION

##### Selection of Gaging Station Sites

Many factors enter into the selection of a gaging-station site, which, in combination, greatly restrict the number of suitable sites. Because the program involves a sampling process, it is necessary to select sites that represent various types of topography and soil conditions, provide adequate areal coverage, and include the desired range in drainage area size.

In addition to the physical properties listed above, consideration must be given to the hydraulic conditions at the site. The definition of a stage-discharge relationship requires a reasonably stable control and channel conditions, so that scour and deposition of bed material are at a minimum. The site must provide a suitable location for the crest-stage gage, so as to protect it from destruction by high velocities, debris, or ice. Because of the flashy nature of runoff from small watersheds, it is often necessary to rely on indirect methods

of measuring discharge rather than the conventional current-meter measurement. Bridges and culverts, which form channel constrictions, are convenient control structures for indirect measurement of flood discharge. Where such structures are not available, the site must have an adequate reach of reasonably uniform channel, where the discharge can be computed by the slope-area method. It is only after these and other minor factors have been considered that final selection of a gaging site is made.

#### Instrumentation

As previously noted, the permanent gage at each station is a simple device called a "crest-stage gage". The gage used in Minnesota consists of a 2-inch pipe containing a graduated wooden rod and a small amount of granulated cork. The pipe is closed at both ends except for a group of intake holes at the bottom and a vent hole at the top. The gage pipe is mounted in a vertical position by pinning it to a support pipe driven into the stream bed or by attaching it to the wingwall of a bridge or culvert. The gage is set so that the intake holes are above the stage of sustained low flows. As the water rises in the stream and covers the intake holes, it also rises inside the gage pipe. The granulated cork floats on the rising water surface inside the pipe, and, when the stage recedes, a ring of cork is deposited on the wooden rod at the same elevation as the peak stage. After the flood peak has passed, the peak stage is determined by removing the graduated rod and reading the elevation of the cork line.

Equipment at recording stations consists of a stilling well connected to the stream by intake pipes, a shelter atop the stilling well, a continuous graphic recorder, and an automatic tipping-bucket rain gage. Water from the stream enters through intake pipes to the stilling well, where a float activates a recorder pen, which graphically traces the fluctuating water surface.

The automatic rain gage consists of a receiver mounted on the roof of the shelter, a tipping-bucket device, and a battery-powered counter with pen attachment. Rainfall is collected in the receiver and then transferred to the tipping-bucket device, where it is measured in 0.1-inch increments. When 0.1 inch of rainfall accumulates, the bucket tips thereby closing an electrical circuit, which activates the counter and causes movement of a second pen on the recorder chart.

Recording of both precipitation and river stage simultaneously, on the same chart, is advantageous in that it eliminates errors in computing lag time between precipitation and runoff due to variations in time correction that could occur if separate recording instruments were used. It also provides ease of correlation by visual inspection.

#### Data Collection and Analysis

Systematic visits are made to each gaging station through most of the year at approximately monthly intervals. Additional inspections are made during the spring breakup and during periods of intense thundershowers. During the winter, when flood peaks normally do not occur, the gage inspections are discontinued, unless it is known that runoff has been significant in the basin. At each visit, the elevation of the peak stage is determined and verified, whenever possible, by comparison with high-water marks. In the event of outstanding floods, which occasionally overtop the gage, gage heights are obtained by making a transit-stadia survey of high-water marks in the vicinity of the gage from which a plot of the water surface profile is made.

As two or more peak flows may occur between visits to a gaging station, a higher peak may wash off the cork lines left by previously recorded lower peaks. As a result, the crest stage for all floods at a particular site will not be available. However, the highest annual peaks, which are the data to be used in the magnitude and frequency analyses, will be recorded. In addition, many lesser peaks will also be known.

At stations equipped with recording gages, all peaks during the year will be available from the continuous strip charts. These recorders are serviced and the charts removed on a monthly basis.

Current-meter measurements are obtained whenever flows are in the range where definition of the stage-discharge relation is required. During floods, however, it is frequently impossible to measure high discharges. Structures from which current-meter measurements were to have been made may be damaged or not suitably located; stream velocities may be too high; knowledge of the flood rise may not be available in sufficient time to permit reaching the site at the time of the peak; flow of debris or ice may prevent use of a current meter; or limitations of personnel may preclude direct measurements of discharge at all stations within



the flood area. Consequently, considerable reliance must be placed on indirect measurements of peak discharge to establish the stage-discharge relation, or rating curve, as it is frequently termed.

Indirect measurements are of four types, as listed below:

1. Flow through culverts.
2. Flow through width contractions.
3. Slope-area.
4. Flow over dams and embankments.

Indirect measurements make use of the energy equation for computing discharge. The specific equations differ for different types of flow; however, all the methods involve these general factors:

1. Physical characteristics of the channel, such as channel dimensions, boundary conditions, and channel conformation.
2. Water-surface elevations at time of peak stage to define the upper limit of the cross-sectional areas and the difference in elevation between two significant points.
3. Hydraulic factors based on physical characteristics and water-surface elevations, such as roughness coefficients and discharge coefficients.

Most indirect measurements of peak discharge made under this program are of the "flow through culvert" type, although all the remaining methods are utilized to a lesser degree. In each case, a transit-stadia survey is made to determine the high-water profile, geometry of any structure involved, channel cross sections, and roadway features, when applicable. Engineers making the survey evaluate roughness coefficients and appraise possible backwater conditions at the site. From these data and the appropriate equations for the type of indirect measurement being made, the peak discharge can be computed. A digital-computer program developed by the Geological Survey facilitates the computation of peak discharges. This program includes the various types of culvert-flow computations necessary for the determination of the stage-discharge relation. Using this method, theoretical ratings have been computed for a considerable number of stations.

A complicating factor in determining peak discharge is the occurrence of ice backwater during periods of high runoff in early spring. For this reason,

more frequent inspections of the gaging stations are made during the spring breakup than at other times in order to make assessments of ice conditions, from which backwater corrections can be ascertained.

Permanent bench marks are established at each gaging station to provide the basis for maintaining a stable gage datum. Level loops are run annually to detect any movement of the gage and to determine the datum correction applicable.

At the end of each water year, the peak stages are corrected to the base datum and tabulated. Backwater conditions are then evaluated and appropriate corrections applied, where necessary. From this tabulation, the highest effective peak stage for the water year is determined. When sufficient discharge measurements become available, a curve of relation between stage and discharge is established. By application of this curve, the maximum discharge for the water year is obtained. The dates on which peak flows occur are obtained from precipitation data collected under this program and by correlation with time-oriented peak data from recorder-equipped stations.

#### Flood Investigations at Miscellaneous Sites

To enhance the supply of peak-flow information, investigations are made of outstanding small-area floods, even though they occur in basins outside the crest-stage network. These investigations are undertaken to provide peak stage and discharge. Also, precipitation data may be collected from local sources in the immediate area. The available maximum discharges at miscellaneous sites are listed in table 1.

#### PRESENTATION OF DATA

##### Maximum Floods

Peak discharge data for small drainage areas in Minnesota have now been collected at some locations for as long as 17 years, commencing in 1958. During this time, several outstanding floods have occurred, for which data are available at gaging stations and at miscellaneous ungaged sites. These recorded peak flows may provide a reasonable basis for estimating the maximum flood flows to be expected in various parts of the State.

The State has been divided into seven hydrologic regions, as illustrated in figure 1. These region boundaries are intended to enclose areas having similar

hydrologic characteristics and are identical to those used in the Minnesota Highway Department Drainage Manual. The region boundaries are considered provisional and may require revision when a complete analysis of the flood data is made. Such revision would be consistent with the objectives of the program--to define flood-frequency characteristics on a regional basis.

The relative magnitude of flood flows from small drainage areas is indicated by a comparison of maximum discharge in relation to drainage area size. These data for each of the several hydrologic regions are shown in figures 2-8, wherein the maximum discharge observed at each gaging station or miscellaneous site is plotted against drainage area.

Each figure contains an enveloping curve of maximum discharges for drainage areas ranging in size from 0.05 to 18 square miles. This curve has been based on a composite plot of all maximum discharge data available for small drainage areas in Minnesota and provides a means of comparing maximum discharge values observed in a particular region with those observed throughout the State.

#### Station Manuscripts

Hydrologic and physiographic data pertinent to each gaging station are presented in the section of this report titled "Gaging-station Records". A manuscript is included for each active gaging station in the program. Data for several discontinued stations having a significant amount of record are also included. The manuscript gives the permanent station number and name, site number, location, drainage area, period of records available, type of gage, pertinent elevations of on-site structures, bankfull stage where applicable, basin characteristics, and a tabulation of the annual maximum discharges and corresponding gage heights.

Some drainage area outlines were originally determined from maps of poor quality or by photographic interpretation. As topographic maps became available for these areas, previously determined drainage areas have been revised. Revised drainage area figures are indicated when first published by the word "revised" in parenthesis following the figure.

For some years, insufficient information was available to determine the annual maximum discharge, and, in these cases, a footnote states "discharge not determined". This does not mean that the discharge will never be known, but

indicates that the determination of peak flow has been delayed, pending the accumulation of additional data. Present inability to determine annual maximum discharge is usually due to a lack of discharge measurements with which to define the stage-discharge relation. When more data become available, the appropriate discharges will be computed and published.

Annual peak gage heights are determined from an arbitrary local datum, which is tied in to the on-site drainage structure. Information regarding the recovery of this datum can be obtained from the Minnesota district office of the U.S. Geological Survey, 1033 Post Office Building, St. Paul, Minnesota 55101. At some sites the mean sea level datum of the gage is available and is given in the "Gage" paragraph of the manuscript.

The omission of annual peak gage heights in the tabular listing is usually the result of low-water years, when the peak stage did not reach the bottom of the gage. Under these circumstances, a footnote describing the condition is entered in place of the peak gage height, and a maximum discharge of less than the value corresponding to the elevation of the gage zero is given. This would represent a limiting value for the maximum discharge. Occasionally, a malfunction of the gage occurred, resulting in the loss of the annual peak gage height. A dash is inserted in the gage-height tabulation to indicate such a loss, and, if conditions permit, the annual maximum discharge is estimated on the basis of a correlation with adjacent stations or by evaluation of precipitation data and their relationship to other available peak data.

#### Definition of Terms

The terms referring to hydrologic data, as used in this report, are defined as follows:

Permanent station number - Distinctive numbers assigned on a national basis to each gaging station to provide a convenient method of geographical location and identification. The numbers are assigned on the basis of downstream order for each major river basin. The identification number consists of two elements separated by a hyphen--(1) the part number and (2) the station number. The digit to the left of the hyphen designates the part or major river basin in which the station is located. Part divisions pertinent to Minnesota are as follows:  
Part 4, St. Lawrence River basin; Part 5, Hudson Bay and Upper Mississippi River

basins; and Part 6, Missouri River basin. The digits to the right of the hyphen designate the station's downstream position within the basin.

Site number - These numbers assigned to each station included in the crest-stage network are used as a means of local identification for those stations operated in the cooperative program with the Minnesota Highway Department.

Bankfull stage - That gage height at which the stream begins to flow over-bank or recedes from the flood plain. It pertains to bank elevations in the immediate vicinity of the gage.

Main-channel length - The length of the watercourse, in miles, from the gaging station to the basin divide, as measured on topographic maps with dividers. The main channel is defined as the watercourse that drains the greatest area.

Main-channel slope - The slope of the watercourse, in feet per mile, determined as the average between points 10 percent and 85 percent of the distance along the main channel from the gaging station to the divide.

Mean basin altitude - The altitude, in feet above mean sea level, computed as the mean of elevations at the 10 percent and 85 percent points along the main stream channel.

Forest area - Area expressed as percentage of the drainage area covered by forests, as shown on topographic maps, determined by the grid method.

Area of lakes and swamps - Area expressed as percentage of the drainage area covered by lakes, ponds, and swamps, as shown on topographic maps, determined by the grid method.

Occasionally swamp and forest area may be common, resulting in the sum of forest area and lake and swamp area being greater than 100 percent of the total drainage area.

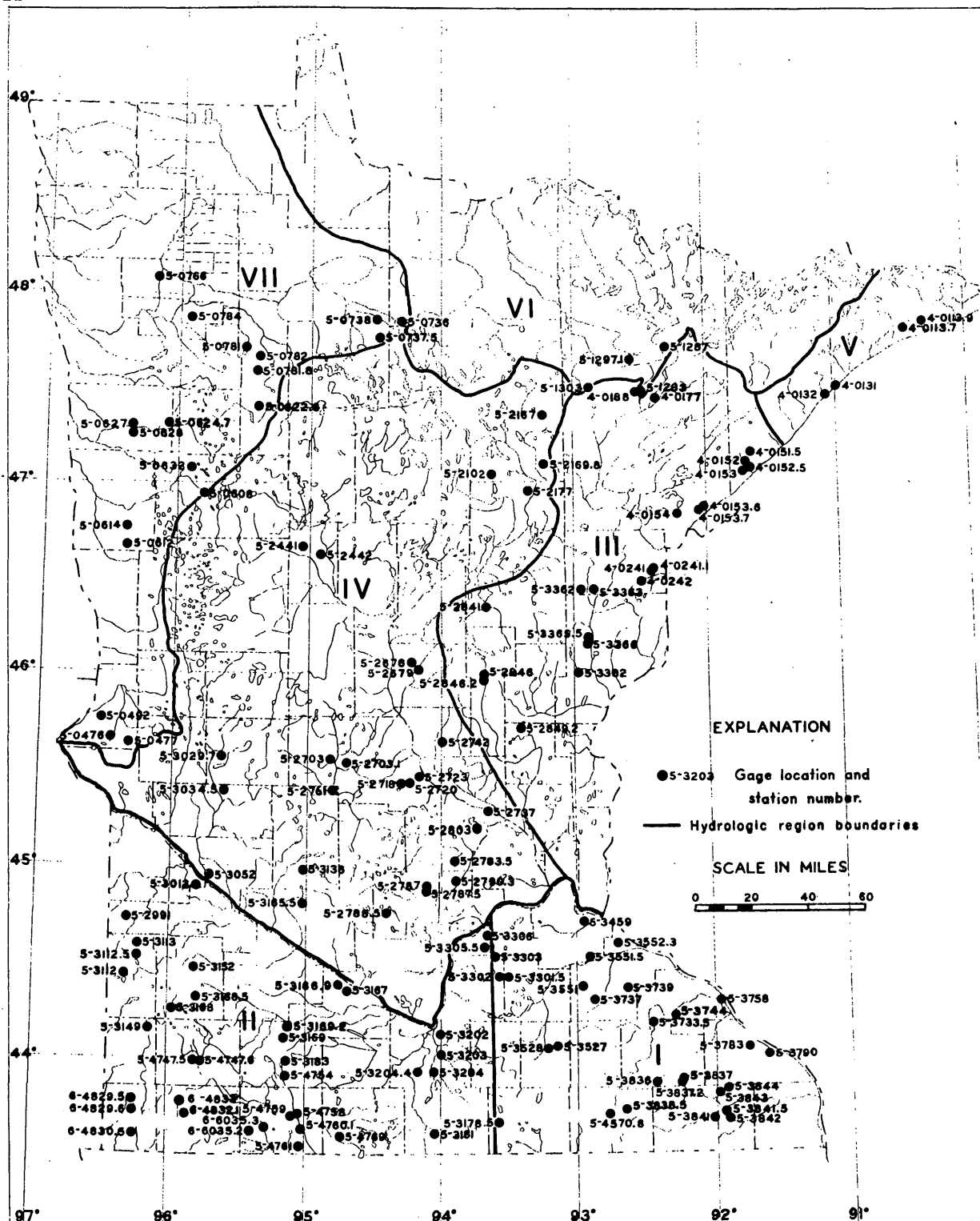


Figure 1.- Map of Minnesota showing location of gaging stations and hydrologic region boundaries.



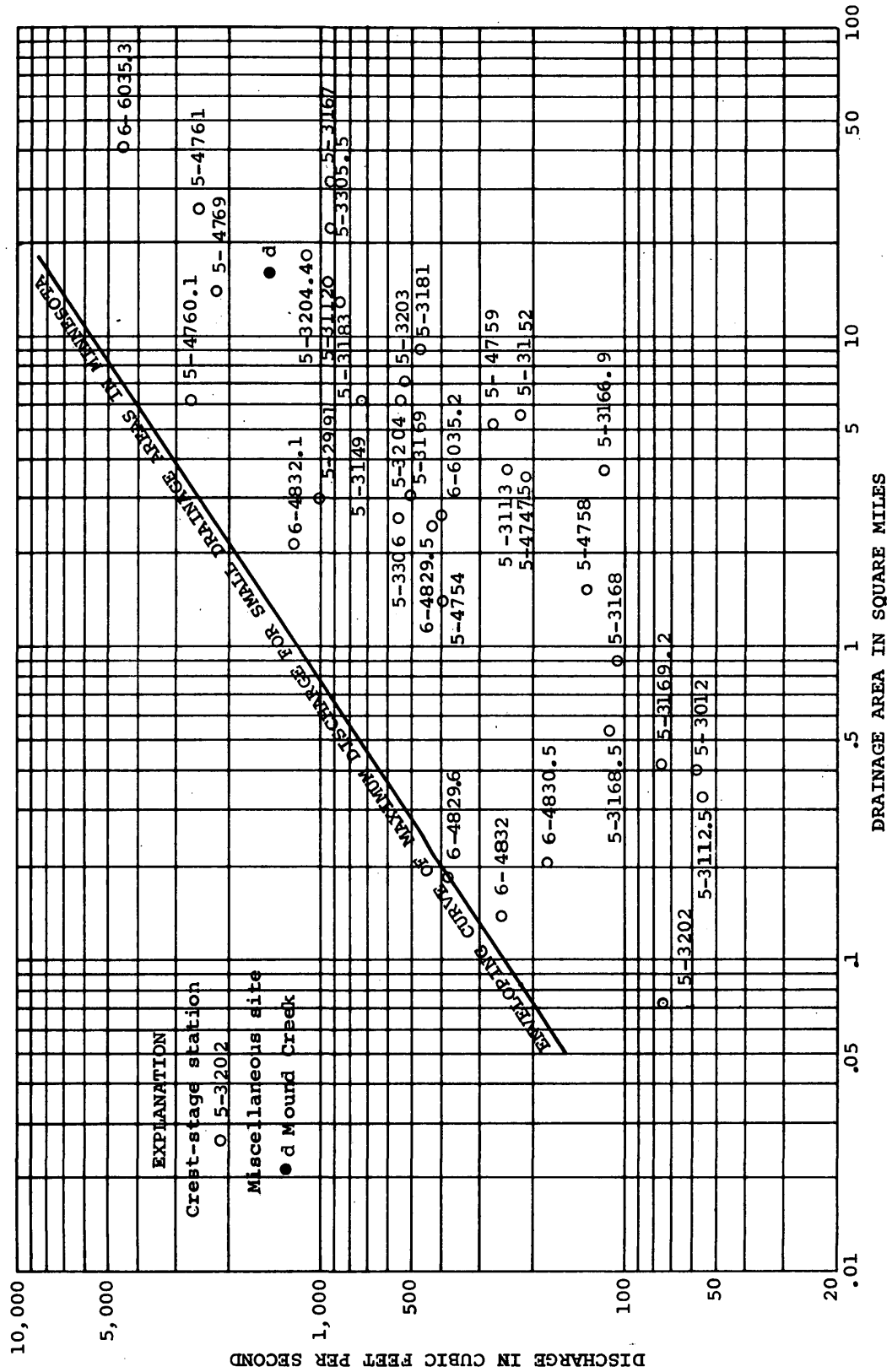


Figure 3.-Maximum discharge from small drainage areas in hydrologic region II



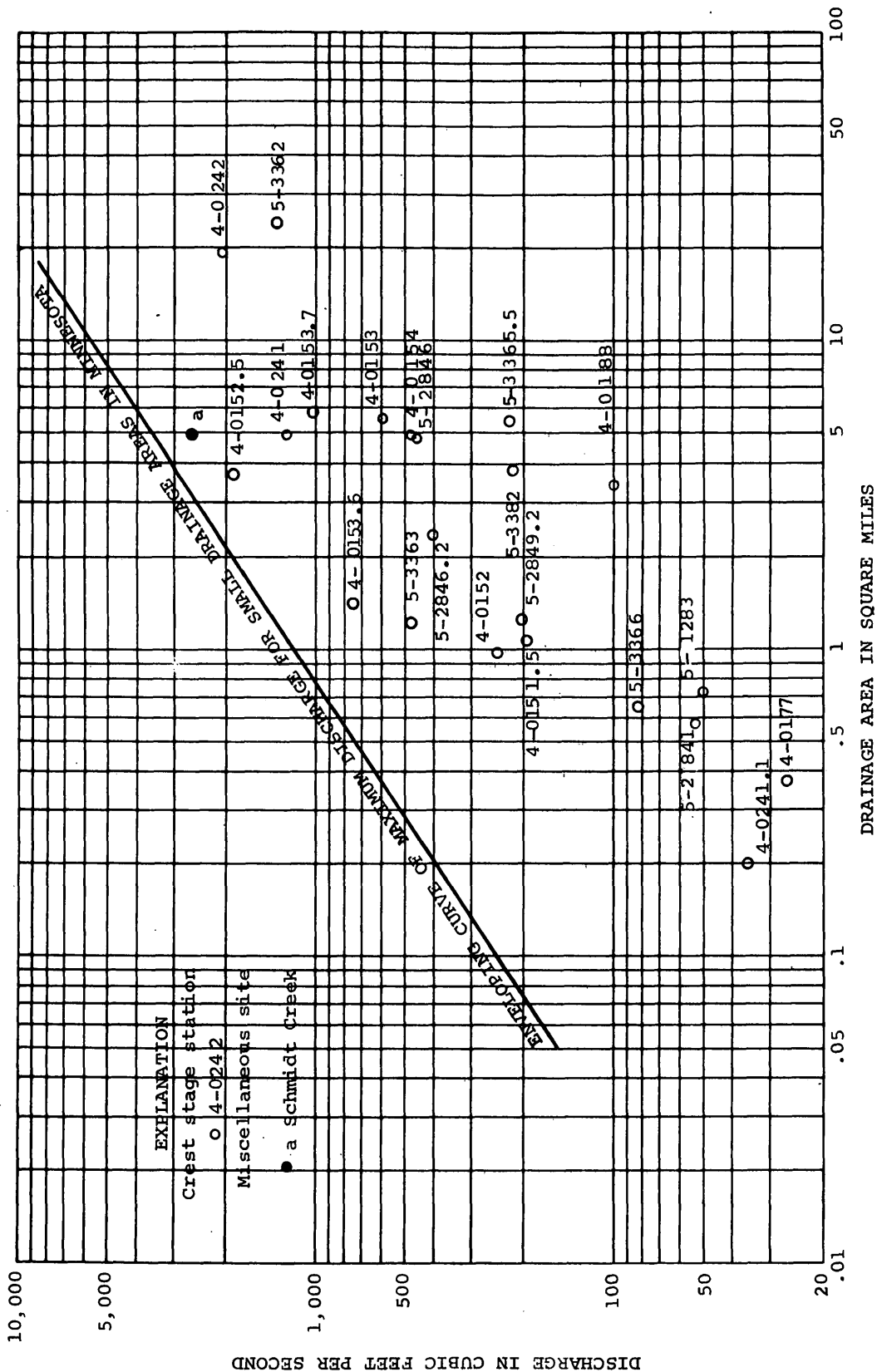


Figure 4.-Maximum discharge from small drainage areas in hydrologic region III

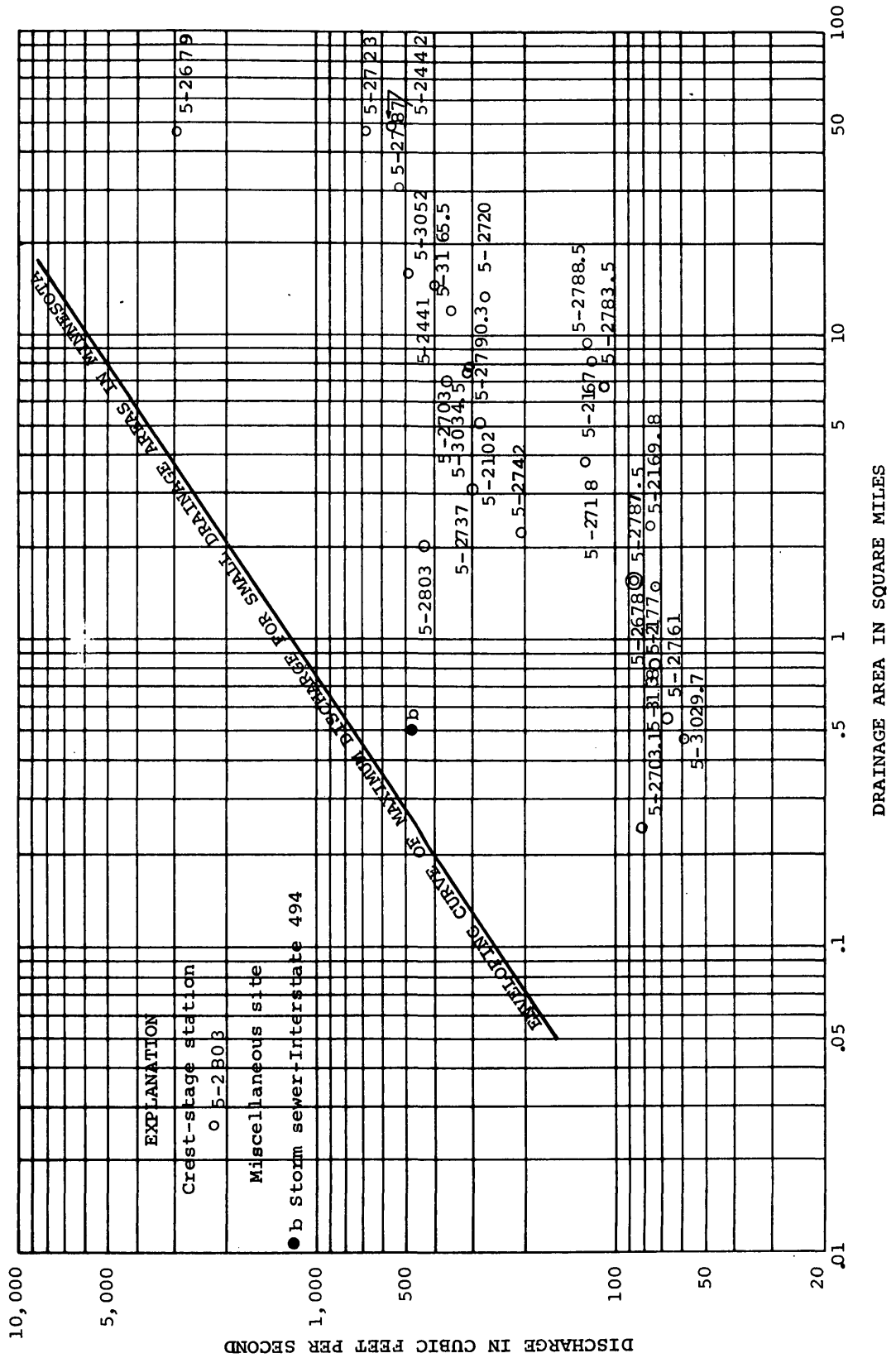


Figure 5.-Maximum discharge from small drainage areas in hydrologic region IV

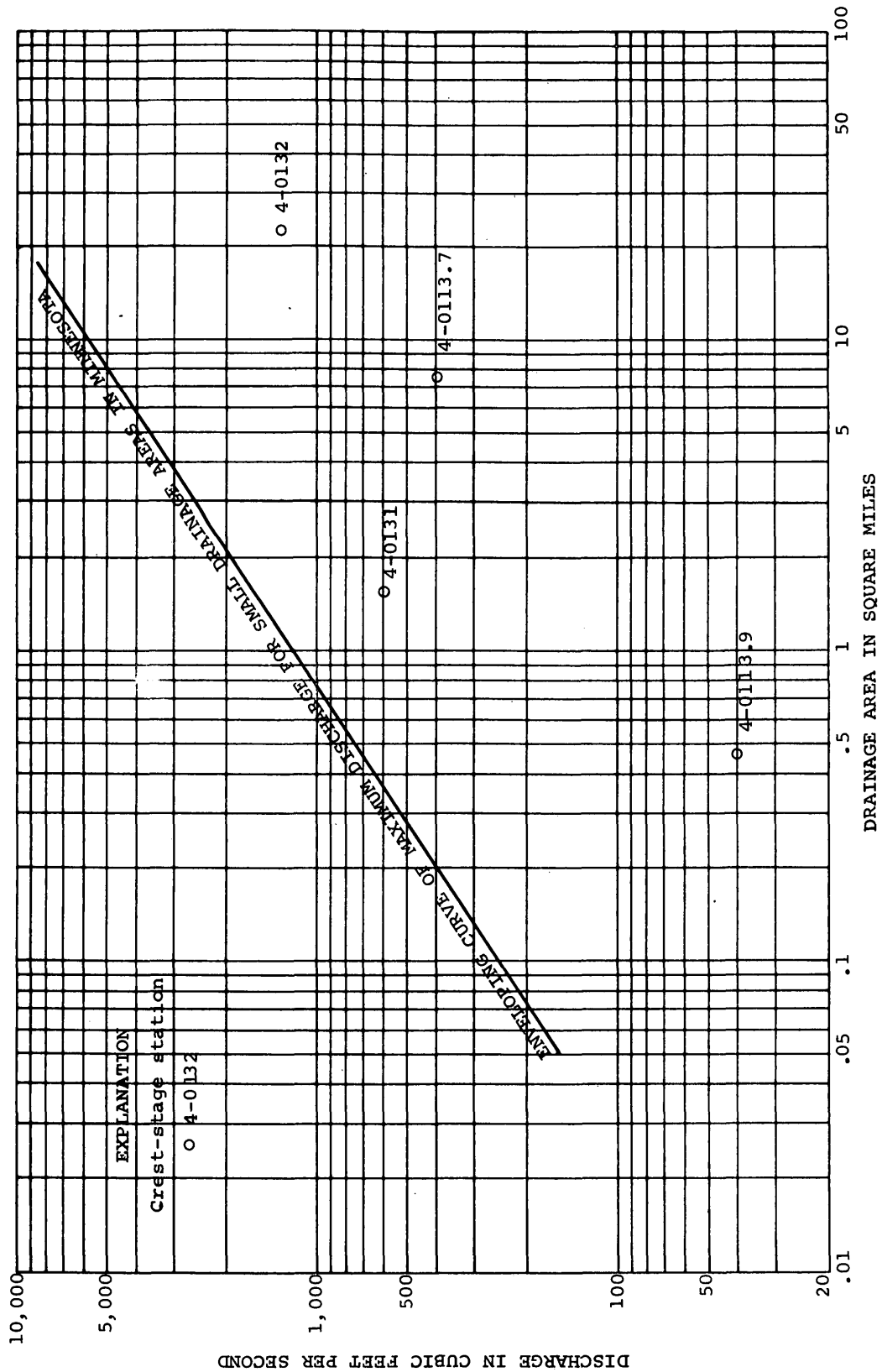


Figure 6.-Maximum discharge from small drainage areas in hydrologic region V

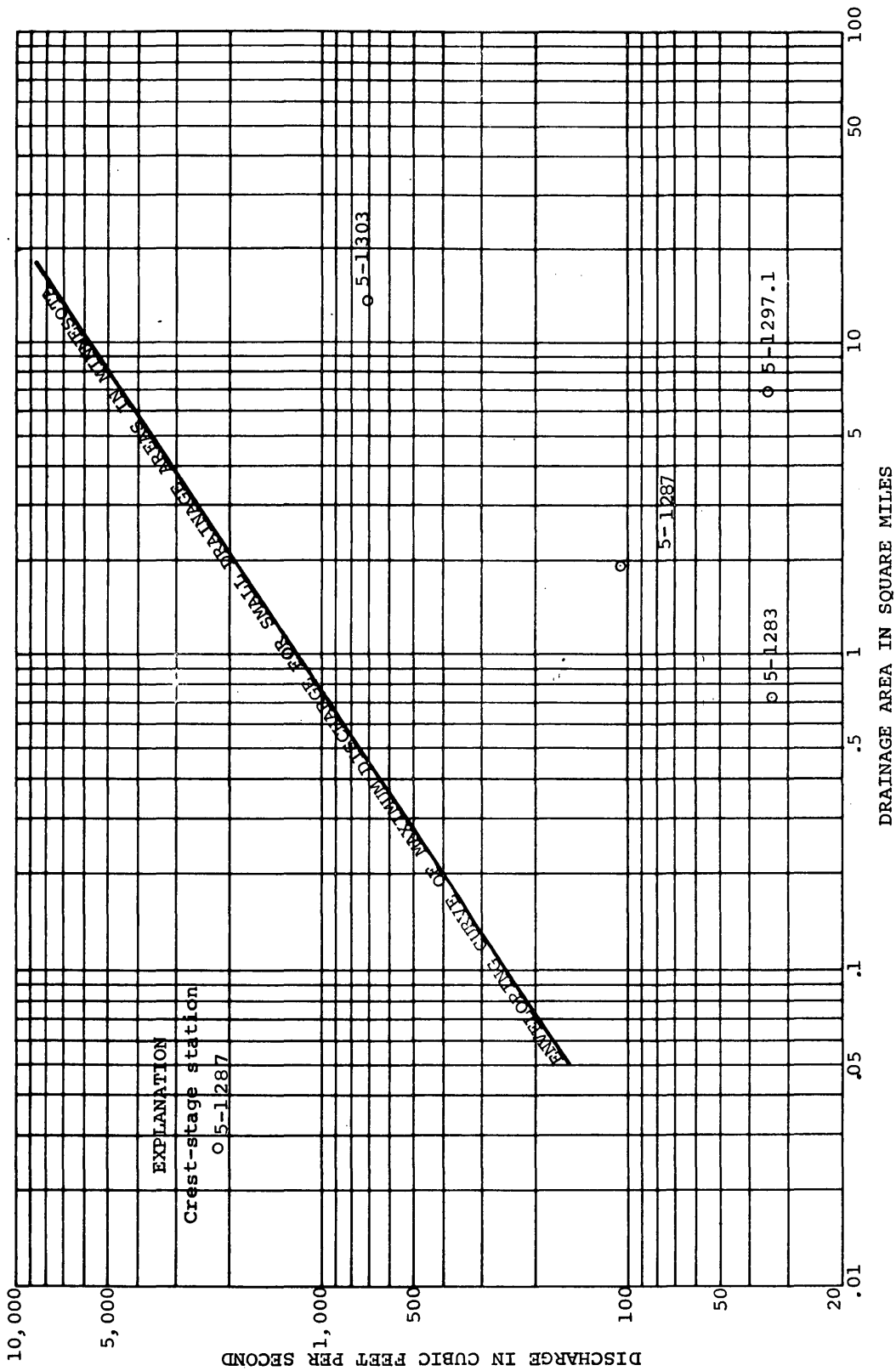


Figure 7.--Maximum discharge from small drainage areas in hydrologic region VI

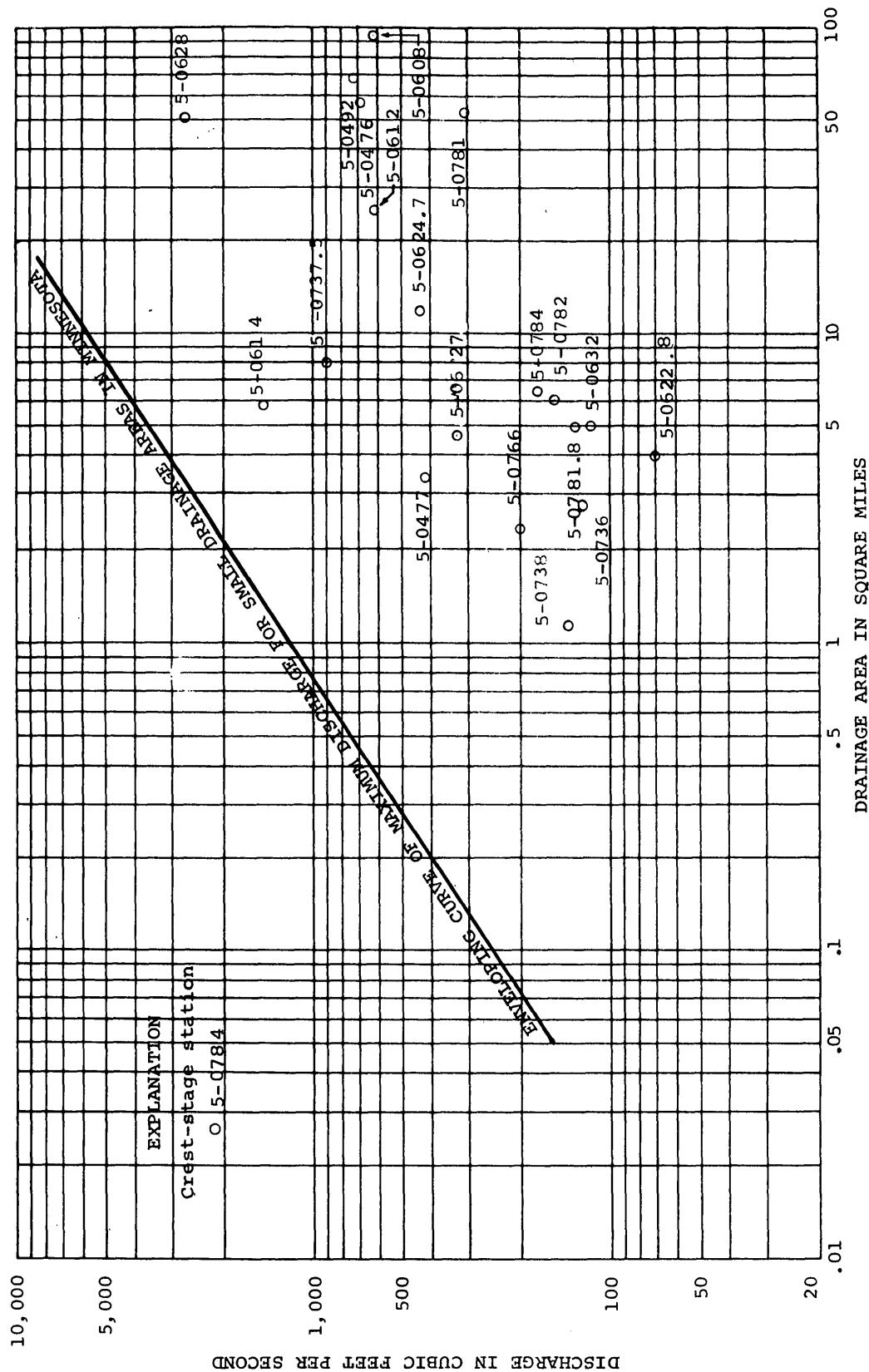


Figure 8.-Maximum discharge from small drainage areas in hydrologic region VII

## STREAMS TRIBUTARY TO LAKE SUPERIOR

4-0113.7 Little Devil Track River near Grand Marais, Minn.

(Site No. 132)

Location.--Lat 47°47'09", long 90°19'44", in NE¼NW¼ sec.9, T.61 N., R.1 E., at culvert on County Highway 12, 1.6 miles above mouth, and 2.5 miles north of Grand Marais.

Drainage area.--7.49 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--12.90 ft, upstream; 11.73 ft, downstream.

Bankfull stage.--15 ft.

Basin characteristics.--Main-channel length, 4.88 miles; main-channel slope, 51.4 ft per mile; mean basin altitude, 1,544 ft; forest area, 92 percent; area of lakes and swamps, 10 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
s1961	Apr. 20, 1961	17.50	156
1962	May 23, 1962	16.25	74
1963	June 15, 1963	a15.54	19
1964	May 6, 1964	19.06	260
1965	May 21, 1965	17.35	137
1966	May 5, 1966	17.21	129
1967	Apr. 17, 1967	22.43	390
1968	Apr. 26, 1968	16.56	92
1969	Oct. 9, 1968	20.62	341
1970	Apr. 29, 1970	18.10	188
1971	Oct. 27, 1970	19.24	273
1972	May 2, 1972	17.39	138
1973	May 1, 1973	15.63	51
1974	May 11, 1974	18.96	250
1975	July 2, 1975	15.75	56

a Backwater from debris.

STREAMS TRIBUTARY TO LAKE SUPERIOR

21

4-0113.9 Little Devil Track River tributary near Grand Marais, Minn.

(Site No. 170)

Location.--Lat 47°47'17", long 90°19'20", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.4, T.61 N., R.1 E., at culvert on County Highway 55, 0.2 mile above mouth, and 2.8 miles north of Grand Marais.

Drainage area.--0.47 sq mi.

Records available.--October 1965 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--8.49 ft, upstream; 6.69 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 1.15 miles; main-channel slope, 192 ft per mile; mean basin altitude, 1,543 ft; forest area, 83 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1966	May 5, 1966	b10.88	5.3
1967	Apr. 17, 1967	16.41	40
1968	June 14, 1968	10.09	6.4
1969	Oct. 9, 1968	16.02	19
1970	Sept. 21, 1970	16.02	19
1971	Oct. 27, 1970	16.31	28
1972	Oct. 27, 1971	14.42	15
1973	Sept. 1, 1973	10.02	6.1
1974	Apr. 22, 1974	b11.64	8.9
1975	Apr. 23, 1975	b 9.91	3.8

## STREAMS TRIBUTARY TO LAKE SUPERIOR

4-0131. Lake Superior tributary near Taconite Harbor, Minn.

(Site No. 161)

Location.--Lat 47°29'14", long 90°59'19", in SW¼SE¼ sec.20, T.58 N., R.5 W., at culvert on U. S. Highway 61, 0.2 mile above mouth, and 3.7 miles southwest of Taconite Harbor.

Drainage area.--1.56 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.92 ft, upstream (corrugated pipe); 4.08 ft, downstream (concrete box culvert).

Bankfull stage.--10 ft.

Basin characteristics.--Main-channel length, 2.80 miles; main-channel slope, 226 ft per mile; mean basin altitude, 1,028 ft; forest area, 99 percent; area of lakes and swamps, 8 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	May 23, 1964	11.63	167
1965	Apr. 21, 1965	8.12	59
1966	Apr. 15, 1966	7.69	33
1967	Apr. 17, 1967	10.37	125
1968	Apr. 25, 1968	7.20	33
1969	Oct. 9, 1968	9.62	102
1970	Apr. 26, 1970	7.71	48
1971	Oct. 27, 1970	12.28	188
1972	Aug. 21, 1972	14.05	600
1973	June 4, 1973	7.12	32
1974	Oct. 6, 1974	10.47	129
1975	Apr. 28, 1975	7.94	54

b Backwater from ice.



STREAMS TRIBUTARY TO LAKE SUPERIOR

23

4-0132. Caribou River near Little Marais, Minn.

(Site No. 130)

Location.--Lat 47°27'51", long 91°01'50", in NW¼SE¼ sec.36, T.58 N., R.6 W., at culvert on U. S. Highway 61, 0.2 mile above mouth, and 5.2 miles northeast of Little Marais.

Drainage area.--22.7 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--8.89 ft, upstream; 8.42 ft, downstream.

Bankfull stage.--15 ft.

Basin characteristics.--Main-channel length, 14.6 miles; main-channel slope, 52.6 ft per mile; mean basin altitude, 1,286 ft; forest area, 99 percent; area of lakes and swamps, 7 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Apr. 20, 1961	15.97	1,130
1962	Apr. 27, 1962	11.28	190
	May 23, 1962		
1963	Apr. 7, 1963	b13.23	307
1964	Apr. 28, 1964	16.74	1,340
1965	May 15, 1965	12.66	443
1966	Apr. 19, 1966	13.34	548
1967	Apr. 17, 1967	15.70	1,080
1968	June 9, 1968	12.14	378
1969	Oct. 9, 1968	13.64	608
1970	Apr. 27, 1970	13.12	500
1971	Oct. 27, 1970	16.63	1,320
1972	Aug. 16, 1972	16.28	1,230
1973	June 4, 1973	12.92	463
1974	May 11, 1974	13.88	655
1975	Apr. 23, 1975	12.69	422

b Backwater from ice.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

4-0151.5 Crow Creek near Silver Creek, Minn.

(Site No. 58)

Location.--Lat 47°08'30", long 91°34'38", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.23, T.54 N., R.10 W.,  
at culvert on County Highway 3, 2.3 miles northeast of Silver Creek, and  
4.0 miles above mouth.

Drainage area.--1.07 sq mi.

Records available.--October 1959 to September 1975.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--6.97 ft, upstream; 6.37 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 2.60 miles; main-channel slope,  
108 ft per mile; mean basin altitude, 1,195 ft; forest area, 93 percent;  
area of lakes and swamps, 19 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 13, 1960	9.56	49
1961	Apr. 20, 1961	11.08	121
1962	May 23, 1962	8.47	21
1963	Apr. 2, 1963	b9.20	19
1964	May 23, 1964	9.30	41
1965	Apr. 19, 1965	b9.29	23
1966	Aug. 8, 1966	9.13	37
1967	June 12, 1967	8.81	29
1968	Apr. 24, 1968	9.65	51
1969	Apr. 13, 1969	8.83	32
1970	Apr. 27, 1970	8.72	30
1971	Apr. 12, 1971	b9.30	30
1972	Sept. 20, 1972	11.34	196
1973	June 17, 1973	9.29	43
1974	Oct. 9, 1973	11.19	154
1975	Apr. 23, 1975	c9.00	34

b Backwater from ice

c Affected by shifting control

STREAMS TRIBUTARY TO LAKE SUPERIOR

25

4-0152. Encampment River tributary at Silver Creek, Minn.

(Site No. 59)

Location.--Lat 47°07'01", long 91°36'04", in NE¼SE¼ sec.33, T.54 N., R.10 W., at culvert on County Highway 3, 0.3 mile north of Silver Creek, and 1.4 miles above mouth.

Drainage area.--0.96 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.02 ft, upstream; 4.07 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 1.70 miles; main-channel slope, 183 ft per mile; mean basin altitude, 1,142 ft; forest area, 97 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 13, 1960	8.65	72
1961	Apr. 20, 1961	9.17	85
1962	May 23, 1962	6.81	26
1963	Apr. 7, 1963	6.55	20
1964	Sept. 7, 1964	7.50	41
1965	May 21, 1965	7.01	29
1966	Aug. 8, 1966	7.77	47
1967	Apr. 9, 1967	c7.78	45
1968	July 12, 1968	11.49	245
1969	Aug. 6, 1969	7.73	46
1970	May 9, 1970	7.21	31
1971	Apr. 11, 1971	b8.81	45
1972	Sept. 20, 1972	11.49	225
1973	June 17, 1973	7.90	48
1974	Oct. 9, 1973	11.03	149
1975	Apr. 23, 1975	b7.79	41

b Backwater from ice.

c Affected by shifting control.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

4-0152.5 Silver Creek tributary near Two Harbors, Minn.

(Site No. 169)

Location.--Lat 47°04'40", long 91°36'49", in SW $\frac{1}{4}$ NE $\frac{1}{4}$  sec.16, T.53 N., R.10 W.,  
at culvert on County Highway 3, 1.0 mile above mouth, and 4.5 miles north-  
east of Two Harbors.

Drainage area.--3.72 sq mi.

Records available.--October 1964 to present.

Gage.--Water-stage recorder upstream from culvert.

Culvert invert elevations.--0.20 ft, upstream; -0.59 ft, downstream.

Bankfull stage.--3 ft.

Basin characteristics.--Main-channel length, 3.00 miles; main-channel slope,  
110 ft per mile; mean basin altitude, 962 ft; forest area, 91 percent;  
area of lakes and swamps, 0 percent.

Remarks.--Recording rain gage installed Mar. 16, 1966.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1965	Sept. 30, 1965	4.06	130
1966	Oct. 18, 1965	4.47	155
1967	June 12, 1967	4.66	168
1968	July 12, 1968	14.41	1,020
1969	Aug. 6, 1969	5.22	208
1970	May 9, 1970	5.16	203
1971	Oct. 27, 1970	5.21	206
1972	Sept. 20, 1972	17.08	1,880
1973	June 17, 1973	7.06	(/)
1974	Oct. 9, 1973	11.00	(/)
1975	Apr. 24, 1975	b4.74	(/)

/ Discharge not determined.  
b Backwater from ice.

STREAMS TRIBUTARY TO LAKE SUPERIOR

27

4-0153. Little Stewart River near Two Harbors, Minn.

(Site No. 57)

Location.--Lat 47°03'52", long 91°40'03", in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.24, T.53 N., R.11 W., at culvert on county highway, 2.0 miles above mouth, and 2.7 miles north of Two Harbors.

Drainage area.--5.54 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--7.87 ft, upstream; 7.73 ft, downstream.

Bankfull stage.--10 ft.

Basin characteristics.--Main-channel length, 7.47 miles; main-channel slope, 53.8 ft per mile; mean basin altitude, 1,152 ft; forest area, 75 percent; area of lakes and swamps, 3 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 13, 1960	10.80	140
1961	Apr. 20, 1961	11.76	200
1962	May 23, 1962	10.43	118
1963	Apr. 7, 1963	b10.05	65
1964	Sept. 7, 1964	12.03	260
1965	Apr. 19, 1965	10.62	161
1966	Oct. 18, 1965	10.34	139
1967	June 12, 1967	10.78	171
1968	Apr. 24, 1968	11.80	243
1969	Apr. 13, 1969	10.85	176
1970	Apr. 8, 1970	10.98	185
1971	Apr. 11, 1971	b12.72	207
1972	Sept. 20, 1972	15.18	598
1973	Aug. 16, 1973	11.31	206
1974	Oct. 9, 1973	13.05	362
1975	Apr. 23, 1975	b13.33	245

b Backwater from ice.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

4-0153.6 Lake Superior tributary No. 2 at French River, Minn.

(Site No. 160)

Location.--Lat 46°53'43", long 91°54'31"; in SW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.18, T.51 N., R.12 W., at culvert on U.S. Highway 61, 0.35 mile above mouth, and 0.7 mile west of French River.

Drainage area.--1.41 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--14.52 ft, upstream; 0.71 ft, downstream.

Bankfull stage.--20 ft.

Basin characteristics.--Main-channel length, 2.81 miles; main-channel slope, 144 ft per mile; mean basin altitude, 902 ft; forest area, 95 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	Sept. 7, 1964	28.25	337
1965	June 6, 1965	18.03	64
1966	Oct. 18, 1965	18.27	69
1967	June 13, 1967	23.00	276
1968	Apr. 24, 1968	19.72	109
1969	Apr. 13, 1969	18.48	75
1970	Apr. 8, 1970	18.24	69
1971	Apr. 11, 1971	b18.89	80
1972	Sept. 20, 1972	31.58	748
1973	Aug. 15, 1973	18.22	68
1974	June 10, 1974	23.5	282
1975	Apr. 27, 1975	19.17	94

STREAMS TRIBUTARY TO LAKE SUPERIOR

29

4-0153.7 Talmadge River at Duluth, Minn.

(Site No. 159)

Location.--Lat  $46^{\circ}53'20''$ , long  $91^{\circ}55'21''$ , in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.24, T.51 N., R.13 W., at culvert on U. S. Highway 61, 0.6 mile above mouth, and 0.5 mile northeast of Duluth city limits.

Drainage area.--5.79 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--10.51 ft, upstream; 5.12 ft, downstream.

Bankfull stage.--13 ft.

Basin characteristics.--Main-channel length, 5.85 miles; main-channel slope, 92.7 ft per mile; mean basin altitude, 972 ft; forest area, 65 percent; area of lakes and swamps, 3 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	Sept. 7, 1964	17.54	609
1965	Apr. 19, 1965	13.17	187
1966	Oct. 18, 1965	12.61	150
1967	June 13, 1967	15.55	371
1968	Apr. 24, 1968	15.23	335
1969	Apr. 14, 1969	13.85	224
1970	Apr. 8, 1970	13.68	139
1971	Apr. 11, 1971	15.33	358
1972	Sept. 20, 1972	20.54	1,020
1973	h Apr. 15, 1973	b14.11	h152
1974	Oct. 9, 1973	16.42	h470
1975	Apr. 27, 1975	14.69	252

b Backwater from ice.  
h Revised.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

4-0154. Miller Creek at Duluth, Minn.

(Site No. 56)

Location.--Lat 46°49'01", long 92°10'42", in SE¼NE¼ sec.13, T.50 N., R.15 W., at culvert on U. S. Highway 53, 0.2 mile northwest of Duluth city limits.

Drainage area.--4.92 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--12.03 ft, upstream; 11.60 ft, downstream.

Bankfull stage.--14 ft.

Basin characteristics.--Main-channel length, 3.95 miles; main-channel slope, 28.0 ft per mile; mean basin altitude, 1,384 ft; forest area, 72 percent; area of lakes and swamps, 8 percent.

Remarks.--Stream density figure above includes 2.9 miles of additional ditched channel.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 20, 1960	15.55	154
1961	Apr. 20, 1961	18.85	424
1962	May 23, 1962	c16.22	193
1963	Apr. 2, 1963	c13.94	43
1964	Sept. 7, 1964	17.95	343
1965	Apr. 19, 1965	b16.18	190
1966	Oct. 18, 1965	c15.92	150
1967	June 13, 1967	16.76	242
1968	June 9, 1968	15.74	167
1969	Apr. 11, 1969	15.67	164
1970	Apr. 8, 1970	15.28	134
1971	Apr. 11, 1971	16.83	254
1972	Sept. 20, 1972	19.24	481
1973	Aug. 15, 1973	17.47	302
1974	Oct. 9, 1973	17.19	282
1975	Apr. 29, 1975	15.96	185

b Backwater from ice.

c Affected by shifting control.



STREAMS TRIBUTARY TO LAKE SUPERIOR

31

4-0177. McKinley Lake tributary at McKinley, Minn.

(Site No. 54)

Location.--Lat 47°30'41", long 92°25'11", in SW¼NE¼ sec.18, T.58 N., R.16 W., at culvert on State Highway 135 at west edge of McKinley.

Drainage area.--0.37 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--6.48 ft, upstream; 5.60 ft, downstream.

Bankfull stage.--10 ft.

Basin characteristics.--Main-channel length, 0.95 miles; main-channel slope, 259 ft per mile; mean basin altitude, 1,585 ft; forest area, 97 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 13, 1960	8.20	13
1961	Apr. 17, 1961	b9.84	27
1962	Apr. 27, 1962	8.07	11
1963	Apr. 2, 1963	8.51	18
1964	June 23, 1964	8.03	11
1965	Sept. 28, 1965	8.34	15
1966	Apr. 20, 1966	8.18	13
1967	Mar. 31, 1967	7.80	8.1
1968	Aug. 21, 1968	9.73	27
1969	Sept. 6, 1969	9.35	25
1970	Apr. 8, 1970	b7.33	2.7
1971	June 20, 1971	8.47	17
1972	Apr. 18, 1972	7.64	6.5
1973	May 6, 1973	9.37	25
1974	Oct. 11, 1973	8.57	19
1975	Apr. 29, 1975	7.49	5.2

b Backwater from ice.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

4-0188. East Two River tributary at Virginia, Minn.

(Site No. 40)

Location.--Lat 47°31'54", long 92°33'51", in NE¼NE¼ sec.12, T.58 N., R.18 W., at culvert on U. S. Highway 169, 0.2 mile west of Virginia city limits, and 1.1 miles above mouth.

Drainage area (revised).--3.46 sq mi. (Contributing area)  
4.26 sq mi. (Total area)

Records available.--October 1958 to September 1972.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,421.72 ft above mean sea level, datum of 1929.

Culvert invert elevations.--4.08 ft, upstream; 4.00 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 2.80 miles; main-channel slope, 21.9 ft per mile; mean basin altitude, 1,452 ft; forest area, 77 percent; area of lakes and swamps, 14 percent.

Remarks.--Drainage pattern has been affected by mining operations in the past and will probably continue to be in the future. Several open pit mines and mining dumps are located in basin.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	June 11, 1959	6.11	44
1960	July 16, 1960	a6.59	46
1961	Apr. 20, 1961	8.16	54
1962	June 29, 1962	6.18	44
1963	June 10, 1963	*6.37	40
1964	May 7, 1964	7.87	81
1965	Apr. 19, 1965	6.74	54
1966	Apr. 20, 1966	5.57	41
1967	Mar. 30, 1967	6.38	48
1968	Aug. 21, 1968	8.37	85
1969	Aug. 29, 1969	*8.93	e100
1970	June 11, 1970	6.30	26
1971	Apr. 16, 1971	b7.07	74
1972	Apr. 16, 1972	6.65	64

\* Gage height at downstream end of culvert.

a Backwater from debris.

b Backwater from ice.

e Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

33

4-0241. Rock Creek near Blackhoof, Minn.

(Site No. 128)

Location.--Lat  $46^{\circ}32'10''$ , long  $92^{\circ}22'12''$ , in SW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.21, T.47 N., R.16 W., at culvert on State Highway 23, 4.0 miles above mouth, and 4.4 miles east of Blackhoof.

Drainage area.--4.94 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--10.03 ft, upstream; 8.76 ft, downstream.

Bankfull stage.--18 ft.

Basin characteristics.--Main-channel length, 5.35 miles; main-channel slope, 41.7 ft per mile; mean basin altitude, 960 ft; forest area, 40 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Apr. 20, 1961	15.13	282
1962	May 23, 1962	16.53	404
1963	Apr. 2, 1963	b12.68	85
1964	Sept. 7, 1964	19.44	698
1965	Sept.30, 1965	14.97	269
1966	-	-	-
1967	June 14, 1967	19.29	678
1968	June 9, 1968	24.7	1,110
1969	July 31, 1969	16.03	360
1970	May 21, 1970	28.92	1,270
1971	Apr. 11, 1971	b17.26	233
1972	Sept.20, 1972	27.20	1,210
1973	Aug. 8, 1973	15.55	318
1974	June 6, 1974	16.07	362
1975	Apr. 16, 1975	b14.32	130

b Backwater from ice.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

4-0241.1 Rock Creek tributary near Blackhoof, Minn.

(Site No. 129)

Location.--Lat 46°32'14", long 92°22'05", in NE¼SE¼ sec.21, T.47 N., R.16 W., at culvert on State Highway 23, 0.1 mile above mouth, and 4.5 miles east of Blackhoof.

Drainage area.--0.20 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--7.46 ft, upstream; 3.04 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 0.59 miles; main-channel slope, 90.9 ft per mile; mean basin altitude, 902 ft; forest area, 65 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Apr. 20, 1961	9.44	12
1962	May 23, 1962	9.82	15
1963	Apr. 2, 1963	b9.42	5.8
1964	Sept. 7, 1964	13.23	27
1965	Sept.30, 1965	8.73	5.9
1966	June 25, 1966	13.50	28
1967	June 14, 1967	13.14	27
1968	June 9, 1968	12.73	27
1969	July 31, 1969	15.21	31
1970	May 21, 1970	18.42	36
1971	Apr. 11, 1971	b10.11	8.7
1972	Sept.20, 1972	14.36	30
1973	May 1, 1973	8.73	5.5
1974	Oct. 11, 1973	9.14	8.7
1975	Apr. 16, 1975	b10.10	9.4

STREAMS TRIBUTARY TO LAKE SUPERIOR

35

4-0242. South Fork Nemadji River near Holyoke, Minn.

(Site No. 127)

Location.--Lat 46°29'38", long 92°24'36", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.6, T.46 N., R.16 W., at culvert on State Highway 23, 1.7 miles below Clear Creek, and 2.0 miles northwest of Holyoke.

Drainage area.--19.4 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--7.70 ft, upstream; 6.86 ft, downstream.

Bankfull stage.--11 ft.

Basin characteristics.--Main-channel length, 7.90 miles; main-channel slope, 36.8 ft per mile; mean basin altitude, 946 ft; forest area, 90 percent; area of lakes and swamps, 8 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	May 14, 1961	11.44	458
1962	May 23, 1962	13.46	900
1963	June 10, 1963	9.84	190
1964	Sept. 7, 1964	14.40	1,120
1965	Sept. 30, 1965	10.87	352
1966	June 25, 1966	14.8	1,220
1967	June 14, 1967	14.78	1,210
1968	June 9, 1968	12.71	730
1969	July 31, 1969	16.29	1,590
1970	May 21, 1970	17.99	2,100
1971	Apr. 11, 1971	b12.59	590
1972	Sept. 20, 1972	17.79	2,030
1973	May 25, 1973	10.97	370
1974	June 6, 1974	12.85	760
1975	June 29, 1975	13.40	890

b Backwater from ice.

## RED RIVER OF THE NORTH BASIN

5-0476. West Branch Mustinka River near Graceville, Minn.

(Site No. 157)

Location.--Lat 45°37'43", long 96°26'35", in NW¼NW¼ sec.22, T.125 N., R.46 W., at culverts on county highway, 4.1 miles north of Graceville.

Drainage area.--56.7 sq mi. (Contributing area)  
81.2 sq mi. (Total area)

Records available.--October 1963 to September 1972.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.70 ft, upstream; 5.80 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 12.4 miles; main-channel slope, 7.75 ft per mile; mean basin altitude, 1,106 ft; forest area, 0 percent; area of lakes and swamps, 8 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	Apr. 13, 1964	8.25	41
1965	July 6, 1965	8.80	59
1966	Mar. 18, 1966	9.41	83
1967	June 14, 1967	8.46	47
1968	-	d	<5
1969	Apr. 9, 1969	12.50	686
1970	Apr. 7, 1970	b8.58	(/)
1971	Apr. 7, 1971	8.51	(/)
1972	May 21, 1972	8.63	(/)

/ Discharge not determined.

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## RED RIVER OF THE NORTH BASIN

37

5-0477. West Branch Mustinka River tributary near Graceville, Minn.

(Site No. 156)

Location.--Lat 45°36'53", long 96°19'47", in NE¼NW¼ sec.28, T.125 N., R.45 W.,  
at culvert on county highway, 6.0 mile northeast of Graceville.

Drainage area.--3.37 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.80 ft, upstream; 5.61 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 6.10 miles; main-channel slope,  
13.3 ft per mile; mean basin altitude, 1,122 ft; forest area, 1 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	Apr. 13, 1964	8.76	80
1965	Sept. 30, 1965	6.99	10
1966	Apr. 17, 1966	7.53	27
1967	June 14, 1967	8.06	49
1968	-	d	<3
1969	Apr. 9, 1969	10.56	418
1970	Apr. 7, 1970	b8.04	27
1971	Mar. 14, 1971	b8.26	34
1972	July 12, 1972	8.59	74
1973	Mar. 14, 1973	b7.18	10
1974	-	d	<6
1975	June 14, 1975	7.55	36

&lt; Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## RED RIVER OF THE NORTH BASIN

5-0492. Eighteenmile Creek near Wheaton, Minn.

(Site No. 158)

Location.--Lat  $45^{\circ}47'18''$ , long  $96^{\circ}31'52''$ , on west quarter of line between secs. 24 and 25, T.127 N., R.47 W., at culvert on County Highway 67, 1.4 miles above mouth, and 2.0 miles southwest of Wheaton.

Drainage area.--68.5 sq mi.

Records available.--October 1964 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--1.04 ft, upstream; 1.64 ft, downstream (center culvert).

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 26.6 miles; main-channel slope, 5.03 ft per mile; mean basin altitude, 1,048 ft; forest area, 1 percent; area of lakes and swamps, 1 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1965	June 1, 1965	9.30	701
1966	Mar. 3, 1966	b9.85	246
1967	June 14, 1967	8.48	730
1968	Apr. 22, 1968	4.90	70
1969	-	-	-
1970	Apr. 8, 1970	4.83	(/)
1971	Mar. 14, 1971	b9.24	(/)
1972	May 21, 1972	6.74	(/)
1973	May 24, 1973	6.74	(/)
1974	Mar. 14, 1974	b4.07	(/)
1975	Apr. 16, 1975	b8.82	(/)

/ Discharge not determined.

b Backwater from ice.



## RED RIVER OF THE NORTH BASIN

39

5-0608. Buffalo River near Callaway, Minn.

(Site No. 46)

Location.--Lat 47°01'17", long 95°54'43", in SW¼SW¼ sec.17, T.141 N., R.41 W.,  
at culvert on U. S. Highway 59, 2.7 miles north of Callaway.

Drainage area.--94.5 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--8.14 ft, upstream; 6.70 ft, downstream.

Bankfull stage.--13 ft.

Basin characteristics.--Main-channel length, 20.8 miles; main-channel slope,  
6.03 ft per mile; mean basin altitude, 1,400 ft; forest area, 47 percent;  
area of lakes and swamps, 27 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 13, 1960	b12.92	246
1961	Apr. 4, 1961	b13.57	127
1962	June 8, 1962	13.35	370
1963	Apr. 3, 1963	b12.04	43
1964	Apr. 13, 1964	b13.73	237
1965	Apr. 10, 1965	b16.12	245
1966	May 23, 1966	11.87	238
1967	May 1, 1967	12.85	324
1968	June 30, 1968	10.06	81
1969	Apr. 10, 1969	b15.11	446
1970	Apr. 8, 1970	-	e250
1971	Apr. 18, 1971	b13.65	323
1972	Apr. 15, 1972	12.02	251
1973	Sept. 2, 1973	12.02	251
1974	Apr. 27, 1974	13.65	400
1975	June 29, 1975	15.68	620

b Backwater from ice.  
e Estimated.

## RED RIVER OF THE NORTH BASIN

5-0612. Whisky Creek at Barnesville, Minn.

(Site No. 123)

Location.--Lat 46°39'35", long 96°23'54", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec.20, T.137 N., R.45 W., at culvert on State Highway 34, 0.7 mile above Blue Eagle Lake, and 1.0 mile northeast of Barnesville.

Drainage area.--25.3 sq mi. (Contributing area)  
62.5 sq mi. (Total area)

Records available.--October 1960 to present. Continuous records available October 1964 to September 1966.

Gage.--Crest-stage gage downstream from culvert. Altitude of gage is 1,030 ft (from topographic map). Prior to October 6, 1964, crest-stage gage upstream from culvert at same datum. October 6, 1964, to May 9, 1967, water-stage recorder upstream from culvert at same datum.

Culvert invert elevations.--1.77 ft, upstream; 1.79 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 15.6 miles; main-channel slope, 18.6 ft per mile; mean basin altitude, 1,176 ft; forest area, 4 percent; area of lakes and swamps, 9 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Mar. 13, 1961	b5.75	40
1962	June 8, 1962	6.52	292
1963	June 1, 1963	6.07	236
1964	Apr. 15, 1964	4.83	117
1965	Apr. 9, 1965	5.45	175
1966	Mar. 14, 1966	b8.25	260
1967	June 14, 1967	4.90	159
1968	Apr. 8, 1968	4.94	164
1969	Apr. 9, 1969	6.85	570
1970	June 17, 1970	3.78	73
1971	June 29, 1971	4.44	119
1972	Mar. 17, 1972	b6.41	170
1973	Mar. 14, 1973	3.14	33
1974	Apr. 12, 1974	4.26	105
1975	June 29, 1975	6.97	610

## RED RIVER OF THE NORTH BASIN

41

5-0614. Hay Creek above Downer, Minn.

(Site No. 124)

Location.--Lat 46°44'37", long 96°25'12", in NW¼NW¼ sec.30, T.138 N., R.45 W.,  
at culvert on county road, 3.1 miles east of Downer.

Drainage area.--5.81 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culverts.

Culvert invert elevations.--4.95 ft, upstream; 5.01 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 3.83 miles; main-channel slope,  
16.0 ft per mile; mean basin altitude, 1,070 ft; forest area, 1 percent;  
area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Mar. 3, 1961	6.96	21
1962	June 8, 1962	13.46	h860
1963	May 26, 1963	7.78	69
1964	Apr. 15, 1964	c6.90	41
1965	Apr. 10, 1965	7.47	103
1966	June 5, 1966	6.64	53
1967	June 14, 1967	c6.26	12
1968	June 10, 1968	6.30	35
1969	Apr. 9, 1969	8.08	117
1970	Apr. 8, 1970	5.96	15
1971	June 29, 1971	7.38	84
1972	Mar. 17, 1972	7.38	84
1973	Apr. 14, 1973	7.39	84
1974	July 13, 1974	5.85	11
1975	June 29, 1975	13.52	1,460

c Affected by shifting control  
h Revised

## RED RIVER OF THE NORTH BASIN

5-0622.8 Mosquito Creek near Bagley, Minn.

(Site No. 120)

Location.--Lat 47°27'02", long 95°22'55", in SW¼NW¼ sec.21, T.146 N., R.37 W.,  
at culvert on State Highway 92, 5.0 miles south of Bagley.

Drainage area.--3.98 sq mi

Records available.--October 1960 to present.

Gage.--Water-stage recorder upstream from culvert. Prior to June 21, 1968,  
crest-stage gage at same site and datum.

Culvert invert elevations.--6.06 ft, upstream; 4.81 ft, downstream.

Bankfull stage.--10 ft.

Basin characteristics.--Main-channel length, 4.22 miles; main channel slope,  
11.4 ft per mile; mean basin altitude, 1,536 ft; forest area, 34 percent;  
area of lakes and swamps, 3 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Apr. 18, 1961	b7.12	5
1962	May 23, 1962	7.94	29
1963	May 27, 1963	c8.34	37
1964	May 5, 1964	c8.32	36
1965	Apr. 11, 1965	b10.30	67
1966	Apr. 1, 1966	b11.37	60
1967	Apr. 17, 1967	9.72	68
1968	Apr. 20, 1968	8.06	11
1969	Apr. 10, 1969	9.24	57
1970	Apr. 26, 1970	c8.09	12
1971	Apr. 8, 1971	8.47	21
1972	Apr. 15, 1972	c8.50	32
1973	Sept. 2, 1973	9.35	57
1974	Apr. 12, 1974	b10.08	34
1975	Apr. 17, 1975	b10.53	71

b Backwater from ice.

c Affected by shifting control.

## RED RIVER OF THE NORTH BASIN

43

5-0624.7 Marsh Creek tributary near Mahnomen, Minn.

(Site No. 121)

Location.--Lat 47°19'31", long 96°04'41", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec.36, T.145 N., R.43 W.,  
at culvert on State Highway 31, 0.1 mile above mouth, and 5.2 miles west of  
Mahnomen.

Drainage area.--11.9 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--7.95 ft, upstream; 5.82 ft, downstream.

Bankfull stage.--10 ft.

Basin characteristics.--Main-channel length, 8.98 miles; main-channel slope,  
4.01 ft per mile; mean basin altitude, 1,196 ft; forest area, 2 percent;  
area of lakes and swamps, 5 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Mar. 17, 1961	b10.55	6
1962	June 8, 1962	10.27	116
1963	May 28, 1963	d	e15
1964	Apr. 17, 1964	b12.52	140
1965	Apr. 10, 1965	b12.90	241
1966	Apr. 2, 1966	b13.43	205
1967	Mar. 29, 1967	10.37	110
1968	Mar. 25, 1968	9.18	25
1969	Apr. 11, 1969	13.76	436
1970	Apr. 7, 1970	b12.81	107
1971	Apr. 7, 1971	b11.42	98
1972	Apr. 13, 1972	10.35	110
1973	Mar. 14, 1973	b10.03	46
1974	Apr. 12, 1974	b14.56	370
1975	July 2, 1975	10.47	119

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

## RED RIVER OF THE NORTH BASIN

5-0627. Wild Rice River tributary near Twin Valley, Minn.

(Site No. 122)

Location.--Lat 47°17'47", long 96°19'42", in SW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.12, T.144 N., R.45 W.,  
at culvert on State Highway 31, 1.2 miles above mouth, and 4.1 miles northwest  
of Twin Valley.

Drainage area.--4.72 sq mi (revised).

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--9.90 ft, upstream; 9.42 ft, downstream.

Bankfull stage.--13 ft.

Basin characteristics.--Main-channel length, 5.05 miles; main-channel slope,  
17.9 ft per mile; mean basin altitude, 1,034 ft; forest area, 7 percent;  
area of lakes and swamps, 3 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	May 14, 1961	10.63	6.4
1962	June 8, 1962	12.39	107
1963	May 28, 1963	10.83	12
1964	Apr. 21, 1964	c11.25	23
1965	June 19, 1965	12.66	135
1966	Mar. 16, 1966	b15.70	91
1967	Mar. 29, 1967	12.07	79
1968	Mar. 24, 1968	b13.32	61
1969	Apr. 9, 1969	13.83	236
1970	June 16, 1970	14.76	324
1971	Sept. 4, 1971	12.26	102
1972	Apr. 12, 1972	12.85	154
1973	Sept. 2, 1973	12.45	117
1974	Apr. 12, 1974	12.18	94
1975	July 2, 1975	c12.39	90

b Backwater from ice.

c Affected by shifting control.

## RED RIVER OF THE NORTH BASIN

45

5-0628. Coon Creek near Twin Valley, Minn.

(Site No. 141)

Location.--Lat 47°15'51", long 96°20'34", in NE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.26, T.144 N., R.45 W.,  
at bridge on County Highway 28, 1.3 miles above mouth, and 4.0 miles west of  
Twin Valley.

Drainage area.--50.8 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage at downstream side of bridge.

Basin characteristics.--Main-channel length, 15.1 miles; main-channel slope,  
15.2 ft per mile; mean basin altitude, 1,067 ft; forest area, 5 percent;  
area of lakes and swamps, 1 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	June 8, 1962	12.68	896
1963	May 28, 1963	11.35	415
1964	June 19, 1964	11.83	565
1965	Apr. 10, 1965	b13.21	745
1966	Mar. 17, 1966	b13.52	630
1967	Apr. 17, 1967	10.77	267
1968	Mar. 24, 1968	b9.59	44
1969	Apr. 9, 1969	b13.42	1,520
1970	June 16, 1970	12.11	1,090
1971	Sept. 4, 1971	9.28	42
1972	Oct. 2, 1971	11.55	722
1973	Mar. 14, 1973	10.55	290
1974	Apr. 27, 1974	12.09	1,060
1975	June 29, 1975	14.59	2,700

b Backwater from ice.

## RED RIVER OF THE NORTH BASIN

5-0632. Spring Creek tributary near Ogema, Minn.

(Site No. 154)

Location.--Lat 47°07'22", long 95°57'35", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.11, T.142 N., R.42 W.,  
at culvert on county highway, 2.0 miles northwest of Ogema.

Drainage area.--4.99 sq mi.

Records available.--October 1962 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.87 ft, upstream; 4.31 ft, downstream.

Basin characteristics.--Main-channel length, 3.62 miles; main-channel slope,  
20.2 ft per mile; mean basin altitude, 1,260 ft; forest area, 1 percent;  
area of lakes and swamps, 21 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1963	June 2, 1963	8.21	70
1964	Apr. 17, 1964	8.87	83
1965	Apr. 10, 1965	b9.87	83
1966	Mar. 16, 1966	b9.49	57
1967	Mar. 29, 1967	8.48	72
1968	June 30, 1968	7.30	34
1969	Apr. 9, 1969	8.68	115
1970	Apr. 7, 1970	6.79	76
1971	Apr. 9, 1971	6.00	37
1972	Apr. 13, 1972	5.85	33
1973	Sept. 2, 1973	6.29	36
1974	Apr. 27, 1974	6.71	59
1975	June 29, 1975	8.44	101



## RED RIVER OF THE NORTH BASIN

47

5-0736. South Branch Battle River at Northome, Minn.

(Site No. 52)

Location.--Lat 47°52'17", long 94°17'45", in NW¼NE¼ sec.25, T.151 N., R.29 W.,  
at culvert on U.S. Highway 71, 0.7 mile west of Northome, and 3.1 miles  
above Battle Lake.

Drainage area.--2.80 sq mi

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--12.08 ft, upstream 12.01 ft, downstream.

Bankfull stage.--17 ft.

Basin characteristics.--Main-channel length, 2.88 miles; main-channel slope,  
9.72 ft per mile; mean basin altitude, 1,417 ft; forest area, 75 percent;  
area of lakes and swamps, 14 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 29, 1960	12.88	5.7
1961	May 14, 1961	14.83	99
1962	May 23, 1962	14.45	68
1963	May 27, 1963	14.25	56
1964	Apr. 13, 1964	b13.92	24
1965	Apr. 15, 1965	b15.13	37
1966	Apr. 16, 1966	c14.21	40
1967	Apr. 1, 1967	14.71	89
1968	Apr. 7, 1968	13.90	36
1969	Apr. 13, 1969	b16.43	109
1970	Apr. 26, 1970	b14.94	84
1971	Apr. 13, 1971	b14.84	43
1972	July 22, 1972	c13.97	46
1973	Sept. 3, 1973	c14.45	46
1974	May 11, 1974	14.52	75
1975	July 2, 1975	15.09	126

b Backwater from ice.

c Affected by shifting control.

## RED RIVER OF THE NORTH BASIN

5-0737.5 Spring Creek near Blackduck, Minn.

(Site No. 51)

Location.--Lat 47°46'23", long 94°31'22", in NW¼NW¼ sec.32, T.150 N., R.30 W., at culvert on County Highway 304, 3.1 miles north of Blackduck, and 3.2 miles above mouth.

Drainage area.--7.96 sq mi

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--10.00 ft, upstream 9.92 ft, downstream.

Bankfull stage.--11 ft.

Basin characteristics.--Main-channel length, 4.78 miles; main-channel slope, 13.1 ft per mile; mean basin altitude, 1,366 ft; forest area, 75 percent; area of lakes and swamps, 15 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 13, 1960	12.75	*27
1961	May 14, 1961	13.24	51
1962	May 23, 1962	16.54	346
1963	May 27, 1963	15.87	182
1964	Apr. 13, 1964	b12.59	20
1965	May 15, 1965	12.91	37
1966	Apr. 16, 1966	13.53	78
1967	Apr. 1, 1967	14.00	61
1968	Apr. 7, 1968	12.53	39
1969	Apr. 13, 1969	16.16	235
1970	Apr. 26, 1970	14.60	111
1971	Apr. 11, 1971	b14.20	81
1972	Apr. 16, 1972	14.30	99
1973	Sept. 3, 1973	15.86	180
1974	June 6, 1974	15.20	143
1975	July 2, 1975	16.85	896

\* Higher discharge resulted from blasting of beaver dams, but did not represent natural yield.

b Backwater from ice.

## RED RIVER OF THE NORTH BASIN

49

5-0738. Perry Creek tributary near Shooks, Minn.

(Site No. 50)

Location.--Lat 47°52'00", long 94°32'52", in NW¼SW¼ sec.30, T.151 N., R.30 W.,  
at culvert on State Highway 72, 5.2 miles west of Shooks.

Drainage area.--1.14 sq mi

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.45 ft, upstream; 3.94 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 2.80 miles; main-channel slope,  
10.5 ft per mile; mean basin altitude, 1,330 ft; forest area, 90 percent;  
area of lakes and swamps, 51 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	July 16, 1960	5.84	8.6
1961	May 14, 1961	6.54	30
1962	May 23, 1962	7.38	61
1963	May 27, 1963	7.10	50
1964	June 23, 1964	5.93	13
1965	May 15, 1965	6.23	21
1966	Apr. 16, 1966	7.45	64
1967	Mar. 29, 1967	b7.58	31
1968	June 10, 1968	6.03	15
1969	Apr. 13, 1969	a8.05	76
1970	Apr. 26, 1970	6.86	41
1971	Apr. 11, 1971	c6.96	36
1972	Apr. 16, 1972	c7.35	49
1973	Sept. 3, 1973	c7.79	58
1974	June 6, 1974	c6.81	23
1975	July 2, 1975	9.91	140

a Backwater from debris.

b Backwater from ice.

c Affected by shifting control.

## RED RIVER OF THE NORTH BASIN

5-0766. Red Lake River tributary near Thief River Falls, Minn.

(Site No. 140)

Location.--Lat 48°04'44", long 96°12'15", in SW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub> sec.8, T.153 N., R.43 W.,  
at culvert on County Highway 7, 0.5 mile above mouth, and 3.1 miles south of  
Thief River Falls.

Drainage area.--2.33 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.26 ft, upstream; 3.79 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 2.80 miles; main-channel slope,  
5.71 ft per mile; mean basin altitude, 1,112 ft; forest area, 1 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	June 8, 1962	6.20	36
1963	Apr. 4, 1963	7.29	81
1964	Sept. 26, 1964	f7.39	77
1965	Apr. 11, 1965	-	g150
1966	Mar. 20, 1966	b10.60	39
1967	Mar. 30, 1967	b9.67	115
1968	June 7, 1968	5.85	30
1969	Apr. 9, 1969	7.22	200
1970	Apr. 20, 1970	7.99	111
1971	Apr. 8, 1971	6.89	64
1972	Mar. 20, 1972	*b9.94	45
1973	May 10, 1973	6.28	43
1974	Apr. 21, 1974	8.10	117
1975	Apr. 18, 1975	6.55	52

\* Gage height at downstream end of culvert.

b Backwater from ice.

f Backwater from aquatic growth.

g Estimated; gage height unknown

## RED RIVER OF THE NORTH BASIN

51

5-0781. Lost River at Gonvick, Minn.

(Site No. 47)

Location.--Lat 47°44'14", long 95°31'05", in NE¼SE¼ sec.9, T.149 N., R.38 W.,  
at culvert on State Highway 92 at west edge of Gonvick, and 3.8 miles below  
Pine Lake.

Drainage area.--53.6 sq mi.

Records available.--October 1959 to September 1972.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--3.95 ft, upstream; 4.07 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 19.9 miles; main-channel slope,  
12.2 ft per mile; mean basin altitude, 1,354 ft; forest area, 28 percent;  
area of lakes and swamps, 18 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 26, 1960	6.48	50
1961	May 15, 1961	a7.42	25
1962	June 8, 1962	9.06	255
1963	June 9, 1963	7.67	121
1964	Apr. 21, 1964	b7.54	110
1965	Apr. 19, 1965	8.34	178
1966	May 15, 1966	8.24	167
1967	Mar. 30, 1967	b9.58	202
1968	Mar. 28, 1968	a7.14	60
1969	Apr. 8, 1969	b13.33	308
1970	Apr. 26, 1970	9.50	230
1971	Apr. 8, 1971	b11.38	142
1972	Apr. 13, 1972	b10.84	260

a Backwater from debris.

b Backwater from ice.

## RED RIVER OF THE NORTH BASIN

5-0781.8 Silver Creek near Clearbrook, Minn.

(Site No. 49)

Location.--Lat 47°38'43", long 95°26'33", in NW¼NW¼ sec.13, T.148 N., R.38 W.,  
at culvert on county highway, 3.4 miles south of Clearbrook.

Drainage area.--4.96 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.96 ft, upstream; 5.67 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 4.23 miles; main-channel slope, 39.6 ft per mile; mean basin altitude, 1,487 ft; forest area, 47 percent; area of lakes and swamps, 15 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 6, 1960	8.56	33
1961	Mar. 26, 1961	b7.79	5.4
1962	May 23, 1962	14.35	132
1963	May 27, 1963	11.04	81
1964	Apr. 21, 1964	8.04	21
1965	Apr. 11, 1965	12.19	98
1966	May 15, 1966	8.54	33
1967	Mar. 31, 1967	12.85	109
1968	Apr. 20, 1968	10.01	63
1969	Apr. 10, 1969	9.54	56
1970	Apr. 26, 1970	8.80	40
1971	Apr. 9, 1971	9.07	46
1972	Apr. 15, 1972	10.06	67
1973	Sept. 2, 1973	11.51	94
1974	Apr. 17, 1974	9.57	57
1975	Apr. 17, 1975	b11.89	(/)

/ Discharge not determined.  
b Backwater from ice.

## RED RIVER OF THE NORTH BASIN

53

5-0782. Silver Creek tributary at Clearbrook, Minn.

(Site No. 48)

Location.--Lat 47°41'49", long 95°25'50", in SW¼NW¼ sec.29, T.149 N., R.37 W.,  
at culvert on county highway at north edge of Clearbrook, 0.9 mile above  
mouth.

Drainage area.--6.02 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.47 ft, upstream; 5.35 ft, downstream.

Bankfull stage.--11 ft.

Basin characteristics.--Main-channel length, 3.22 miles; main-channel slope,  
36.4 ft per mile; mean basin altitude, 1,370 ft; forest area, 29 percent;  
area of lakes and swamps, 9 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 6, 1960	b8.60	18
1961	Apr. 26, 1961	8.40	20
1962	May 23, 1962	15.83	147
1963	May 27, 1963	10.57	56
1964	Apr. 13, 1964	9.89	45
1965	Apr. 11, 1965	b12.99	89
1966	Aug. 13, 1966	9.84	44
1967	Mar. 30, 1967	14.47	123
1968	Mar. 28, 1968	b9.99	30
1969	Apr. 9, 1969	12.74	93
1970	Apr. 26, 1970	c11.06	62
1971	Apr. 8, 1971	c10.19	43
1972	Apr. 15, 1972	c10.92	59
1973	Sept. 2, 1973	16.11	152
1974	Apr. 17, 1974	c11.86	67
1975	Apr. 17, 1975	c11.90	69

b Backwater from ice.

c Affected by shifting control.

## RED RIVER OF THE NORTH BASIN

5-0784. Clearwater River tributary near Plummer, Minn.

(Site No. 119)

Location.--Lat 47°52'34", long 96°08'35", in SE¼SE¼ sec.22, T.151 N., R.43 W., at culvert on county highway, 1.2 miles above mouth, and 5.3 miles southwest of Plummer.

Drainage area.--6.51 sq mi (revised).

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.62 ft, upstream; 3.64 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 5.78 miles; main-channel slope, 8.31 ft per mile; mean basin altitude, 1,094 ft; forest area, 24 percent; area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Mar. 24, 1961	6.10	10
1962	May 23, 1962	8.48	106
1963	July 12, 1963	6.59	20
1964	July 10, 1964	8.33	96
1965	Apr. 11, 1965	b11.23	177
1966	Apr. 27, 1966	8.27	85
1967	Mar. 30, 1967	7.93	71
1968	July 16, 1968	f7.36	41
1969	Apr. 10, 1969	9.97	153
1970	May 15, 1970	8.80	106
1971	Apr. 7, 1971	b7.48	38
1972	Mar. 20, 1972	b8.38	45
1973	Sept. 24, 1973	10.64	(/)
1974	Apr. 12, 1974	b13.24	(/)
1975	Apr. 28, 1975	11.54	(/)

/ Discharge not determined.

b Backwater from ice.

f Backwater from aquatic growth.



## LAKE OF THE WOODS BASIN

55

5-1283. Pike River near Gilbert, Minn.

(Site No. 171)

Location.--Lat 47°29'34", long 92°29'15", in NE¼SW¼ sec.22, T.58 N., R.17 W.,  
at culvert on State Highway 135, 1.1 miles west of Gilbert.

Drainage area.--0.73 sq mi.

Records available.--October 1965 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.66 ft, upstream; 2.37 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 1.32 miles; main-channel slope,  
114 ft per mile; mean basin altitude, 1,650 ft; forest area, 100 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1966	Apr. 15, 1966	7.13	13
1967	Mar. 31, 1967	7.17	14
1968	Aug. 21, 1968	8.11	34
1969	Oct. 17, 1968	7.67	24
1970	Apr. 27, 1970	7.25	16
1971	Apr. 16, 1971	c7.91	33
1972	Apr. 27, 1972	8.24	37
1973	May 7, 1973	7.54	21
1974	Apr. 21, 1974	8.69	50
1975	July 2, 1975	7.29	16

## LAKE OF THE WOODS BASIN

5-1287. Pike River tributary near Wahlsten, Minn.

(Site No. 133)

Location.--Lat 47°43'04", long 92°17'12", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.32, T.61 N., R.15 W., at culvert on State Highway 135, 1.2 miles south of Wahlsten, and 2.7 miles above mouth.

Drainage area.--1.93 sq mi. (Contributing area)  
2.64 sq mi. (Total area)

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.55 ft, upstream; 4.10 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 2.58 miles; main-channel slope, 18.1 ft per mile; mean basin altitude, 1,450 ft; forest area, 87 percent; area of lakes and swamps, 36 percent.

Annual maximum data.---

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Apr. 15, 1961	b8.06	60
1962	July 8, 1962	6.37	23
1963	June 10, 1963	5.73	8.2
1964	June 23, 1964	6.71	39
1965	Apr. 26, 1965	c6.35	26
1966	Apr. 15, 1966	b8.91	25
1967	Apr. 17, 1967	6.57	31
1968	June 8, 1968	7.08	62
1969	Apr. 13, 1969	7.29	80
1970	May 21, 1970	7.28	71
1971	June 17, 1971	7.31	70
1972	Aug. 16, 1972	c6.79	30
1973	July 26, 1973	*6.65	34
1974	Oct. 10, 1973	8.22	105
1975	Apr. 27, 1975	b8.34	92

\* Gage height at downstream end of culvert.

b Backwater from ice.

c Affected by shifting control.

## LAKE OF THE WOODS BASIN

57

5-1297.1 Johnson Creek near Britt, Minn.

(Site No. 134)

Location.--Lat 47°39'40", long 92°38'03", in NW<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> sec.28, T.60 N., R.18 W., at culvert adjacent to U. S. Highway 53, 0.6 mile below Sand Lake, and 5.9 miles west of Britt.

Drainage area.--6.92 sq mi.

Records available.--October 1960 to September 1964, October 1965 to September 1975.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.19 ft, upstream; 4.98 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 3.32 miles; main-channel slope, 4.42 ft per mile; mean basin altitude, 1,464 ft; forest area, 70 percent; area of lakes and swamps, 42 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Apr. 21, 1961	7.60	28
1962	May 23, 1962	7.22	22
1963	June 10, 1963	c6.75	13
1964	May 6, 1964	7.63	29
1965	-	-	-
1966	Apr. 15, 1966	a9.19	35
1967	Mar. 28, 1967	8.03	17
1968	June 14, 1968	7.46	22
1969	Apr. 13, 1969	7.86	31
1970	June 11, 1970	7.69	26
1971	Apr. 16, 1971	8.19	37
1972	Apr. 21, 1972	7.79	23
1973	July 25, 1973	7.66	20
1974	Oct. 11, 1973	8.11	29
1975	Apr. 30, 1975	8.19	32

a Backwater from debris.

c Affected by shifting control.

## LAKE OF THE WOODS BASIN

5-1303. Boriin Creek near Chisholm, Minn.

(Site No. 39)

Location.--Lat 47°36'14", long 92°51'58", in SE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub> sec.9, T.59 N., R.20 W., at culvert on State Highway 73, 1.2 miles above mouth, and 7.8 miles north of Chisholm.

Drainage area.--13.7 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage at downstream end of culvert.

Culvert invert elevations.--7.92 ft, upstream; 6.84 ft, downstream.

Bankfull stage.--11 ft.

Basin characteristics.--Main-channel length, 9.55 miles; main-channel slope, 13.8 ft per mile; mean basin altitude, 1,472 ft; forest area, 83 percent; area of lakes and swamps, 20 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	Sept. 6, 1959	12.58	305
1960	Apr. 13, 1960	12.23	206
1961	Apr. 23, 1961	13.01	485
1962	June 11, 1962	11.79	124
1963	Apr. 3, 1963	b12.00	83
1964	May 6, 1964	12.21	202
1965	Sept. 30, 1965	12.18	191
1966	Apr. 16, 1966	12.26	211
1967	Mar. 31, 1967	b12.63	182
1968	Sept. 18, 1968	12.02	159
1969	Apr. 13, 1969	13.40	700
1970	Apr. 27, 1970	12.62	318
1971	Apr. 17, 1971	c13.11	410
1972	Apr. 17, 1972	b12.66	165
1973	Mar. 14, 1973	b10.92	48
1974	Oct. 12, 1973	c13.06	335
1975	Apr. 29, 1975	12.49	284

b Backwater from ice.

c Affected by shifting control.

# SMITH CREEK BASIN

59

5-2102. Smith Creek near Hill City, Minn.

(Site No. 118)

Location.--Lat 47°04'58", long 93°34'59", in SE 1/4 sec.13, T.53 N., R.26 W., at culvert on U. S. Highway 169, 6.2 miles north of Hill City.

Drainage area.--8.00 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--1.87 ft, upstream; 1.69 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 4.96 miles; main-channel slope, 41.9 ft per mile; mean basin altitude, 1,414 ft; forest area, 86 percent; area of lakes and swamps, 20 percent.

## Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	May 14, 1961	5.15	60
1962	May 23, 1962	6.02	238
1963	May 28, 1963	4.45	30
1964	May 6, 1964	6.28	282
1965	June 2, 1965	5.70	150
1966	Aug. 7, 1966	5.67	140
1967	Apr. 10, 1967	5.48	105
1968	Apr. 23, 1968	3.71	16
1969	Apr. 13, 1969	6.04	248
1970	Apr. 19, 1970	5.48	104
1971	Apr. 16, 1971	c5.67	120
1972	Aug. 22, 1972	5.96	220
1973	Mar. 14, 1973	3.75	17
1974	Oct. 10, 1973	c6.59	235
1975	Apr. 27, 1975	c5.90	108

c Affected by shifting control.

## SWAN RIVER BASIN

5-2167. O'Brien Creek near Nashwauk, Minn.

(Site No. 42)

Location.---Lat 47°22'59", long 93°08'08", in NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> sec.33, T.57 N., R.22 W., at culvert on U. S. Highway 169, 1.5 miles east of Nashwauk, and 3.0 miles above Welcome Creek.

Drainage area.--8.26 sq mi.

Records available.--October 1958 to September 1972.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.98 ft, upstream; 5.36 ft, downstream.

Bankfull stage.--13 ft.

Basin characteristics.--Main-channel length, 5.34 miles; main-channel slope, 42.4 ft per mile; mean basin altitude, 1,465 ft; forest area, 80 percent; area of lakes and swamps, 3 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	Apr. 18, 1959	8.39	88
1960	May 4, 1960	8.08	70
1961	May 14, 1961	8.35	85
1962	Apr. 8, 1962	b8.66	74
1963	Apr. 2, 1963	c8.21	48
1964	June 24, 1964	8.80	98
1965	Apr. 17, 1965	b9.28	87
1966	Apr. 19, 1966	a8.99	103
1967	Mar. 31, 1967	b9.57	120
1968	June 6, 1968	a9.76	94
1969	Apr. 12, 1969	b8.31	25
1970	Apr. 19, 1970	b8.59	50
1971	Apr. 16, 1971	b8.80	68
1972	Apr. 18, 1972	b8.76	66

a Backwater from debris.

b Backwater from ice.

c Affected by shifting control.

## SWAN RIVER BASIN

61

5-2169.8 Swan River tributary at Warba, Minn.

(Site No. 116)

Location.--Lat 47°07'11", long 93°15'00", in SE $\frac{1}{4}$ NW $\frac{1}{4}$  sec.34, T.54 N., R.23 W., at culvert on U.S. Highway 2, 0.9 mile above mouth, and 1.1 miles southeast of Warba.

Drainage area.---3.95 sq mi.

Records available.---October 1960 to present.

Gage.---Crest-stage gage upstream from culvert.

Culvert invert elevations.---4.19 ft, upstream; 2.55 ft, downstream.

Bankfull stage.---5 ft.

Basin characteristics.---Main-channel length, 2.76 miles; main-channel slope, 15.9 ft per mile; mean basin altitude, 1,294 ft; forest area, 89 percent; area of lakes and swamps, 24 percent.

Annual maximum data.---

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Apr. 21, 1961	c5.63	27
1962	May 23, 1962	6.80	77
1963	Apr. 2, 1963	b6.87	39
1964	Apr. 21, 1964	6.21	52
1965	June 2, 1965	5.59	29
1966	Apr. 19, 1966	5.69	33
1967	Mar. 31, 1967	b5.68	29
1968	June 6, 1968	5.09	13
1969	Apr. 13, 1969	5.98	44
1970	Apr. 19, 1970	5.60	30
1971	Apr. 10, 1971	b6.74	42
1972	Aug. 22, 1972	5.81	37
1973	May 25, 1973	5.15	15
1974	Oct. 10, 1973	6.12	49
1975	Apr. 27, 1975	6.18	51

b Backwater from ice.

c Affected by shifting control.

## BLUFF CREEK BASIN

5-2177. Bluff Creek near Jacobson, Minn.

(Site No. 117)

Location.--Lat 47°00'19", long 93°17'30", in SW $\frac{1}{4}$ NW $\frac{1}{4}$  sec.8, T.52 N., R.23 W., at culvert on State Highway 200, 1.2 miles west of Jacobson.

Drainage area.--1.50 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.08 ft, upstream; 4.01 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 1.58 miles; main-channel slope, 12.7 ft per mile; mean basin altitude, 1,244 ft; forest area, 83 percent; area of lakes and swamps, 27 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	May 14, 1961	6.94	18
1962	Sept. 11, 1962	8.35	60
1963	Apr. 2, 1963	b7.12	10
1964	June 23, 1964	7.72	41
1965	June 2, 1965	7.73	41
1966	Oct. 1, 1965	8.33	59
1967	Mar. 31, 1967	b8.15	31
1968	-	d	< 15
1969	Apr. 13, 1969	8.33	59
1970	Apr. 19, 1970	7.15	26
1971	Apr. 10, 1971	b8.42	49
1972	Aug. 22, 1972	c7.43	38
1973	Mar. 14, 1973	b7.33	18
1974	June 6, 1974	7.85	44
1975	Apr. 27, 1975	8.69	73

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.



## CROW WING RIVER BASIN

63

5-2441. Kitten Creek near Sebeka, Minn.

(Site No. 136)

Location.--Lat 46°40'33", long 95°04'46", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.15, T.137 N., R.35 W., at culvert on county highway, 3.3 miles above mouth, and 3.2 miles north of Sebeka.

Drainage area.--14.7 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.93 ft, upstream; 5.57 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 8.39 miles; main-channel slope, 15.4 ft per mile; mean basin altitude, 1,422 ft; forest area, 27 percent; area of lakes and swamps, 4 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	May 14, 1961	9.81	41
1962	May 23, 1962	10.50	60
1963	June 1, 1963	9.37	36
1964	May 6, 1964	10.52	174
1965	Apr. 13, 1965	11.14	320
1966	Apr. 3, 1966	10.36	143
1967	Mar. 30, 1967	10.63	200
1968	June 10, 1968	10.45	160
1969	Apr. 12, 1969	10.77	227
1970	Apr. 9, 1970	10.23	125
1971	Apr. 10, 1971	9.98	76
1972	Mar. 23, 1972	10.06	91
1973	Mar. 14, 1973	9.06	41
1974	Oct. 10, 1973	10.95	400
1975	Apr. 20, 1975	10.25	160

## CROW WING RIVER BASIN

5-2442. Cat River near Nimrod, Minn.

(Site No. 135)

Location.--Lat 46°37'49", long 94°55'51", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.36, T.137 N., R.34 W., at bridge on State Highway 227, 2.5 miles west of Nimrod, and 3.0 miles above mouth.

Drainage area.--49.2 sq mi.

Records available.--October 1960 to present.

Gage.--Water-stage recorder upstream from bridge. Prior to Sept. 8, 1967, crest-stage gage at same site and datum.

Low-steel elevation.--8.11 ft.

Bankfull stage.--7 ft.

Remarks.--Recording rain gage installed Sept. 20, 1967.

Basin characteristics.--Main-channel length, 13.9 miles; main-channel slope, 6.90 ft per mile; mean basin altitude, 1,375 ft; forest area, 33 percent; area of lakes and swamps, 15 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Apr. 24, 1961	6.56	217
1962	May 23, 1962	7.52	316
1963	June 1, 1963	5.47	125
1964	May 6, 1964	6.38	200
1965	Apr. 14, 1965	8.93	488
1966	Apr. 3, 1966	7.44	336
1967	Apr. 1, 1967	6.84	244
1968	June 10, 1968	8.33	410
1969	Apr. 12, 1969	8.33	410
1970	Apr. 30, 1970	6.85	240
1971	Apr. 11, 1971	5.67	140
1972	Apr. 17, 1972	6.98	255
1973	July 27, 1973	4.69	79
1974	Oct. 12, 1973	9.43	560
1975	Apr. 20, 1975	7.43	305

## PLATTE RIVER BASIN

65

5-2678. Big Mink Creek tributary near Lastrup, Minn.

(Site No. 138)

Location.--Lat 46°01'58", long 94°06'13", in NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.14, T.41 N., R.30 W.,  
at culvert on State Highway 25, 1.4 miles above mouth, and 2.1 miles west of  
Lastrup.

Drainage area.--1.53 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--7.45 ft, upstream; 6.93 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 2.62 miles; main-channel slope,  
24.9 ft per mile; mean basin altitude, 1,228 ft; forest area, 0 percent;  
area of lakes and swamps, 10 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	-	d	<0.2
1962	May 23, 1962	9.27	14
1963	Mar. 15, 1963	b8.80	3.3
1964	Apr. 13, 1964	8.57	5.8
1965	Apr. 12, 1965	10.42	27
1966	Mar. 15, 1966	b10.47	21
1967	Mar. 30, 1967	10.08	23
1968	June 29, 1968	8.29	2.8
1969	Apr. 8, 1969	11.76	35
1970	Apr. 19, 1970	9.92	21
1971	Apr. 7, 1971	10.58	28
1972	July 22, 1972	12.56	86
1973	Mar. 12, 1973	b9.62	11
1974	Apr. 2, 1974	b8.64	4
1975	Apr. 20, 1975	9.33	14

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## PLATTE RIVER BASIN

5-2679. Hillman Creek near Pierz, Minn.

(Site No. 162)

Location.--Lat 45°58'27", long 94°04'21", in NE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.9, T.40 N., R.30 W., at bridge on county highway, 1.1 miles above mouth, and 1.5 miles east of Pierz.

Drainage area.--46.7 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage at downstream side of bridge.

Basin characteristics.--Main-channel length, 15.5 miles; main-channel slope, 9.53 ft per mile; mean basin altitude, 1,258 ft; forest area, 36 percent; area of lakes and swamps, 20 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	May 7, 1964	14.55	1,380
1965	Apr. 13, 1965	14.68	1,550
1966	Mar. 17, 1966	14.06	795
1967	Mar. 31, 1967	13.93	620
1968	June 21, 1968	13.21	190
1969	Apr. 9, 1969	15.48	2,960
1970	Apr. 21, 1970	13.51	290
1971	Apr. 8, 1971	13.97	670
1972	July 22, 1972	15.25	2,490
1973	Mar. 12, 1973	13.98	680
1974	June 6, 1974	12.61	77
1975	Apr. 27, 1975	14.11	840

## SAUK RIVER BASIN

67

5-2703. Sauk River tributary at Spring Hill, Minn.

(Site No. 97)

Location.--Lat 45°31'22", long 94°48'31", in SW $\frac{1}{4}$ NE $\frac{1}{4}$  sec.27, T.124 N., R.33 W.,  
at culvert on State Highway 4, 1.0 mile east of Spring Hill, and 2.7 miles  
above mouth.

Drainage area.--7.06 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--7.87 ft, upstream; 7.45 ft, downstream.

Bankfull stage.--11 ft.

Basin characteristics.--Main-channel length, 5.08 miles; main-channel slope,  
16.8 ft per mile; mean basin altitude, 1,236 ft; forest area, 1 percent;  
area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Aug. 27, 1960	10.27	116
1961	Apr. 14, 1961	b12.33	157
1962	July 19, 1962	10.87	160
1963	Mar. 23, 1963	b11.26	8.5
1964	Apr. 6, 1964	b10.08	75
1965	Apr. 11, 1965	b12.60	268
1966	June 21, 1966	11.64	225
1967	Mar. 30, 1967	12.20	277
1968	June 10, 1968	9.78	82
1969	Apr. 7, 1969	13.09	364
1970	Apr. 19, 1970	11.21	190
1971	Mar. 31, 1971	b13.54	134
1972	July 8, 1972	12.22	280
1973	Mar. 14, 1973	b10.36	74
1974	June 6, 1974	10.81	260
1975	Apr. 27, 1975	10.77	153

## SAUK RIVER BASIN

5-2703.1 Sauk River tributary No. 2 near St. Martin, Minn.

(Site No. 142)

Location.--Lat 45°31'44", long 94°44'50", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.19; T.124 N., R.32 W., at culvert on county highway, 4.2 miles northwest of St. Martin.

Drainage area.--0.24 sq mi.

Records available.--October 1961 to present. Annual peak for 1960 available from miscellaneous flood data collected prior to activation of station.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.97 ft, upstream; 2.89 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, .68 miles; main-channel slope, 78.4 ft per mile; mean basin altitude, 1,199 ft; forest area, 1 percent; area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Aug. 27, 1960	10.63	83
1962	July 19, 1962	10.47	79
1963	May 26, 1963	7.59	15
1964	May 6, 1964	7.10	7.4
1965	Apr. 11, 1965	b8.49	17
1966	June 21, 1966	7.80	19
1967	Mar. 30, 1967	b10.24	12
1968	Sept. 22, 1968	7.48	13
1969	Apr. 8, 1969	7.34	11
1970	Apr. 19, 1970	8.52	33
1971	July 7, 1971	7.07	7.1
1972	Mar. 21, 1972	b8.44	21
1973	Mar. 14, 1973	b9.04	16
1974	Apr. 1, 1974	b8.06	14
1975	June 21, 1975	7.37	11

## JOHNSON CREEK BASIN

69

5-2718. Johnson Creek tributary at Luxemburg, Minn.

(Site No. 167)

Location.--Lat 45°26'30", long 94°14'46", in NW¼NE¼ sec.30, T. 123 N., R.28 W.,  
at culverts on State Highway 15, 0.8 mile south of Luxemburg.

Drainage area.--3.82 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.64 ft, upstream; 5.22 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 3.61 miles; main-channel slope,  
7.38 ft per mile; mean basin altitude, 1,113 ft; forest area, 11 percent;  
area of lakes and swamps, 14 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	Aug. 29, 1964	7.24	29
1965	Apr. 12, 1965	9.43	125
1966	Mar. 11, 1966	b8.55	23
1967	Mar. 30, 1967	7.54	39
1968	-	d	< 14
1969	Apr. 8, 1969	b8.25	52
1970	Apr. 19, 1970	7.93	54
1971	Apr. 6, 1971	7.78	49
1972	Mar. 21, 1972	b7.61	26
1973	Mar. 11, 1973	b7.14	13
1974	May 10, 1974	6.57	11
1975	Apr. 27, 1975	7.43	35

&lt; Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## JOHNSON CREEK BASIN

5-2720. Johnson Creek tributary No. 2 near St. Augusta, Minn.

(Site No. 165)

Location.--Lat 45°26'52", long 94°12'00", in NE¼SE¼ sec.21, T.123 N., R.28 W., at culvert on county highway, 0.7 mile above mouth, and 3.1 miles southwest of St. Augusta.

Drainage area.--13.4 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.46 ft, upstream; 4.50 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 6.75 miles; main-channel slope, 16.6 ft per mile; mean basin altitude, 1,081 ft; forest area, 4 percent; area of lakes and swamps, 4 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	May 6, 1964	6.45	39
1965	Apr. 12, 1965	10.16	274
1966	Mar. 11, 1966	b8.45	108
1967	June 14, 1967	7.45	88
1968	Sept. 22, 1968	6.41	38
1969	Apr. 8, 1969	9.09	196
1970	Apr. 19, 1970	6.04	25
1971	June 29, 1971	6.88	57
1972	Mar. 21, 1972	6.84	56
1973	Mar. 11, 1973	b7.00	41
1974	Sept. 9, 1974	6.45	(f)
1975	Apr. 27, 1975	9.12	(f)



## JOHNSON CREEK BASIN

71

5-2723. Johnson Creek near St. Augusta, Minn.

(Site No. 166)

Location.--Lat 45°27'49", long 94°09'19", in NW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.13, T.123 N., R.28 W.,  
at bridge on County Highway 7, 1.0 mile south of St. Augusta, and 3.3 miles  
above mouth.

Drainage area.--46.7 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage at downstream side of bridge.

Basin characteristics.--Main-channel length, 11.2 miles; main-channel slope,  
15.4 ft per mile; mean basin altitude, 1,049 ft; forest area, 8 percent;  
area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	Apr. 13, 1964	12.85	227
1965	Apr. 12, 1965	14.77	682
1966	Mar. 11, 1966	b14.84	430
1967	Mar. 31, 1967	13.51	358
1968	Sept. 22, 1968	11.96	105
1969	Apr. 8, 1969	14.23	532
1970	-	d	<90
1971	Apr. 6, 1971	12.58	185
1972	July 22, 1972	c12.46	191
1973	Mar. 11, 1973	b13.82	154
1974	Mar. 31, 1974	b12.16	85
1975	Apr. 27, 1975	14.10	495

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

## OTSEGO CREEK BASIN

5-2737. Otsego Creek near Otsego, Minn.

(Site No. 164)

Location.--Lat 45°17'19", long 93°38'59", in SW <sup>1</sup>/<sub>4</sub> sec.13, T.121 N., R.24 W., at culvert on County Highway 39, 1.3 miles above mouth, and 1.9 miles west of Otsego.

Drainage area.--3.11 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--2.99 ft, upstream; 2.67 ft, downstream.

Bankfull stage.--4 ft.

Basin characteristics.--Main-channel length, 3.60 miles; main-channel slope, 24.1 ft per mile; mean basin altitude, 924 ft; forest area, 5 percent; area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	Apr. 6, 1964	b4.39	23
1965	Apr. 11, 1965	7.48	202
1966	Mar. 11, 1966	8.86	303
1967	Mar. 30, 1967	8.36	263
1968	-	d	< 22
1969	Apr. 7, 1969	7.00	171
1970	May 22, 1970	4.34	33
1971	Mar. 30, 1971	3.31	37
1972	Mar. 21, 1972	b5.32	63
1973	Mar. 12, 1973	b5.25	60
1974	Oct. 10, 1973	4.31	88
1975	June 27, 1975	5.59	154

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## ELK RIVER BASIN

73

5-2742. Stony Brook tributary near Foley, Minn.

(Site No. 96)

Location.--Lat 45°38'42", long 93°54'54", in NE¼NW¼ sec.2, T.36 N., R.29 W., at culvert on State Highway 25, 0.3 mile above mouth, and 1.5 miles south of Foley.

Drainage area.--2.26 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.62 ft, upstream; 5.02 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 3.50 miles; main-channel slope, 10.7 ft per mile; mean basin altitude, 1,138 ft; forest area, 5 percent; area of lakes and swamps, 9 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	June 28, 1960	6.90	9.8
1961	Apr. 14, 1961	7.89	29
1962	May 23, 1962	11.35	132
1963	Aug. 11, 1963	7.74	25
1964	May 6, 1964	8.96	59
1965	Apr. 12, 1965	b11.26	83
1966	Mar. 11, 1966	b9.07	51
1967	Mar. 30, 1967	8.80	55
1968	June 30, 1968	6.88	9.5
1969	Apr. 7, 1969	b10.20	78
1970	Apr. 19, 1970	8.12	35
1971	Mar. 31, 1971	b9.84	41
1972	July 22, 1972	14.29	204
1973	Mar. 11, 1973	b8.03	21
1974	June 6, 1974	7.09	13
1975	Apr. 27, 1975	8.72	52

## CROW RIVER BASIN

5-2761. North Fork Crow River tributary near Paynesville, Minn.

(Site No. 98)

Location.--Lat 45°23'29", long 94°46'56", in SW¼NW¼ sec.12, T.122 N., R.33 W., at culvert on county highway, 1.2 miles above mouth, and 3.0 miles west of Paynesville.

Drainage area.--0.55 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--15.51 ft, upstream; 13.31 ft, downstream.

Bankfull stage.--19 ft.

Basin characteristics.--Main-channel length, 1.05 miles; main-channel slope, 48.1 ft per mile; mean basin altitude, 1,248 ft; forest area, 0 percent; area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Aug. 27, 1960	18.59	48
1961	Apr. 14, 1961	b17.94	13
1962	May 23, 1962	16.74	10
1963	Sept. 15, 1963	16.42	5.3
1964	Apr. 6, 1964	b16.82	6.7
1965	Apr. 11, 1965	17.87	31
1966	June 21, 1966	19.41	68
1967	Mar. 30, 1967	17.35	21
1968	June 10, 1968	16.07	2.1
1969	Apr. 7, 1969	17.04	15
1970	Apr. 19, 1970	17.79	29
1971	June 29, 1971	17.45	23
1972	July 26, 1972	18.52	46
1973	Aug. 16, 1973	16.67	9.0
1974	Oct. 9, 1973	16.52	6.8
1975	Apr. 27, 1975	17.33	21

## CROW RIVER BASIN

75

5-2783.5 Fountain Creek near Montrose, Minn.

(Site No. 153)

Location.--Lat 45°01'20", long 93°56'29", in NE $\frac{1}{4}$ NW $\frac{1}{4}$  sec.22, T.118 N., R.26 W.,  
at culvert on County Highway 30, 3.3 miles southwest of Montrose.

Drainage area.--6.73 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--3.42 ft, upstream; 2.72 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 6.50 miles; main-channel slope,  
3.49 ft per mile; mean basin altitude, 988 ft; forest area, 6 percent;  
area of lakes and swamps, 12 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	May 23, 1962	7.42	109
1963	June 10, 1963	5.40	32
1964	May 6, 1964	5.46	33
1965	Apr. 9, 1965	b8.14	95
1966	Mar. 4, 1966	b7.20	38
1967	Mar. 30, 1967	6.61	73
1968	July 14, 1968	5.51	36
1969	Apr. 7, 1969	6.37	63
1970	June 16, 1970	5.28	29
1971	Mar. 31, 1971	b7.77	60
1972	July 23, 1972	6.79	81
1973	Mar. 11, 1973	b5.45	28
1974	July 12, 1974	6.27	60
1975	Apr. 23, 1975	5.88	47

b Backwater from ice.

## CROW RIVER BASIN

5-2787. Otter Creek near Lester Prairie, Minn.

(Site No. 115)

Location.--Lat 44°54'23", long 94°04'24", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.28, T.117 N., R.27 W., at culvert on State Highway 7, 2.1 miles northwest of Lester Prairie, and 4.4 miles above mouth.

Drainage area.--30.2 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert. Prior to Aug. 12, 1970, water-stage recorder at same site and datum.

Culvert invert elevations.--4.60 ft, upstream; 4.12 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 14.3 miles; main-channel slope, 3.27 ft per mile; mean basin altitude, 1,030 ft; forest area, 4 percent; area of lakes and swamps, 4 percent.

Remarks.--Recording rain gage operated Nov. 23, 1965 to Aug. 11, 1970.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	May 18, 1961	6.08	46
1962	May 22, 1962	8.66	348
1963	June 11, 1963	c7.46	89
1964	May 8, 1964	5.75	33
1965	Apr. 14, 1965	9.24	525
1966	Mar. 4, 1966	b8.37	106
1967	Mar. 30, 1967	b8.86	195
1968	Apr. 24, 1968	7.22	82
1969	Apr. 9, 1969	9.02	365
1970	June 19, 1970	6.34	43
1971	June 29, 1971	8.08	170
1972	Mar. 24, 1972	8.52	244
1973	Mar. 14, 1973	b8.98	156
1974	Apr. 3, 1974	6.80	63
1975	Apr. 23, 1975	8.08	169

b Backwater from ice.

c Affected by shifting control.

## CROW RIVER BASIN

77

5-2787.5 Otter Creek tributary near Lester Prairie, Minn.

(Site No. 151)

Location.--Lat 44°53'34", long 94°04'24", in SE~~SE~~ sec.33, T.117 N., R.27 W., at culvert on County Highway 63, 1.7 miles northwest of Lester Prairie, and 3.3 miles above mouth.

Drainage area.--1.54 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.98 ft, upstream; 5.49 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 2.12 miles; main-channel slope, 14.5 ft per mile; mean basin altitude, 1,018 ft; forest area, 5 percent; area of lakes and swamps, 3 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	May 23, 1962	10.83	79
1963	June 10, 1963	7.98	21
1964	May 6, 1964	8.28	26
1965	Apr. 10, 1965	11.14	87
1966	Mar. 4, 1966	b10.09	41
1967	June 19, 1967	8.10	23
1968	July 14, 1968	7.50	12
1969	Apr. 7, 1969	8.42	31
1970	Apr. 19, 1970	8.17	27
1971	June 29, 1971	8.32	30
1972	July 23, 1972	8.27	29
1973	Mar. 14, 1973	b8.88	31
1974	Apr. 3, 1974	8.38	31
1975	Apr. 28, 1975	8.40	31

b Backwater from ice.

## CROW RIVER BASIN

5-2788.5 Buffalo Creek tributary near Brownton, Minn.

(Site No. 113)

Location.--Lat 44°45'55", long 94°22'33", in NE¼SE¼ sec.13, T.115 N., R.30 W., at culvert on State Highway 15, 0.6 mile above mouth, and 2.6 miles northwest of Brownton.

Drainage area.--9.45 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--12.26 ft, upstream; 11.73 ft, downstream.

Bankfull stage.--16 ft.

Basin characteristics.--Main-channel length, 4.60 miles; main-channel slope, 2.90 ft per mile; mean basin altitude, 1,033 ft; forest area, 3 percent; area of lakes and swamps, 14 percent.

Remarks.--0.86 sq mi of drainage area is lake storage.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	-	d	< 9
1962	Mar. 28, 1962	b16.16	70
1963	June 10, 1963	13.71	35
1964	-	d	< 12
1965	Apr. 10, 1965	b17.39	124
1966	Mar. 4, 1966	b14.33	36
1967	Apr. 2, 1967	13.88	39
1968	June 18, 1968	13.38	20
1969	Apr. 6, 1969	14.57	64
1970	-	d	< 17
1971	June 29, 1971	13.98	43
1972	May 27, 1972	14.27	53
1973	-	d	< 25
1974	Apr. 12, 1974	13.45	23
1975	Apr. 28, 1975	14.33	55

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.



## CROW RIVER BASIN

79

5-2790.3 South Fork Crow River tributary near Mayer, Minn.

(Site No. 152)

Location.--Lat 44°54'21", long 93°53'51", in NW 1/4 sec.36, T.117 N., R.26 W.,  
at culvert on State Highway 7, 0.7 mile above mouth, and 1.4 miles north of  
Mayer.

Drainage area.--7.74 sq mi.

Records available.--October 1961 to May 1971.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--3.98 ft, upstream; 3.04 ft, downstream.

Bankfull stage.--5 ft.

Basin characteristics.--Main-channel length, 5.09 miles; main-channel slope,  
6.02 ft per mile; mean basin altitude, 958 ft; forest area, 6 percent;  
area of lakes and swamps, 5 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	May 22, 1962	5.91	95
1963	Mar. 24, 1963	b5.84	57
1964	-	d	<20
1965	Apr. 8, 1965	b9.06	306
1966	Mar. 4, 1966	b5.95	82
1967	Mar. 29, 1967	6.54	167
1968	July 14, 1968	5.92	96
1969	Apr. 7, 1969	6.04	108
1970	June 16, 1970	4.67	21

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## CROW RIVER BASIN

5-2803. School Lake Creek tributary near St. Michael, Minn.

(Site No. 163)

Location.--Lat 45°12'09", long 93°41'31", in NW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.15, T.120 N., R.24 W.,  
at culvert on county highway, 0.2 mile above mouth; and 1.5 miles southwest  
of St. Michael.

Drainage area.--2.04 sq mi.

Records available.--October 1963 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.59 ft, upstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 2.52 miles; main-channel slope,  
10.6 ft per mile; mean basin altitude, 950 ft; forest area, 10 percent;  
area of lakes and swamps, 6 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1964	May 6, 1964	7.34	9.1
1965	Apr. 11, 1965	12.68	434
1966	Mar. 4, 1966	b11.03	47
1967	Mar. 30, 1967	11.05	166
1968	Mar. 7, 1968	b8.20	15
1969	Apr. 7, 1969	9.23	61
1970	June 16, 1970	7.49	21
1971	Mar. 30, 1971	b8.89	39
1972	Mar. 21, 1972	b10.05	33
1973	Mar. 11, 1973	b8.08	20
1974	June 10, 1974	9.13	59
1975	June 27, 1975	11.92	135

## RUM RIVER BASIN

81

5-2841. Mille Lacs Lake tributary near Wealthwood, Minn.

(Site No. 137)

Location.--Lat 46°21'26", long 93°41'43", in NW 1/4 sec.25, T.45 N., R.27 W., at culvert on State Highway 18, 0.2 mile above mouth, and 2.0 miles west of Wealthwood.

Drainage area.--0.58 sq mi (revised).

Records available.--October 1960 to September 1972.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--6.93 ft, upstream; 6.64 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, .82 miles; main-channel slope, 33.9 ft per mile; mean basin altitude, 1,268 ft; forest area, 97 percent; area of lakes and swamps, 7 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Apr. 18, 1961	7.34	0.5
1962	May 23, 1962	10.10	32
1963	June 10, 1963	7.91	3.8
1964	May 6, 1964	8.47	9.4
1965	Apr. 13, 1965	b10.35	20
1966	Mar. 31, 1966	b9.56	10
1967	Mar. 31, 1967	b9.21	8.7
1968	June 20, 1968	11.60	48
1969	Apr. 7, 1969	9.41	23
1970	Apr. 19, 1970	7.94	4.8
1971	Apr. 11, 1971	b9.77	15
1972	July 22, 1972	12.34	53

b Backwater from ice.

## RUM RIVER BASIN

5-2846. Robinson Brook near Onamia, Minn.

(Site No. 95)

Location.--Lat 45°58'22", long 93°39'42", in NE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub> sec.11, T.40 N., R.27 W., at culvert on U. S. Highway 169, 0.2 mile above mouth, and 6.8 miles south of Onamia.

Drainage area.--4.79 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--12.23 ft, upstream; 11.53 ft, downstream.

Bankfull stage.--14 ft.

Basin characteristics.--Main-channel length, 5.62 miles; main-channel slope, 9.48 ft per mile; mean basin altitude, 1,248 ft; forest area, 61 percent; area of lakes and swamps, 24 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	July 16, 1960	14.36	36
1961	Apr. 18, 1961	-	g10
1962	May 23, 1962	15.52	140
1963	June 8, 1963	16.75	232
1964	May 6, 1964	15.17	96
1965	Apr. 13, 1965	b15.85	130
1966	June 4, 1966	15.40	123
1967	June 14, 1967	15.79	162
1968	June 30, 1968	c14.34	62
1969	Oct. 17, 1968	15.43	138
1970	Apr. 19, 1970	15.13	119
1971	Apr. 8, 1971	15.30	116
1972	July 22, 1972	19.32	458
1973	Mar. 11, 1973	b14.77	42
1974	June 6, 1974	13.68	38
1975	Apr. 27, 1975	16.12	186

b Backwater from ice.

c Affected by shifting control.

g Estimated; gage height unknown.

## RUM RIVER BASIN

83

5-2846.2 Rum River tributary near Onamia, Minn.

(Site No. 94)

Location.--Lat 45°57'29", long 93°39'43", in NE¼SE¼ sec.14, T.40 N., R.27 W., at culvert on U.S. Highway 169, 0.3 mile above mouth, and 7.8 miles south of Onamia.

Drainage area.--2.37 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.46 ft, upstream; 5.13 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 3.65 miles; main-channel slope, 13.1 ft per mile; mean basin altitude, 1,236 ft; forest area, 46 percent; area of lakes and swamps, 20 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 3, 1960	6.92	19
1961	Apr. 18, 1961	b7.68	27
1962	May 23, 1962	9.49	80
1963	June 8, 1963	13.37	172
1964	May 6, 1964	8.87	65
1965	Apr. 13, 1965	10.19	96
1966	June 4, 1966	9.21	74
1967	June 14, 1967	13.85	405
1968	June 21, 1968	7.85	40
1969	Apr. 7, 1969	10.32	98
1970	Apr. 19, 1970	8.06	45
1971	Apr. 8, 1971	b8.66	55
1972	July 22, 1972	13.87	280
1973	Mar. 11, 1973	b7.97	31
1974	Oct. 10, 1973	6.94	19
1975	July 2, 1975	10.77	107

b Backwater from ice.

## RUM RIVER BASIN

5-2849.2 Stanchfield Creek tributary near Day, Minn.

(Site No. 126)

Location.--Lat 45°41'29", long 93°23'45", in NW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.13, T.37 N., R.25 W., at culvert on County Highway 60, 0.5 mile above mouth, and 1.5 miles southwest of Day.

Drainage area.--1.26 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.91 ft, upstream; 4.37 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 1.46 miles; main-channel slope, 34.9 ft per mile; mean basin altitude, 979 ft; forest area, 26 percent; area of lakes and swamps, 9 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	May 14, 1961	6.38	13
1962	May 23, 1962	8.50	70
1963	May 28, 1963	6.80	22
1964	May 8, 1964	5.95	26
1965	Apr. 12, 1965	7.01	55
1966	Mar. 15, 1966	b7.45	48
1967	Mar. 30, 1967	b7.18	55
1968	Sept. 23, 1968	6.51	41
1969	Apr. 7, 1969	6.73	47
1970	Apr. 19, 1970	4.71	e2
1971	Mar. 30, 1971	5.62	22
1972	July 22, 1972	10.22	203
1973	May 24, 1973	5.55	20
1974	June 10, 1974	6.08	34
1975	July 2, 1975	8.25	99

b Backwater from ice.

e Estimated.

## MINNESOTA RIVER BASIN

85

5-2991. Lazarus Creek tributary near Canby, Minn.

(Site No. 79)

Location.--Lat 44°43'04", long 96°19'42", in NE¼NW¼ sec.6, T.114 N., R.45 W., at culvert on State Highway 68, 2.7 miles west of Canby, and 4.2 miles above mouth.

Drainage area.--2.97 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,283.12 ft above mean sea level, datum of 1929.

Culvert invert elevations.--8.18 ft, upstream; 7.83 ft, downstream.

Bankfull stage.--13 ft.

Basin characteristics.--Main-channel length, 3.20 miles; main-channel slope, 67.9 ft per mile; mean basin altitude, 1,388 ft; forest area, 1 percent; area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Mar. 29, 1960	11.67	139
1961	July 1, 1961	10.80	55
1962	July 4, 1962	13.64	387
1963	July 26, 1963	18.49	1,000
1964	Apr. 13, 1964	10.75	51
1965	May 21, 1965	12.19	204
1966	Mar. 10, 1966	b11.44	74
1967	June 18, 1967	11.00	71
1968	-	d	<5
1969	Apr. 7, 1969	13.17	330
1970	June 16, 1970	f14.92	486
1971	June 29, 1971	13.92	420
1972	May 30, 1972	12.03	228
1973	Mar. 11, 1973	10.51	99
1974	-	d	<20
1975	Apr. 13, 1975	b12.19	74

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

f Backwater from aquatic growth.

## MINNESOTA RIVER BASIN

5-3012. Minnesota River tributary near Montevideo, Minn.

(Site No. 80)

Location.--Lat 44°56'08", long 95°48'12", in SW $\frac{1}{4}$ SE $\frac{1}{4}$  sec.16, T.117 N., R.41 W.,  
at culvert on U.S. Highway 212, 0.1 mile above mouth, and 4.0 miles west of  
Montevideo.

Drainage area.--0.40 sq mi.

Records available.--October 1959 to September 1975.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--6.64 ft, upstream; 3.59 ft, downstream.

Bankfull stage.--Not subject to overflow.

Basin characteristics.--Main-channel length, 1.56 miles; main-channel slope,  
10.3 ft per mile; mean basin altitude, 1,006 ft; forest area, 1 percent;  
area of lakes and swamps, 5 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Mar. 29, 1960	b8.91	21
1961	Mar. 25, 1961	b8.16	e0.8
1962	July 19, 1962	9.28	31
1963	June 10, 1963	7.49	4.1
1964	Apr. 12, 1964	b8.20	1.6
1965	May 23, 1965	10.20	50
1966	Mar. 3, 1966	b8.64	1.2
1967	June 14, 1967	7.27	2.0
1968	-	d	h1
1969	Apr. 7, 1969	b14.40	30
1970	June 15, 1970	10.57	58
1971	June 29, 1971	8.54	18
1972	May 23, 1972	8.39	16
1973	May 24, 1973	8.80	23
1974	Apr. 1, 1974	b7.76	0.8
1975	Apr. 26, 1975	7.43	3.5

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

h Revised.



## MINNESOTA RIVER BASIN

87

5.3029.7 Outlet Creek tributary near Starbuck, Minn.

(Site No. 150)

Location (revised).--Lat 40°31'35", long 95°33'43", in NW¼NW¼ sec.27, T.124 N., R.39 W., at culvert on State Highway 29, 0.2 mile above mouth, and 6.6 miles south of Starbuck.

Drainage area (revised).--0.47 sq mi. (Contributing area)  
0.57 sq mi. (Total area)

Records available.--October 1961 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--6.15 ft, upstream; 5.54 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 1.09 miles; main-channel slope, 51.2 ft per mile; mean basin altitude, 1,211 ft; forest area, 4 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	July 19, 1962	10.30	59
1963	-	d	<2
1964	Apr. 5, 1964	b7.26	3.3
1965	Aug. 6, 1965	8.00	17
1966	Oct. 18, 1965	7.29	7.3
1967	June 16, 1967	7.08	4.6
1968	-	d	<2
1969	Apr. 7, 1969	7.70	13
1970	May 29, 1970	8.14	19
1971	June 29, 1971	7.65	12
1972	May 27, 1972	8.15	19
1973	Mar. 11, 1973	7.41	9.0
1974	Mar. 15, 1974	b7.05	1.7
1975	June 24, 1975	8.32	22

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## MINNESOTA RIVER BASIN

5-3034.5 Hassel Creek near Clontarf, Minn.

(Site No. 149)

Location.--Lat 45°24'03", long 95°34'13", in SW¼SE¼ sec.4, T.122 N., R.39 W., at culvert on State Highway 29, 0.2 mile above Lake Hassel, and 5.6 miles east of Clontarf.

Drainage area.--7.53 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.60 ft, upstream; 5.04 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 5.71 miles; main-channel slope, 40.4 ft per mile; mean basin altitude, 1,158 ft; forest area, 2 percent; area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	July 19, 1962	11.92	177
1963	June 3, 1963	8.41	44
1964	Oct. 20, 1963	9.70	81
1965	May 23, 1965	7.86	30
1966	Mar. 12, 1966	b8.69	38
1967	Mar. 26, 1967	b10.89	56
1968	Mar. 19, 1968	b8.26	28
1969	May 16, 1969	14.41	313
1970	Apr. 28, 1970	9.57	76
1971	Mar. 31, 1971	b10.03	61
1972	July 26, 1972	10.26	110
1973	Mar. 11, 1973	8.29	48
1974	Oct. 9, 1973	7.26	22
1975	Apr. 28, 1975	7.83	35

## MINNESOTA RIVER BASIN

89

5-3052. Spring Creek near Montevideo, Minn.

(Site No. 38)

Location.--Lat 44°58'41", long 95°42'57", in NW¼NW¼ sec.5, T.117 N., R.40 W., at culvert on State Highway 29; 1.2 miles above mouth, and 2.0 miles north of Montevideo.

Drainage area.--16.0 sq mi.

Records available.--October 1958 to present.

Gage.--Water-stage recorder upstream from culvert. Prior to Sept. 23, 1970, crest-stage gage at same site and datum.

Culvert invert elevations.--11.82 ft, upstream; 11.30 ft, downstream.

Bankfull stage.--14 ft.

Basin characteristics.--Main-channel length, 7.51 miles; main-channel slope, 5.68 ft per mile; mean basin altitude, 991 ft; forest area, 2 percent; area of lakes and swamps, 1 percent.

Remarks.--Recording rain gage installed Sept. 23, 1970.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	Sept. 22, 1959	13.67	62
1960	Apr. 4, 1960	17.60	427
1961	Mar. 13, 1961	12.74	21
1962	July 19, 1962	18.22	492
1963	Aug. 26, 1963	13.92	99
1964	Apr. 12, 1964	13.51	69
1965	Apr. 5, 1965	15.21	203
1966	Mar. 11, 1966	b14.15	79
1967	June 14, 1967	15.14	197
1968	June 20, 1968	12.60	17
1969	Apr. 7, 1969	17.94	463
1970	June 16, 1970	13.75	86
1971	Mar. 13, 1971	14.99	185
1972	May 23, 1972	14.02	108
1973	Mar. 11, 1973	14.14	118
1974	Mar. 4, 1974	b12.97	30
1975	Apr. 26, 1975	13.07	40

b Backwater from ice.

## MINNESOTA RIVER BASIN

5-3112. North Branch Yellow Medicine River near Ivanhoe, Minn.

(Site No. 75)

Location.--Lat 44°27'32", long 96°21'27", in NE¼NW¼ sec.2, T.111 N., R.46 W.,  
at culvert on State Highway 19, 5.3 miles west of Ivanhoe.

Drainage area.--14.8 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--9.96 ft, upstream; 9.76 ft, downstream.

Bankfull stage.--12 ft.

Basin characteristics.--Main-channel length, 7.26 miles; main-channel slope,  
11.8 ft per mile; mean basin altitude, 1,780 ft; forest area, 2 percent;  
area of lakes and swamps, 3 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 13, 1960	13.98	228
1961	July 31, 1961	f12.10	3.6
1962	July 1, 1962	13.66	168
1963	July 26, 1963	14.30	288
1964	Apr. 21, 1964	12.60	25
1965	Apr. 8, 1965	b15.89	431
1966	Mar. 10, 1966	b14.28	19
1967	June 15, 1967	16.0	540
1968	July 26, 1968	12.70	31
1969	Apr. 7, 1969	18.70	940
1970	June 16, 1970	14.63	158
1971	Mar. 14, 1971	b13.55	59
1972	May 30, 1972	13.87	96
1973	Mar. 11, 1973	b13.90	87
1974	Mar. 3, 1974	b13.08	24
1975	Apr. 13, 1975	b13.12	17

b Backwater from ice.

f Backwater from aquatic growth.

## MINNESOTA RIVER BASIN

91

5-3112.5 North Branch Yellow Medicine River tributary near Wilno, Minn.

(Site No. 77)

Location.--Lat 44°33'12", long 96°16'33", in SE¼NE¼ sec.33, T.113 N., R.45 W., at culvert on U.S. Highway 75, 2.1 miles above mouth, and 4.3 miles northwest of Wilno.

Drainage area.--0.33 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,636.33 ft above mean sea level, datum of 1929.

Culvert invert elevations.--6.72 ft, upstream; 5.87 ft, downstream.

Bankfull stage.--10 ft.

Basin characteristics.--Main-channel length, 0.76 miles; main-channel slope, 87.7 ft per mile; mean basin altitude, 1,669 ft; forest area, 3 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 13, 1960	8.63	19
1961	July 1, 1961	10.27	50
1962	July 4, 1962	9.10	26
1963	July 26, 1963	9.23	28
1964	Apr. 13, 1964	8.71	20
1965	May 23, 1965	10.19	48
1966	July 13, 1966	8.80	21
1967	Mar. 10, 1967	7.86	6.8
1968	July 26, 1968	10.64	56
1969	Apr. 4, 1969	10.47	54
1970	June 16, 1970	9.22	28
1971	July 7, 1971	9.51	34
1972	May 1, 1972	8.18	11
1973	Mar. 11, 1973	8.28	13
1974	-	d	< 2
1975	Apr. 13, 1975	b8.59	13

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## MINNESOTA RIVER BASIN

5-3113. North Branch Yellow Medicine River tributary No. 2 near Porter, Minn.

(Site No. 78)

Location.--Lat 44°35'39", long 96°16'34", in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.16, T.113 N., R.45 W., at culvert on U.S. Highway 75, 6.2 miles southwest of Porter.

Drainage area.--3.70 sq mi.

Records available.--October 1959 to September 1975.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,521.97 ft above mean sea level, datum of 1929.

Culvert invert elevations.--12.24 ft, upstream; 11.85 ft, downstream.

Bankfull stage.--14 ft.

Basin characteristics.--Main-channel length, 2.90 miles; main-channel slope, 30.9 ft per mile; mean basin altitude, 1,524 ft; forest area, 2 percent; area of lakes and swamps, 1 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 13, 1960	14.56	111
1961	July 1, 1961	14.30	93
1962	Apr. 10, 1962	b16.79	247
1963	July 26, 1963	14.76	124
1964	Apr. 13, 1964	b14.78	92
1965	May 23, 1965	15.15	153
1966	Mar. 10, 1966	b15.76	91
1967	Mar. 10, 1967	b15.14	20
1968	July 26, 1968	14.23	64
1969	Apr. 7, 1969	16.57	212
1970	June 16, 1970	15.15	78
1971	June 29, 1971	14.61	76
1972	May 1, 1972	14.49	55
1973	May 28, 1973	14.03	66
1974	June 9, 1974	14.45	73
1975	Apr. 13, 1975	b15.54	74

## MINNESOTA RIVER BASIN

93

5-3138. Kandiyohi County ditch #16 near Blomkest, Minn.

(Site No. 35)

Location.--Lat 44°58'48", long 95°02'36", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.35, T.118 N., R.35 W.,  
at culvert on U.S. Highway 71, 2.8 miles northwest of Blomkest.

Drainage area.--0.83 sq mi.

Records available.--October 1958 to September 1972.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.50 ft, upstream; 3.58 ft, downstream.

Bankfull stage.--13 ft.

Basin characteristics.--Main-channel length, 1.72 miles; main-channel slope,  
7.75 ft per mile; mean basin altitude, 1,106 ft; forest area, 1 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	-	d	< 5
1960	Apr. 2, 1960	7.26	51
1961	May 5, 1961	5.86	8.6
1962	Apr. 17, 1962	b8.71	49
1963	June 5, 1963	8.52	74
1964	Apr. 13, 1964	7.79	70
1965	May 15, 1965	7.78	69
1966	Mar. 11, 1966	b9.92	26
1967	July 8, 1967	9.70	57
1968	Mar. 18, 1968	6.76	33
1969	Apr. 7, 1969	8.02	34
1970	June 16, 1970	8.94	23
1971	June 29, 1971	9.15	32
1972	May 27, 1972	7.69	13

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## MINNESOTA RIVER BASIN

5-3149. Redwood River at Ruthton, Minn.

(Site No. 31)

Location.--Lat 44°10'53", long 96°06'07", in NW $\frac{1}{4}$ NW $\frac{1}{4}$  sec.11, T.108 N., R.44 W.,  
at culvert on State Highway 23, 0.3 mile north of Ruthton.

Drainage area.--6.18 sq mi (revised).

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--9.87 ft, upstream; 9.50 ft, downstream.

Bankfull stage.--13 ft.

Basin characteristics.--Main-channel length, 4.91 miles; main-channel slope, 42.4 ft per mile; mean basin altitude, 1,791 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	Mar. 10, 1959	b12.79	19
1960	Apr. 2, 1960	14.37	228
1961	July 5, 1961	13.23	71
1962	July 4, 1962	16.09	472
1963	July 19, 1963	14.22	204
1964	Apr. 13, 1964	13.75	126
1965	Apr. 9, 1965	14.81	330
1966	Mar. 14, 1966	b14.66	142
1967	June 7, 1967	14.86	338
1968	July 26, 1968	14.52	187
1969	Apr. 8, 1969	18.19	728
1970	June 16, 1970	14.55	191
1971	June 29, 1971	a15.25	230
1972	May 1, 1972	a14.21	82
1973	Mar. 11, 1973	b14.37	109
1974	May 12, 1974	12.19	8.8
1975	Apr. 13, 1975	b14.92	38

a Backwater from debris.

b Backwater from ice.



## MINNESOTA RIVER BASIN

95

5-3152. Prairie Ravine near Marshall, Minn.

(Site No. 33)

Location.--Lat 44°29'44", long 95°47'48", in SE 1/4 sec. 20, T.112 N., R.41 W.,  
at culvert on U. S. Highway 59, 2.7 miles north of Marshall.

Drainage area.--5.63 sq mi.

Records available.--October 1958 to present. Continuous records available  
March 1959 to September 1964.

Gage.--Crest-stage gage upstream from culvert. Prior to Oct. 5, 1964, water-  
stage recorder at same site and datum.

Culvert invert elevations.--4.24 ft, upstream; 3.86 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 3.85 miles; main-channel slope,  
11.4 ft per mile; mean basin altitude, 1,148 ft; forest area, 1 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	June 17, 1959	4.89	2.0
1960	Apr. 4, 1960	c7.11	65
1961	May 17, 1961	c5.27	8.3
1962	Mar. 28, 1962	b7.62	75
1963	July 18, 1963	c7.30	67
1964	Apr. 28, 1964	c5.17	9.8
1965	Apr. 9, 1965	b9.84	55
1966	Mar. 14, 1966	b7.48	44
1967	June 15, 1967	6.58	47
1968	June 10, 1968	6.37	41
1969	Apr. 7, 1969	9.96	221
1970	Apr. 13, 1970	5.75	23
1971	Mar. 14, 1971	b7.51	45
1972	Mar. 16, 1972	b7.84	55
1973	Mar. 11, 1973	b6.18	26
1974	Mar. 4, 1974	b5.37	6.3
1975	Apr. 13, 1975	b6.42	19

b Backwater from ice.

c Affected by shifting control.

## MINNESOTA RIVER BASIN

5-3165.5 West Fork Beaver Creek near Olivia, Minn.

(Site No. 34)

Location.--Lat 44°50'56", long 95°01'53", in SE¼SW¼ sec.14, T.116 N., R.35 W.,  
at culvert on field road, 0.25 mile upstream from U.S. Highway 71, and 5.5  
miles northwest of Olivia.

Drainage area.--12.2 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--1.46 ft, upstream; 1.28 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 6.13 miles; main-channel slope,  
4.57 ft per mile; mean basin altitude, 1,102 ft; forest area, 2 percent;  
area of lakes and swamps, 4 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	June 26, 1959	4.51	14
1960	Mar. 30, 1960	6.17	70
1961	Apr. 26, 1961	4.52	13
1962	Apr. 8, 1962	b7.53	98
1963	June 5, 1963	7.45	110
1964	Apr. 13, 1964	5.90	61
1965	May 15, 1965	6.80	91
1966	Mar. 11, 1966	b6.65	32
1967	June 26, 1967	7.53	352
1968	July 14, 1968	3.18	20
1969	Apr. 7, 1969	7.7	269
1970	July 13, 1970	8.34	243
1971	Mar. 31, 1971	b9.85	148
1972	May 27, 1972	6.32	87
1973	Mar. 11, 1973	5.46	30
1974	Apr. 12, 1974	c6.70	61
1975	Apr. 26, 1975	b7.49	74

b Backwater from ice.

c Affected by shifting control

## MINNESOTA RIVER BASIN

97

5-3166.9 Spring Creek tributary near Sleepy Eye, Minn.

(Site No. 173)

Location.--Lat 44°23'54", long 94°45'35", NW¼ sec.25, T.111 N., R.33 W., at culvert on county highway, 0.1 mile above mouth, and 7.5 miles north of Sleepy Eye.

Drainage area.--3.69 sq mi.

Records available.--October 1965 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--2.60 ft, upstream; 1.01 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 2.95 miles; main-channel slope, 6.33 ft per mile; mean basin altitude, 1,011 ft; forest area, 1 percent; area of lakes and swamps, 6 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1966	Mar. 3, 1966	b5.49	40
1967	July 8, 1967	5.45	62
1968	July 26, 1968	3.97	20
	Sept. 22, 1968		
1969	Apr. 6, 1969	7.14	117
1970	Apr. 5, 1970	b5.02	21
1971	May 31, 1971	5.56	64
1972	Mar. 20, 1972	4.71	40
1973	Mar. 11, 1973	3.41	7.5
1974	Mar. 3, 1974	b4.76	15
1975	Apr. 23, 1975	b6.31	49

b Backwater from ice.

## MINNESOTA RIVER BASIN

5-3167. Spring Creek near Sleepy Eye, Minn.

(Site No. 22)

Location.--Lat 44°24'12", long 94°44'41", in NE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.24, T.111 N., R.33 W.,  
at culvert on county highway, 4.3 miles above mouth, and 7.5 miles north of  
Sleepy Eye.

Drainage area.--31.3 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--7.92 ft, upstream; 7.04 ft, downstream.

Bankfull stage.--11 ft.

Basin characteristics.--Main-channel length, 15.4 miles; main-channel slope,  
2.88 ft per mile; mean basin altitude, 1,012 ft; forest area, 2 percent;  
area of lakes and swamps, 4 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 31, 1959	10.81	149
1960	Mar. 28, 1960	13.66	416
1961	Aug. 1, 1961	10.66	139
1962	July 7, 1962	15.89	680
1963	Mar. 26, 1963	b11.25	161
1964	Apr. 13, 1964	9.61	66
1965	Apr. 10, 1965	17.79	930
1966	Mar. 3, 1966	b11.56	170
1967	Apr. 2, 1967	11.45	203
1968	July 26, 1968	11.89	241
1969	Apr. 6, 1969	15.93	683
1970	Apr. 5, 1970	9.83	83
1971	May 31, 1971	11.55	212
1972	Mar. 20, 1972	10.35	116
1973	Mar. 11, 1973	b9.36	45
1974	Aug. 9, 1974	9.06	39
1975	Apr. 24, 1975	b11.91	200

b Backwater from ice.

MINNESOTA RIVER BASIN

99

5-3168. Cottonwood River tributary near Balaton, Minn.

(Site No. 32)

Location.--Lat 44°14'24", long 95°57'22", in NW1/4 sec.19, T.109 N., R.42 W.,  
at culvert on U. S. Highway 14, 4.0 miles west of Balaton.

Drainage area.--0.91 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.20 ft, upstream; 3.62 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 1.78 miles; main-channel slope,  
42.8 ft per mile; mean basin altitude, 1,648 ft; forest area, 0 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	Mar. 10, 1959	b6.54	12
1960	Mar. 30, 1960	b6.87	64
1961	Mar. 14, 1961	5.24	h8.2
1962	July 4, 1962	5.73	31
1963	July 19, 1963	6.74	73
1964	Apr. 13, 1964	5.84	35
1965	Apr. 9, 1965	5.47	23
1966	Mar. 23, 1966	5.31	h12
1967	June 7, 1967	5.37	h16
1968	June 26, 1968	4.89	h1.3
1969	Apr. 6, 1969	b7.74	106
1970	June 16, 1970	5.47	23
1971	June 7, 1971	5.97	39
1972	Mar. 16, 1972	b8.09	44
1973	Mar. 11, 1973	b5.55	9.8
1974	Mar. 3, 1974	b7.06	25
1975	Apr. 13, 1975	b6.90	19

b Backwater from ice.  
h Revised.

## MINNESOTA RIVER BASIN

5-3168.5 Meadow Creek tributary near Marshall, Minn.

(Site No. 99)

Location.--Lat 44°22'42", long 95°45'20", in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.34, T.111 N., R.41 W., at culvert on U.S. Highway 59, 1.2 miles above mouth, and 4.5 miles south of Marshall.

Drainage area.--0.54 sq mi.

Records available.--October 1960 to September 1972.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--12.10 ft, upstream; 11.44 ft, downstream.

Bankfull stage.--14 ft.

Basin characteristics.--Main-channel length, 2.08 miles; main-channel slope, 57.0 ft per mile; mean basin altitude, 1,232 ft; forest area, 2 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Mar. 19, 1961	b14.18	5.0
1962	May 22, 1962	13.49	1.4
1963	July 19, 1963	13.94	17
1964	June 30, 1964	14.02	24
1965	Apr. 9, 1965	14.00	22
1966	Mar. 14, 1966	b14.78	8.6
1967	Apr. 30, 1967	14.63	76
1968	July 26, 1968	13.52	1.8
1969	July 4, 1969	14.81	90
1970	Apr. 5, 1970	13.89	14
1971	June 7, 1971	15.05	112
1972	Mar. 16, 1972	b16.59	29

## MINNESOTA RIVER BASIN

101

5-3169. Dry Creek near Jeffers, Minn.

(Site No. 72)

Location.---Lat 44°07'21", long 95°12'13", in NE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> sec.31, T.108 N., R.36 W.,  
at culvert on County Highway 10, 4.5 miles north of Jeffers.

Drainage area.---3.13 sq mi.

Records available.---October 1960 to present.

Gage.---Water-stage recorder upstream from culvert.

Culvert invert elevations.---3.56 ft, upstream; 2.95 ft, downstream.

Bankfull stage.---5 ft.

Basin characteristics.---Main-channel length, 4.62 miles; main-channel slope, 61.4 ft per mile; mean basin altitude, 1,332 ft; forest area, 2 percent; area of lakes and swamps, 0 percent.

Remarks.---Recording rain gage installed Sept. 27, 1963

Annual maximum data.---

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Mar. 14, 1961	b5.12	26
1962	July 7, 1962	6.50	158
1963	July 19, 1963	9.96	508
1964	July 10, 1964	4.83	37
1965	Apr. 6, 1965	b10.64	400
1966	Mar. 3, 1966	b6.00	83
1967	Apr. 2, 1967	8.39	332
1968	July 26, 1968	8.66	360
1969	Oct. 17, 1968	9.36	435
1970	June 16, 1970	6.87	188
1971	May 31, 1971	6.56	163
1972	May 2, 1972	4.90	41
1973	Mar. 11, 1973	b6.28	66
1974	Apr. 12, 1974	c4.92	25
1975	Apr. 13, 1975	b7.34	71

b Backwater from ice.

c Affected by shifting control.

## MINNESOTA RIVER BASIN

5-3169.2 Cottonwood River tributary No. 2 near Sanborn, Minn.

(Site No. 74)

Location.--Lat 44°10'34", long 95°07'15", in SW¼NW¼ sec.12, T.108 N., R.36 W.,  
at culvert on U.S. Highway 71, 2.4 miles south of Sanborn.

Drainage area.--0.42 sq mi.

Records available.--October 1965 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--2.41 ft, upstream; 0.20 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 1.18 miles; main-channel slope,  
46.6 ft per mile; mean basin altitude, 1,144 ft; forest area, 2 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1966	Apr. 19, 1966	6.06	72
1967	Apr. 22, 1967	4.43	21
1968	July 26, 1968	4.58	25
1969	Oct. 17, 1968	4.82	31
1970	June 16, 1970	f5.48	44
1971	May 31, 1971	6.18	76
1972	Mar. 13, 1972	b8.59	6.7
1973	-	d	<7
1974	-	d	<12
1975	Apr. 23, 1975	4.11	14

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

f Backwater from aquatic growth.



## MINNESOTA RIVER BASIN

103

5-3178.5 Foster Creek near Alden, Minn.

(Site No. 16)

Location.---Lat 43°39'31", long 93°35'30", in NE<sup>1</sup>/<sub>4</sub> sec.9, T.102 N., R.23 W.,  
at culvert on U. S. Highway 16, 1.2 miles southwest of Alden.

Drainage area.---2.26 sq mi.

Records available.---October 1958 to present.

Gage.---Crest-stage gage upstream from culvert.

Culvert invert elevations.---3.80 ft, upstream; 3.34 ft, downstream.

Bankfull stage.---6 ft.

Basin characteristics.---Main-channel length, 2.12 miles; main-channel slope,  
20.1 ft per mile; mean basin altitude, 1,249 ft; forest area, 3 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.---

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 30, 1959	f4.55	13
1960	May 21, 1960	f6.37	112
1961	July 21, 1961	f7.55	175
1962	Oct. 10, 1961	5.83	86
1963	July 18, 1963	f5.21	24
1964	Sept. 20, 1964	4.42	13
1965	Apr. 7, 1965	6.99	185
1966	Mar. 31, 1966	6.23	108
1967	June 11, 1967	7.27	152
1968	June 9, 1968	7.62	183
1969	Oct. 16, 1968	7.30	123
1970	May 14, 1970	5.02	39
1971	June 7, 1971	6.83	147
1972	July 20, 1972	5.92	46
1973	Apr. 16, 1973	5.82	85
1974	June 9, 1974	6.70	148
1975	June 30, 1975	7.40	169

f Backwater from aquatic growth.

## MINNESOTA RIVER BASIN

5-3181. East Branch Blue Earth River tributary near Blue Earth, Minn.

(Site No. 65)

Location.--Lat 43°37'09", long 94°01'03", in SW¼SE¼ sec.24, T.102 N., R.27 W., at culvert on County Highway 13, 0.5 mile above mouth, and 4.3 miles east of Blue Earth.

Drainage area.--9.20 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--2.02 ft, upstream; 1.81 ft, downstream.

Bankfull stage.--4 ft.

Basin characteristics.--Main-channel length, 5.46 miles; main-channel slope, 10.5 ft per mile; mean basin altitude, 1,094 ft; forest area, 2 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 21, 1960	6.55	233
1961	June 12, 1961	6.42	222
1962	Mar. 27, 1962	b6.87	119
1963	July 19, 1963	8.57	406
1964	Apr. 13, 1964	3.79	58
1965	Apr. 6, 1965	a6.54	187
1966	June 21, 1966	a6.51	217
1967	June 8, 1967	a5.29	130
1968	June 9, 1968	9.23	468
1969	June 29, 1969	a6.65	203
1970	May 14, 1970	3.30	35
1971	Mar. 13, 1971	b5.67	107
1972	June 28, 1972	6.35	218
1973	Mar. 11, 1973	a4.73	73
1974	June 6, 1974	c4.19	52
1975	June 4, 1975	c5.51	138

a Backwater from debris.

b Backwater from ice.

c Affected by shifting control.

## MINNESOTA RIVER BASIN

105

5-3183. Watonwan River near Delft, Minn.

(Site No. 70)

Location.--Lat 43°59'55", long 95°07'11", in NE¼SE¼ sec.11, T.106 N., R.36 W., at culvert on U.S. Highway 71, 1.7 miles northwest of Delft.

Drainage area.--13.0 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--11.95 ft, upstream; 11.74 ft, downstream.

Bankfull stage.--15 ft.

Basin characteristics.--Main-channel length, 7.04 miles; main-channel slope, 15.7 ft per mile; mean basin altitude, 1,434 ft; forest area, 1 percent; area of lakes and swamps, 2 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Mar. 29, 1960	17.04	549
1961	Mar. 25, 1961	b14.91	32
1962	Apr. 9, 1962	b18.00	108
1963	July 19, 1963	f17.30	345
1964	Apr. 13, 1964	14.48	27
1965	Apr. 4, 1965	b18.42	810
1966	June 21, 1966	15.45	61
1967	Apr. 2, 1967	15.33	55
1968	July 26, 1968	17.21	565
1969	Apr. 6, 1969	17.72	865
1970	Apr. 5, 1970	b16.28	92
1971	Mar. 27, 1971	b16.42	177
1972	May 2, 1972	14.77	34
1973	May 27, 1973	14.05	18
1974	Apr. 13, 1974	c14.74	39
1975	Apr. 23, 1975	c15.09	54

b Backwater from ice

c Affected by shifting control.

f Backwater from aquatic growth.

## MINNESOTA RIVER BASIN

5-3202. Le Sueur River tributary near Mankato, Minn.

(Site No. 19)

Location.--Lat 44°07'29", long 93°57'33", in SE<sup>1</sup>/<sub>4</sub>SW<sup>1</sup>/<sub>4</sub> sec.28, T.108 N., R.26 W., at culvert on State Highway 22, 0.2 mile above mouth, and 1.5 miles southeast of Mankato Airport.

Drainage area.--0.073 sq mi.

Records available.--October 1958 to present.

Gage.--Water-stage recorder upstream from culvert. Prior to Nov. 5, 1965, crest-stage gage at same site and datum.

Culvert invert elevations.--17.92 ft, upstream; 11.28 ft, downstream.

Basin characteristics.--Main-channel length, 0.35 miles; main-channel slope, 158 ft per mile; mean basin altitude, 982 ft; forest area, 0 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 30, 1959	23.72	33
1960	May 21, 1960	23.02	33
1961	May 18, 1961	22.29	32
1962	July 20, 1962	20.33	18
1963	July 18, 1963	21.11	29
1964	-	d	<1.0
1965	July 8, 1965	20.50	20
1966	Feb. 9, 1966	b21.09	16
1967	Apr. 2, 1967	19.96	14
1968	Aug. 7, 1968	24.99	36
1969	Oct. 17, 1968	19.48	8.6
1970	May 29, 1970	20.03	15
1971	July 7, 1971	22.51	61
1972	July 9, 1972	19.56	9.7
1973	May 1, 1973	19.44	8.0
1974	June 6, 1974	23.02	75
1975	Apr. 28, 1975	19.62	10

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## MINNESOTA RIVER BASIN

107

5-3203. Cobb River tributary near Mapleton, Minn.

(Site No. 18)

Location.--Lat 44°01'05"; long 93°57'30", in SW $\frac{1}{4}$ NE $\frac{1}{4}$  sec.4, T.106 N., R.26 W.,  
at culvert on State Highway 22, 1.0 mile above mouth, and 6.3 miles north  
of Mapleton.

Drainage area.--7.25 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--12.22 ft, upstream; 11.52 ft, downstream.

Bankfull stage.--14 ft.

Basin characteristics.--Main-channel length, 4.30 miles; main-channel slope,  
4.02 ft per mile; mean basin altitude, 992 ft; forest area, 4 percent;  
area of lakes and swamps, 4 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 30, 1959	18.09	258
1960	May 21, 1960	22.24	526
1961	Mar. 25, 1961	16.61	176
1962	July 7, 1962	15.67	126
1963	July 18, 1963	15.89	137
1964	Apr. 13, 1964	14.99	92
1965	Apr. 6, 1965	18.60	293
1966	Feb. 9, 1966	b14.93	71
1967	June 15, 1967	17.92	252
1968	Aug. 7, 1968	18.77	302
1969	Oct. 17, 1968	16.35	162
1970	Apr. 7, 1970	14.29	60
1971	Nov. 9, 1970	15.94	140
1972	Mar. 14, 1972	b14.57	38
1973	May 1, 1973	15.86	135
1974	June 6, 1974	19.40	343
1975	June 15, 1975	15.34	109

## MINNESOTA RIVER BASIN

5-3204. Maple River tributary near Mapleton, Minn.

(Site No. 20)

Location.--Lat 43°55'18", long 94°01'17", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec.1, T.105 N., R.27 W., at culvert on State Highway 30, 0.9 mile above mouth, and 3.3 miles west of Mapleton.

Drainage area.--6.22 sq mi.

Records available.--October 1958 to present.

Gage.--Water-stage recorder upstream from culvert. Prior to Nov. 5, 1965, crest-stage gage at same site and datum.

Culvert invert elevations.--12.95 ft, upstream; 12.32 ft, downstream.

Bankfull stage.--14 ft.

Basin characteristics.--Main-channel length, 4.16 miles; main-channel slope, 9.30 ft per mile; mean basin altitude, 1,010 ft; forest area, 0 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 30, 1959	15.89	54
1960	May 21, 1960	23.26	548
1961	Mar. 25, 1961	19.58	257
1962	Aug. 31, 1962	18.08	175
1963	Oct. 9, 1962	15.61	43
1964	Sept. 7, 1964	15.64	44
1965	Apr. 6, 1965	b21.11	285
1966	Mar. 23, 1966	16.73	96
1967	June 8, 1967	19.67	381
1968	July 23, 1968	19.81	284
1969	Oct. 17, 1968	18.28	191
1970	Sept. 25, 1970	15.18	38
1971	June 11, 1971	21.16	e500
1972	Oct. 30, 1971	14.71	23
1973	Mar. 14, 1973	16.81	107
1974	June 6, 1974	17.35	140
1975	June 15, 1975	18.28	189

b Backwater from ice.

e Estimated.

## MINNESOTA RIVER BASIN

109

5-3204.4 Judicial ditch 49 near Amboy, Minn.

(Site No. 21)

Location.--Lat 43°53'17", long 94°07'38", in NW¼ sec.19, T.105 N., R.27 W., at culvert on State Highway 30, 1.6 miles east of Amboy, and 4.3 miles above mouth.

Drainage area.--18.0 sq mi.

Records available.--October 1958 to September 1972.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--10.07 ft, upstream; 9.87 ft, downstream.

Bankfull stage.--17 ft.

Basin characteristics.--Main-channel length, 5.30 miles; main-channel slope, 8.82 ft per mile; mean basin altitude, 1,020 ft; forest area, 2 percent; area of lakes and swamps, 1 percent.

Remarks.--Stage-discharge relation affected by variable slope.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	Mar. 30, 1959	b12.26	56
1960	May 21, 1960	19.51	1,110
1961	Mar. 26, 1961	14.06	206
1962	Aug. 31, 1962	c15.60	202
1963	July 19, 1963	c14.30	130
1964	Sept. 7, 1964	c13.59	100
1965	Apr. 6, 1965	b20.30	480
1966	June 28, 1966	13.72	144
1967	June 15, 1967	17.85	450
1968	June 19, 1968		288
	July 23, 1968	16.92	
1969	Oct. 9, 1968		314
	Oct. 17, 1968	15.83	
1970	June 16, 1970	13.88	133
1971	Mar. 27, 1971	14.25	207
1972	June 8, 1972	c13.19	84

b Backwater from ice.

c Affected by shifting control.

## MINNESOTA RIVER BASIN

5-3301.5 Sand Creek tributary near Montgomery, Minn.

(Site No. 106)

Location.--Lat 44°25'41", long 93°30'31", in NE¼NE¼ sec.18, T.111 N., R.22 W., at culvert on State Highway 21, 3.5 miles east of Montgomery.

Drainage area.--0.36 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,097.3 ft above mean sea level, datum of 1929 (4th-order levels by Topographic Division).

Culvert invert elevations.--6.50 ft, upstream; 5.49 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 0.90 miles; main-channel slope; 68.7 ft per mile; mean basin altitude, 1,126 ft; forest area, 6 percent; area of lakes and swamps, 6 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	Mar. 25, 1961	8.21	16
1962	May 12, 1962	8.68	25
1963	July 18, 1963	8.11	14
1964	Sept. 8, 1964	8.75	27
1965	Apr. 6, 1965	b10.50	43
1966	Feb. 9, 1966	b9.14	15
1967	Apr. 2, 1967	8.86	29
1968	July 13, 1968	8.97	31
1969	Apr. 3, 1969	8.61	23
1970	Apr. 20, 1970	8.87	29
1971	Mar. 31, 1971	b9.14	24
1972	Mar. 18, 1972	b9.69	10
1973	Sept. 26, 1973	7.86	10
1974	Mar. 6, 1974	b8.80	18
1975	Apr. 28, 1975	8.88	29



## MINNESOTA RIVER BASIN

111

5-3302. Rice Lake tributary near Montgomery, Minn.

(Site No. 105)

Location.--Lat 44°25'42", long 93°32'10", in NE¼NW¼ sec.13, T.111 N., R.23 W., at culvert on State Highway 21, 1.8 miles above Rice Lake, and 2.5 miles east of Montgomery.

Drainage area.--3.16 sq mi.

Records available.--October 1960 to present. Annual peak for 1960 available from miscellaneous flood data collected prior to activation of station.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,057.4 ft above mean sea level, datum of 1929 (4th-order levels by Topographic Division).

Culvert invert elevations.--4.45 ft, upstream; 3.84 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 2.40 miles; main-channel slope, 10.0 ft per mile; mean basin altitude, 1,073 ft; forest area, 6 percent; area of lakes and swamps, 12 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 21, 1960	13.72	279
1961	May 18, 1961	6.67	33
1962	May 12, 1962	7.88	76
1963	Mar. 23, 1963	b6.13	10
1964	Sept. 8, 1964	6.12	18
1965	Apr. 6, 1965	b10.96	114
1966	Feb. 9, 1966	6.66	33
1967	Mar. 24, 1967	b8.16	67
1968	May 16, 1968	6.01	16
1969	Apr. 3, 1969	7.60	65
1970	Apr. 20, 1970	6.46	27
1971	Mar. 14, 1971	8.33	91
1972	July 26, 1972	7.37	57
1973	Sept. 26, 1973	7.68	67
1974	June 6, 1974	7.85	74
1975	Apr. 28, 1975	7.94	77

## MINNESOTA RIVER BASIN

5-3303. Sand Creek near New Prague, Minn.

(Site No. 104)

Location.--Lat 44°32'37", long 93°32'16", in NE 1/4 sec.1, T.112 N., R.23 W., at culvert on State Highways 13 and 19, 1.9 miles east of New Prague.

Drainage area.--62.4 sq mi.

Records available.--October 1960 to present. Annual peak for 1960 available from miscellaneous flood data collected prior to activation of station.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--8.12 ft, upstream; 7.74 ft, downstream.

Bankfull stage.--11 ft.

Basin characteristics.--Main-channel length, 17.8 miles; main-channel slope, 5.97 ft per mile; mean basin altitude, 1,040 ft; forest area, 6 percent; area of lakes and swamps, 11 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 21, 1960	14.84	1,100
1961	Mar. 25, 1961	b10.39	204
1962	Oct. 11, 1961	9.32	84
1963	Mar. 23, 1963	b9.85	54
1964	Sept. 10, 1964	9.14	64
1965	Apr. 8, 1965	14.79	1,070
1966	Mar. 4, 1966	b11.54	325
1967	Apr. 3, 1967	10.85	294
1968	-	d	< 140
1969	Apr. 3, 1969	12.26	540
1970	Apr. 21, 1970	10.20	197
1971	Mar. 31, 1971	b13.89	665
1972	Mar. 21, 1972	b10.94	247
1973	May 1, 1973	10.06	177
1974	June 7, 1974	10.68	268
1975	Apr. 28, 1975	c11.41	420

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

## MINNESOTA RIVER BASIN

113

5-3305.5 Raven Stream tributary near New Prague, Minn.

(Site No. 109)

Location.--Lat 44°34'21", long 93°35'58", in NW $\frac{1}{4}$  sec.28, T.113 N., R.23 W., at culvert on county road, 1.6 miles above mouth, and 2.3 miles northwest of New Prague.

Drainage area.--22.1 sq mi.

Records available.--October 1960 to present. Annual peak for 1960 available from miscellaneous flood data collected prior to activation of station.

Gage.--Water-stage recorder upstream from culvert.

Culvert invert elevations.--8.32 ft, upstream; 7.91 ft, downstream.

Bankfull stage.--13 ft.

Basin characteristics.--Main-channel length, 10.4 miles; main-channel slope, 10.0 ft per mile; mean basin altitude, 978 ft; forest area, 8 percent; area of lakes and swamps, 10 percent.

Remarks.--Recording rain gage installed Mar. 30, 1965.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 21, 1960	17.34	929
1961	May 18, 1961	11.05	161
1962	May 23, 1962	10.57	126
1963	Mar. 23, 1963	9.86	73
1964	June 7, 1964	10.38	112
1965	Apr. 7, 1965	14.74	505
1966	Mar. 4, 1966	11.22	163
1967	June 16, 1967	12.26	249
1968	July 13, 1968	9.73	61
1969	Apr. 3, 1969	13.06	325
1970	Apr. 20, 1970	10.51	122
1971	Mar. 31, 1971	11.82	211
1972	Mar. 18, 1972	b13.09	192
1973	May 1, 1973	10.53	113
1974	June 7, 1974	11.44	180
1975	Apr. 28, 1975	12.14	240

b Backwater from ice.

## MINNESOTA RIVER BASIN

5-3306. Sand Creek tributary No. 2 near Jordan, Minn.

(Site No. 110)

Location.--Lat 44°37'45", long 93°36'33", in NW 1/4 sec. 5, T.113 N., R.23 W., at culvert on State Highway 21, 0.8 mile above mouth, and 2.8 miles south of Jordan.

Drainage area.--2.62 sq mi.

Records available.--October 1960 to present. Annual peak for 1960 available from miscellaneous flood data collected prior to activation of station.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--11.08 ft, upstream; 10.36 ft, downstream.

Bankfull stage.--12 ft.

Basin characteristics.--Main-channel length, 1.64 miles; main-channel slope, 30.9 ft per mile; mean basin altitude, 939 ft; forest area, 2 percent; area of lakes and swamps, 6 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 21, 1960	19.66	558
1961	July 1, 1961	13.27	72
1962	May 23, 1962	13.02	51
1963	Mar. 23, 1963	b12.60	21
1964	-	d	<10
1965	Apr. 7, 1965	b16.77	106
1966	Apr. 1, 1966	13.46	85
1967	Mar. 24, 1967	14.35	143
1968	July 13, 1968	13.31	75
1969	Mar. 23, 1969	13.17	64
1970	Apr. 20, 1970	12.77	37
1971	Mar. 31, 1971	13.55	91
1972	Mar. 18, 1972	b13.19	34
1973	Mar. 14, 1973	12.56	29
1974	June 6, 1974	13.79	107
1975	Apr. 28, 1975	12.76	37

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## ST. CROIX RIVER BASIN

115

5-3362. Glaisby Brook near Kettle River, Minn.

(Site No. 93)

Location.--Lat 46°27'19", long 92°51'34", in SE $\frac{1}{4}$ NW $\frac{1}{4}$  sec.22, T.46 N., R.20 W., at bridge on State Highways 27 and 73, 1.0 mile upstream from mouth, and 2.4 miles south of Kettle River.

Drainage area.--24.2 sq mi.

Records available.--October 1959 to present. Continuous records available October 1959 to September 1970.

Gage.--Water-stage recorder upstream from bridge. Altitude of gage is 1,105 ft (from topographic map).

Basin characteristics.--Main-channel length, 12.2 miles; main-channel slope, 11.5 ft per mile; mean basin altitude, 1,180 ft; forest area, 80 percent; area of lakes and swamps, 17 percent.

Remarks.--Recording rain gage installed Mar. 25, 1965.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 25, 1960	4.37	204
1961	May 16, 1961	4.83	301
1962	May 23, 1962	6.17	476
1963	June 11, 1963	3.81	115
1964	May 7, 1964	5.57	406
1965	Apr. 18, 1965	8.42	813
1966	June 4, 1966	7.27	636
1967	June 15, 1967	8.30	794
1968	Apr. 24, 1968	4.75	270
1969	Apr. 13, 1969	c7.21	614
1970	Apr. 25, 1970	4.97	320
1971	Apr. 11, 1971	7.65	770
1972	July 22, 1972	10.18	1,370
1973	Mar. 15, 1973	b4.37	162
1974	Apr. 17, 1974	5.65	398
1975	Apr. 23, 1975	8.11	865

b Backwater from ice.

c Affected by shifting control.

## ST. CROIX RIVER BASIN

5-3363. Moose River tributary at Moose Lake, Minn.

(Site No. 92)

Location.--Lat 46°27'17", long 92°47'14", in ~~SE 1/4~~ sec.19, T.46 N., R.19 W.,  
at culvert on State Highway 27, 0.9 mile above mouth, and 1.2 miles west of  
Moose Lake.

Drainage area.--1.23 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.92 ft, upstream; 5.84 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 1.37 miles; main-channel slope,  
30.4 ft per mile; mean basin altitude, 1,142 ft; forest area, 19 percent;  
area of lakes and swamps, 3 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 24, 1960	7.81	27
1961	May 15, 1961	8.60	64
1962	May 23, 1962	9.68	112
1963	June 10, 1963	7.54	17
1964	Sept. 7, 1964	9.87	118
1965	Apr. 13, 1965	b11.52	104
1966	Oct. 20, 1965	8.58	64
1967	June 14, 1967	12.11	208
1968	Apr. 23, 1968	8.33	61
1969	Oct. 17, 1968	8.89	83
1970	May 25, 1970	9.71	112
1971	Apr. 11, 1971	9.18	94
1972	July 22, 1972	13.26	479
1973	May 24, 1973	7.65	31
1974	Oct. 12, 1973	8.40	64
1975	Apr. 21, 1975	c8.70	70

b Backwater from ice.

c Affected by shifting control.

## ST. CROIX RIVER BASIN

117

5-3365.5 Wolf Creek tributary near Sandstone, Minn.

(Site No. 91)

Location.--Lat 46°09'45", long 92°51'58", in NE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub> sec.33, T.43 N., R.20 W., at culvert on U. S. Highway 61, 0.2 mile above mouth, and 2.2 miles north of Sandstone.

Drainage area.--5.46 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--14.25 ft, upstream; 13.85 ft, downstream.

Bankfull stage.--16 ft.

Basin characteristics.--Main-channel length, 3.00 miles; main-channel slope, 12.4 ft per mile; mean basin altitude, 1,100 ft; forest area, 16 percent; area of lakes and swamps, 58 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Mar. 29, 1960	b15.80	15
1961	May 14, 1961	15.56	22
1962	May 23, 1962	17.80	121
1963	Mar. 24, 1963	b15.27	7.1
1964	May 6, 1964	16.24	51
1965	Apr. 15, 1965	19.20	200
1966	Apr. 4, 1966	17.06	86
1967	June 19, 1967	17.43	104
1968	June 20, 1968	15.71	33
1969	Oct. 17, 1968	17.87	125
1970	Apr. 19, 1970	15.57	28
1971	Apr. 8, 1971	b16.92	79
1972	July 22, 1972	19.68	224
1973	May 24, 1973	15.70	33
1974	Oct. 12, 1973	16.94	84
1975	June 29, 1975	17.69	115

b Backwater from ice.

## ST. CROIX RIVER BASIN

5-3366. Kettle River tributary at Sandstone, Minn.

(Site No. 90)

Location.---Lat 46°08'46", long 92°51'57", in SE~~1~~SE~~1~~ sec.4, T.42 N., R.20 W., at culvert on U. S. Highway 61 at Sandstone, and 0.2 mile above mouth.

Drainage area.---0.65 sq mi.

Records available.---October 1959 to present.

Gage.---Crest-stage gage upstream from culvert.

Culvert invert elevations.---5.88 ft, upstream; 4.22 ft, downstream.

Bankfull stage.---7 ft.

Basin characteristics.---Main-channel length, 1.40 miles; main-channel slope, 32.4 ft per mile; mean basin altitude, 1,117 ft; forest area, 11 percent; area of lakes and swamps, 28 percent.

Annual maximum data.---

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Apr. 4, 1960	b7.26	6.7
1961	May 15, 1961	6.94	6.3
1962	May 23, 1962	7.45	16
1963	Mar. 24, 1963	b6.97	3.1
1964	May 6, 1964	7.48	17
1965	Apr. 15, 1965	10.11	84
1966	Apr. 4, 1966	8.74	45
1967	June 14, 1967	7.99	28
1968	June 20, 1968	f7.05	6.5
1969	Apr. 9, 1969	8.22	32
1970	Apr. 19, 1970	7.63	21
1971	Apr. 8, 1971	b7.60	15
1972	July 22, 1972	8.22	32
1973	Mar. 12, 1973	7.53	7.8
1974	Oct. 12, 1973	7.72	22
1975	Apr. 16, 1975	b9.20	32

b Backwater from ice.

f Backwater from aquatic growth.



## ST. CROIX RIVER BASIN

119

5-3382. Mission Creek near Hinckley, Minn.

(Site No. 89)

Location.--Lat 45°59'52", long 92°56'44", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.25, T.41 N., R.21 W.,  
at culvert on U. S. Highway 23, 1.2 miles south of Hinckley.

Drainage area.--3.84 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 990.04 ft above  
mean sea level, datum of 1929.

Culvert invert elevations.--11.86 ft, upstream; 11.08 ft, downstream.

Bankfull stage.--16 ft.

Basin characteristics.--Main-channel length, 3.16 miles; main-channel slope,  
12.7 ft per mile; mean basin altitude, 1,020 ft; forest area, 17 percent;  
area of lakes and swamps, 20 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Mar. 29, 1960	b14.28	45
1961	May 15, 1961	13.13	28
1962	May 23, 1962	14.69	121
1963	Mar. 24, 1963	b13.66	21
1964	May 6, 1964	13.63	52
1965	Apr. 15, 1965	14.96	143
1966	Apr. 4, 1966	b15.38	98
1967	Mar. 31, 1967	14.15	82
1968	June 20, 1968	13.88	65
1969	Apr. 9, 1969	15.03	146
1970	Apr. 19, 1970	15.15	158
1971	Mar. 31, 1971	b15.72	56
1972	July 22, 1972	15.39	217
1973	Nov. 2, 1972	13.10	26
1974	Oct. 12, 1973	14.70	122
1975	Apr. 16, 1975	b14.56	76

b Backwater from ice.

## VERMILLION RIVER BASIN

5-3459. Vermillion River tributary near Hastings, Minn.

(Site No. 81)

Location.--Lat 44°43'19", long 92°56'03", in NE¼SE¼ sec.35, T.115 N., R.18 W., at culvert on county highway, 2.0 miles above mouth, and 4.1 miles west of Hastings.

Drainage area.--14.3 sq mi. (Contributing area)  
22.5 sq mi. (Total area)

Records available.--October 1959 to september 1972.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--14.33 ft, upstream; 13.96 ft, downstream

Basin characteristics.--Main-channel length, 7.96 miles; main-channel slope, 5.53 ft per mile; mean basin altitude, 838 ft; forest area, 2 percent; area of lakes and swamps, 16 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Dec. 28, 1959	b15.44	8.0
1961	Mar. 25, 1961	15.62	20
1962	Apr. 3, 1962	b18.50	37
1963	Mar. 15, 1963	15.51	15
1964	Mar. 13, 1964	b15.59	6.2
1965	Apr. 6, 1965	21.95	544
1966	Mar. 4, 1966	21.28	310
1967	Mar. 24, 1967	b21.21	228
1968	-	d	< 1
1969	Apr. 3, 1969	16.15	44
1970	Mar. 3, 1970	b15.7	< 5
1971	Mar. 31, 1971	b15.89	23
1972	Mar. 18, 1972	16.66	65

&lt; Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## CANNON RIVER BASIN

121

5-3527. Turtle Creek tributary No. 2 near Pratt, Minn.

(Site No. 62)

Location.--Lat 44°00'02", long 93°08'30", in NW¼SW¼ sec.8, T.106 N., R.19 W., at culvert on U.S. Highway 218, 1.0 mile above mouth, and 1.7 miles southeast of Pratt.

Drainage area.--1.26 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--14.27 ft, upstream; 13.70 ft, downstream.

Bankfull stage.--16 ft.

Basin characteristics.--Main-channel length, 1.73 miles; main-channel slope, 36.2 ft per mile; mean basin altitude, 1,252 ft; forest area, 3 percent; area of lakes and swamps, 1 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 21, 1960	18.09	135
1961	May 31, 1961	19.79	220
1962	Apr. 30, 1962	15.75	32
1963	July 19, 1963	15.89	37
1964	Apr. 21, 1964	a15.04	7.3
1965	July 8, 1965	18.97	185
1966	Mar. 4, 1966	b16.28	40
1967	June 15, 1967	16.93	79
1968	July 23, 1968	16.71	70
1969	June 29, 1969	16.42	57
1970	May 14, 1970	16.97	81
1971	June 11, 1971	19.40	210
1972	Sept. 25, 1972	15.56	26
1973	Mar. 11, 1973	16.72	70
1974	Apr. 3, 1974	16.23	49
1975	Apr. 28, 1975	16.70	69

a Backwater from debris.

b Backwater from ice.

5-3528. Turtle Creek tributary near Steele Center, Minn.

(Site No. 61)

Location.--Lat 44°00'26", long 93°12'20", in NW $\frac{1}{4}$  sec.11, T.106 N., R.20 W., at culvert on township road, 1.3 miles above mouth, and 1.6 miles northeast of Steele Center.

Drainage area.--5.01 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--3.33 ft, upstream; 2.81 ft, downstream.

Bankfull stage.--10 ft.

Basin characteristics.--Main-channel length, 4.62 miles; main-channel slope, 16.4 ft per mile; mean basin altitude, 1,226 ft; forest area, 2 percent; area of lakes and swamps, 1 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 21, 1960	9.10	206
1961	May 31, 1961	12.20	369
1962	Aug. 31, 1962	6.42	71
1963	July 19, 1963	4.64	27
1964	Sept. 7, 1964	6.18	79
1965	July 8, 1965	9.53	228
1966	Mar. 4, 1966	6.32	84
1967	June 12, 1967	7.04	114
1968	July 23, 1968	5.35	45
1969	June 29, 1969	5.73	58
1970	July 29, 1970	5.40	45
1971	June 11, 1971	11.64	344
1972	Sept. 25, 1972	5.75	59
1973	May 1, 1973	9.61	235
1974	June 3, 1974	6.71	97
1975	June 12, 1975	6.41	85

## CANNON RIVER BASIN

123

5-3551. Little Cannon River tributary near Kenyon, Minn.

(Site No. 88)

Location.--Lat 44°20'45", long 92°58'47", in NE¼SE¼ sec.9, T.110 N., R.18 W., at culvert on State Highway 56, 0.3 mile above mouth, and 5.3 miles north of Kenyon.

Drainage area.--2.20 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,026.0 ft above mean sea level, datum of 1929 (4th-order levels by Topographic Division). Prior to October 18, 1966, water-stage recorder at same site and datum.

Culvert invert elevations.--10.28 ft, upstream; 6.75 ft, downstream.

Bankfull stage.--15 ft.

Basin characteristics.--Main-channel length, 2.58 miles; main-channel slope, 53.4 ft per mile; mean basin altitude, 1,090 ft; forest area, 2 percent; area of lakes and swamps, 0 percent.

Remarks.--Recording rain gage operated Sept. 25, 1963 to Oct. 17, 1966.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	June 23, 1960	18.51	714
1961	Mar. 27, 1961	13.28	162
1962	Aug. 31, 1962	14.56	270
1963	Mar. 15, 1963	b12.52	18
1964	Sept. 9, 1964	12.04	74
1965	July 13, 1965	14.68	280
1966	Mar. 3, 1966	b15.49	264
1967	Mar. 24, 1967	b15.08	186
1968	May 15, 1968	20.84	1,040
1969	Oct. 17, 1968	13.95	217
1970	May 30, 1970	12.83	128
1971	July 12, 1971	13.34	167
1972	June 14, 1972	13.63	190
1973	July 2, 1973	13.82	205
1974	June 3, 1974	12.72	121
1975	June 12, 1975	14.10	229

b Backwater from ice.

## CANNON RIVER BASIN

5-3551.5 Pine Creek near Cannon Falls, Minn.

(Site No. 83)

Location.--Lat 44°32'27", long 92°53'40", in NE 1/4 sec. 6, T.112 N., R.17 W., at culvert on State Highway 20, 2.0 miles above mouth, and 2.1 miles north of Cannon Falls.

Drainage area.--20.2 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Prior to Oct. 16, 1964, water-stage recorder at same site and datum.

Culvert invert elevations.--0.81 ft, upstream; 0.18 ft, downstream.

Bankfull stage.--4 ft.

Basin characteristics.--Main-channel length, 9.20 miles; main-channel slope, 12.8 ft per mile; mean basin altitude, 906 ft; forest area, 1 percent; area of lakes and swamps, 1 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Mar. 27, 1960	1.70	40
1961	Mar. 20, 1961	1.65	36
1962	May 12, 1962	2.78	133
1963	Mar. 16, 1963	1.41	21
1964	Sept. 9, 1964	cl. 1.14	6.3
1965	Apr. 8, 1965	7.54	844
1966	Mar. 4, 1966	5.63	519
1967	Mar. 24, 1967	5.03	428
1968	May 15, 1968	4.92	412
1969	Apr. 3, 1969	3.24	187
1970	May 28, 1970	2.24	81
1971	Mar. 31, 1971	3.62	232
1972	Mar. 18, 1972	3.58	228
1973	Mar. 7, 1973	3.49	216
1974	Mar. 4, 1974	2.41	96
1975	Apr. 28, 1975	4.14	300

## CANNON RIVER BASIN

125

5-3552.3 Cannon River tributary near Welch, Minn.

(Site No. 84)

Location.--Lat 44°36'04", long 92°42'34", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.11, T.113 N., R.16 W.,  
at culvert on U. S. Highway 61, 1.2 miles above mouth, and 2.7 miles north-  
east of Welch.

Drainage area.--0.05 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--6.66 ft, upstream; 2.34 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, 0.26 miles; main-channel slope,  
140 ft per mile; mean basin altitude, 1,034 ft; forest area, 4 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	July 2, 1960	8.43	18
1961	Apr. 15, 1961	8.13	14
1962	May 12, 1962	8.32	14
1963	Mar. 16, 1963	b8.85	8.0
1964	May 25, 1964	10.15	49
1965	July 8, 1965	11.13	80
1966	Mar. 31, 1966	9.15	27
1967	Apr. 2, 1967	8.38	15
1968	May 15, 1968	10.15	48
1969	Apr. 3, 1969	8.24	13
1970	June 13, 1970	9.87	42
1971	June 29, 1971	7.70	6.1
1972	July 23, 1972	9.91	43
1973	Mar. 6, 1973	b10.33	22
1974	June 20, 1974	9.27	30
1975	Aug. 23, 1975	10.07	47

b Backwater from ice.

## ZUMBRO RIVER BASIN

5-3733.5 Zumbro River tributary near South Troy, Minn.

(Site No. 143)

Location.--Lat 44°11'16", long 92°25'22", in SE 1/4 sec. 6, T.108 N., R.13 W.,  
at culvert on county road, 0.8 mile above mouth, and 1.3 miles south of  
South Troy.

Drainage area.--0.16 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.94 ft, upstream; 5.24 ft, downstream.

Bankfull stage.--9 ft.

Basin characteristics.--Main-channel length, .48 miles; main-channel slope,  
156 ft per mile; mean basin altitude, 1,118 ft; forest area, 2 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	June 17, 1962	7.65	16
1963	Mar. 16, 1963	b8.01	9.5
1964	Mar. 13, 1964	b7.21	3.6
1965	Apr. 8, 1965	7.90	21
1966	Mar. 4, 1966	b8.36	12
1967	June 15, 1967	10.75	84
1968	June 25, 1968	8.15	26
1969	Apr. 3, 1969	b8.18	20
1970	June 15, 1970	9.87	65
1971	Mar. 31, 1971	b9.17	9.0
1972	Mar. 17, 1972	b9.08	24
1973	Mar. 6, 1973	b8.65	26
1974	June 20, 1974	12.72	122
1975	July 5, 1975	12.37	117



## ZUMBRO RIVER BASIN

127

5-3737. Spring Creek near Wanamingo, Minn.

(Site No. 87)

Location.--Lat 44°17'13", long 92°52'17", in SE¼SE¼ sec.32, T.110 N., R.17 W., at culvert on County Highway 1, 3.5 miles above mouth, and 4.2 miles southwest of Wanamingo.

Drainage area.--9.93 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,106.15 ft above mean sea level, datum of 1929.

Culvert invert elevations.--8.07 ft, upstream; 7.63 ft, downstream.

Bankfull stage.--12 ft.

Basin characteristics.--Main-channel length, 6.06 miles; main-channel slope, 20.7 ft per mile; mean basin altitude, 1,175 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 31, 1960	12.11	765
1961	Mar. 27, 1961	10.29	331
1962	Aug. 31, 1962	10.86	457
1963	May 12, 1963	10.00	271
1964	-	d	<100
1965	Apr. 7, 1965	b13.00	870
1966	Mar. 3, 1966	b11.60	490
1967	June 12, 1967	13.39	1,120
1968	July 15, 1968	10.38	350
1969	Oct. 17, 1968	11.55	620
1970	Apr. 20, 1970	9.43	123
1971	Mar. 31, 1971	b12.83	450
1972	Sept. 26, 1972	9.67	186
1973	May 1, 1973	15.45	1,820
1974	Apr. 4, 1974	10.39	352
1975	Apr. 28, 1975	11.87	705

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## ZUMBRO RIVER BASIN

5-3739. Trout Brook tributary near Goodhue, Minn.

(Site No. 86)

Location.--Lat 44°21'30", long 92°36'58", in NE¼SE¼ sec.4, T.110 N., R.15 W., at culvert on State Highway 58, 0.8 mile above mouth, and 3.0 miles south of Goodhue.

Drainage area.--0.40 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,082.0 ft above mean sea level, datum of 1929 (4th-order levels by Topographic Division).

Culvert invert elevations.--4.18 ft, upstream; 3.86 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, .97 miles; main-channel slope, 88.9 ft per mile; mean basin altitude, 1,127 ft; forest area, 5 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	June 29, 1960	6.27	55
1961	Apr. 15, 1961	6.50	64
1962	Aug. 31, 1962	6.77	75
1963	July 17, 1963	8.50	163
1964	Apr. 21, 1964	5.76	37
1965	July 13, 1965	7.81	126
1966	Mar. 3, 1966	8.83	181
1967	Mar. 24, 1967	b8.74	54
1968	Aug. 19, 1968	7.04	88
1969	Apr. 2, 1969	b6.24	33
1970	May 28, 1970	13.84	592
1971	Mar. 31, 1971	b9.87	102
1972	Sept. 26, 1972	6.70	72
1973	July 24, 1973	6.68	71
1974	June 3, 1974	7.08	88
1975	June 30, 1975	c6.81	69

b Backwater from ice.

c Affected by shifting control.

## ZUMBRO RIVER BASIN

129

5-3744. Long Creek near Potsdam, Minn.

(Site No. 175)

Location.--Lat 44°10'48", long 92°17'23", at quarter corner on north line of sec.8, T.108 N., R.12 W., at culvert on county highway, 2.6 miles northeast of Potsdam.

Drainage area.--4.46 sq mi.

Records available.--October 1965 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--11.92 ft, upstream; 10.25 ft, downstream.

Basin characteristics.--Main-channel length, 2.68 miles; main-channel slope, 41.3 ft per mile; mean basin altitude, 1,046 ft; forest area, 10 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1966	Mar. 4, 1966	17.39	228
1967	June 15, 1967	19.75	408
1968	June 25, 1968	15.96	137
1969	Apr. 3, 1969	15.24	97
1970	June 15, 1970	16.11	151
1971	Oct. 9, 1970	15.27	100
1972	Mar. 18, 1972	b15.27	78
1973	Mar. 11, 1973	20.08	435
1974	June 20, 1974	26.50	773
1975	July 5, 1975	16.77	200

b Backwater from ice.

## EAST INDIAN CREEK BASIN

5-3758. East Indian Creek tributary near Weaver, Minn.

(Site No. 1)

Location.--Lat 44°13'41", long 91°58'35", in NW<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub> sec.23, T.109 N., R.10 W., at culvert on County Highway 14, 0.3 mile above mouth, and 2.5 miles northwest of Weaver.

Drainage area.--0.22 sq mi (revised).

Records available.--October 1961 to September 1975.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--7.80 ft, upstream; 3.46 ft, downstream.

Basin characteristics.--Main-channel length, .75 miles; main-channel slope, 604 ft per mile; mean basin altitude, 921 ft; forest area, 41 percent; area of lakes and swamps, 9 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	May 29, 1962	9.25	25
1963	Mar. 16, 1963	b7.98	3.2
1964	Oct. 25, 1963	9.67	31
1965	May 16, 1965	10.34	26
1966	Aug. 7, 1966	10.65	31
1967	Oct. 15, 1966	11.01	37
1968	June 21, 1968	10.77	34
1969	July 17, 1969	8.48	3.4
1970	Aug. 29, 1970	8.90	7.6
1971	July 8, 1971	8.79	6.6
1972	Mar. 17, 1972	b8.92	4.0
1973	Mar. 11, 1973	b9.13	8.2
1974	Oct. 3, 1973	8.67	5.3
1975	Apr. 28, 1975	9.04	9.8

## GARVIN BROOK BASIN

131

5-3783. Straight Valley Creek near Rollingstone, Minn.

(Site No. 4)

Location.--Lat 44°05'09", long 91°50'34", in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.12, T.107 N., R.9 W., at bridge on county highway, 0.2 mile above mouth, and 1.5 miles southwest of Rollingstone.

Drainage area.--5.16 sq mi.

Records available.--October 1958 to present. Continuous records available October 1970 to present.

Gage.--Water-stage recorder downstream from bridge. Prior to Oct. 20, 1966, crest-stage gage at same site and datum.

Low-steel elevation.--18.47 ft.

Bankfull stage.--16 ft.

Basin characteristics.--Main-channel length, 4.68 miles; main-channel slope, 113 ft per mile; mean basin altitude, 943 ft; forest area, 41 percent; area of lakes and swamps, 0 percent.

Remarks.--Recording rain gage installed Oct. 20, 1966.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	June 26, 1959	17.28	1,200
1960	May 16, 1960	13.19	255
1961	Mar. 25, 1961	15.30	635
1962	Mar. 28, 1962	15.23	625
1963	Mar. 23, 1963	12.20	149
1964	Sept. 7, 1964	-	960
1965	Apr. 8, 1965	14.65	495
1966	Mar. 4, 1966	13.01	233
1967	Mar. 24, 1967	14.48	460
1968	July 14, 1968	14.17	402
1969	June 26, 1969	11.27	85
1970	Aug. 29, 1970	11.61	104
1971	Mar. 31, 1971	9.89	29
1972	Aug. 20, 1972	13.11	224
1973	Mar. 10, 1973	14.50	470
1974	June 21, 1974	13.93	364
1975	June 4, 1975	12.76	188

## GILMORE CREEK BASIN

5-3790. Gilmore Creek at Winona, Minn.

(Site No. 168)

Location.--Lat 44°02'40", long 91°41'25", in N½ sec.29, T.107 N., R.7 W., about 1500 ft above bridge carrying U.S. Highway 14 at west edge of Winona and 2¼ miles above mouth.

Drainage area.--8.95 sq mi.

Records available.--October 1939 to September 1965. Continuous records available October 1939 to July 1963.

Gage.--Staff gage in stilling well. Datum of gage is 672.92 ft above mean sea level, adjustment of 1912. Prior to July 31, 1963, water-stage recorder at same site and datum.

Basin characteristics.--Main-channel length, 4.94 miles; main-channel slope, 109 ft per mile; mean basin altitude, 890 ft; forest area, 46 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1940	Mar. 29, 1940	2.57	137
1941	Sept. 15, 1941	2.74	169
1942	June 28, 1942	6.74	2,200
1943	July 5, 1943	c4.87	835
1944	June 22, 1944	4.49	820
1945	July 31, 1945	5.58	1,370
1946	Nov. 8, 1945	5.11	1,070
1947	July 27, 1947	c6.97	2,460
1948	Feb. 27, 1948	2.33	131
1949	Aug. 17, 1949	c3.20	333
1950	Mar. 26, 1950	c3.00	330
1951	July 21, 1951	9.47	5,360
1952	July 19, 1952	2.50	156
1953	-	-	-
1954	June 20, 1954	c1.66	54
1955	July 8, 1955	3.22	318
1956	Apr. 3, 1956	c1.83	73
1957	July 20, 1957	2.74	198
1958	Oct. 19, 1957	1.02	22
1959	June 25, 1959	c3.08	585
1960	Mar. 27, 1960	c1.80	201
1961	Mar. 25, 1961	c2.59	425
1962	Aug. 30, 1962	c1.65	436
1963	Mar. 23, 1963	1.86	638
1964	Nov. 22, 1963	1.07	114
1965	Apr. 7, 1965	b4.65	436

b Backwater from ice.

c Affected by shifting control.

ROOT RIVER BASIN

133

5-3836. North Branch Root River tributary near Stewartville, Minn.

(Site No. 13)

Location.---Lat 43°51'20", long 92°26'50", near center of sec.36, T.105 N., R.14 W., at culvert on State Highway 30, 2.0 miles east of Stewartville, and 2.3 miles above mouth.

Drainage area.---0.73 sq mi.

Records available.---October 1958 to present. Continuous records available March 1959 to September 1964. Annual peak for 1958 available from miscellaneous flood data collected prior to activation of station.

Gage.---Water-stage recorder upstream from culvert. Altitude of gage is 1,205 ft (from topographic map).

Culvert invert elevations.---4.12 ft, upstream; 3.12 ft, downstream.

Bankfull stage.---6 ft.

Basin characteristics.---Main-channel length, 2.00 miles; main-channel slope, 47.3 ft per mile; mean basin altitude, 1,252 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Remarks.---Recording rain gage installed Sept. 26, 1963.

Annual maximum data.---

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1958	June 4, 1958	12.47	297
1959	June 25, 1959	9.78	164
1960	July 2, 1960	13.47	328
1961	Mar. 25, 1961	7.97	90
1962	Mar. 28, 1962	b8.63	98
1963	Apr. 29, 1963	5.89	24
1964	Apr. 28, 1964	4.74	0.2
1965	Apr. 7, 1965	7.49	71
1966	Mar. 3, 1966	b6.64	25
1967	Mar. 26, 1967	7.87	86
1968	June 13, 1968	5.26	12
1969	July 17, 1969	9.93	172
1970	May 27, 1970	6.77	49
1971	Mar. 31, 1971	5.95	25
1972	Sept. 28, 1972	6.05	28
1973	Sept. 29, 1973	9.04	133
1974	Apr. 2, 1974	6.83	51
1975	Apr. 28, 1975	7.28	65

b Backwater from ice.

## ROOT RIVER BASIN

5-3837. Mill Creek tributary near Chatfield, Minn.

(Site No. 10)

Location.--Lat 43°53'57", long 92°14'16", in SW<sup>1</sup>/<sub>4</sub>NW<sup>1</sup>/<sub>4</sub> sec.14, T.105 N., R.12 W., at culvert on county highway, 0.8 mile above mouth, and 4.5 miles northwest of Chatfield.

Drainage area.--2.36 sq mi.

Records available.--October 1958 to September 1975.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--10.28 ft, upstream; 9.94 ft, downstream.

Bankfull stage.--15 ft.

Basin characteristics.--Main-channel length, 3.20 miles; main-channel slope, 80.8 ft per mile; mean basin altitude, 1,117 ft; forest area, 8 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	Aug. 21, 1959	13.52	402
1960	July 2, 1960	15.46	703
1961	Apr. 15, 1961	13.74	435
1962	Mar. 28, 1962	13.57	405
1963	Sept. 18, 1963	12.54	235
1964	Sept. 7, 1964	12.09	141
1965	Apr. 6, 1965	14.20	506
1966	Mar. 3, 1966	b13.14	271
1967	June 8, 1967	15.92	780
1968	Apr. 23, 1968	13.45	345
1969	Aug. 7, 1969	14.60	524
1970	June 17, 1970	13.67	376
1971	June 7, 1971	13.44	344
1972	Sept. 28, 1972	12.95	274
1973	Mar. 11, 1973	b14.57	361
1974	June 20, 1974	17.32	1,030
1975	Apr. 28, 1975	13.48	407



ROOT RIVER BASIN

135

5-3837.2 Mill Creek near Chatfield, Minn.

(Site No. 144)

Location.--Lat 43°53'01", long 92°13'46", in SE 1/4 sec.23, T.105 N., R.12 W., at bridge on county highway, 3.4 miles northwest of Chatfield, and 4.8 miles above mouth.

Drainage area.--22.4 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage upstream from bridge.

Basin characteristics.--Main-channel length, 6.40 miles; main-channel slope, 50.4 ft per mile; mean basin altitude, 1,149 ft; forest area, 7 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	Mar. 28, 1962	15.95	4,150
1963	June 9, 1963	12.39	1,030
1964	Mar. 12, 1964	b10.06	137
1965	Apr. 6, 1965	14.31	1,800
1966	Mar. 3, 1966	14.39	1,900
1967	Mar. 26, 1967	13.98	1,550
1968	June 26, 1968	10.76	535
1969	Aug. 7, 1969	11.38	721
1970	June 17, 1970	10.83	555
1971	July 12, 1971	12.71	1,130
1972	Sept. 28, 1972	12.85	1,170
1973	Mar. 11, 1973	13.93	1,530
1974	June 21, 1974	17.51	7,990
1975	June 27, 1975	14.21	(/)

/ Discharge not determined.  
b Backwater from ice.

## ROOT RIVER BASIN

5-3838.5 South Fork Bear Creek near Grand Meadow, Minn.

(Site No. 146)

Location.--Lat 43°43'24", long 92°35'24", in NE¼SE¼ sec.14, T.103 N., R.15 W., at bridge on county highway, 1.5 miles northwest of Grand Meadow, and 4.0 miles above North Fork Bear Creek.

Drainage area.--14.0 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage upstream from bridge.

Low-steel elevation.--18.41 ft.

Basin characteristics.--Main-channel length, 6.89 miles; main-channel slope, 14.5 ft per mile; mean basin altitude, 1,334 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	Mar. 28, 1962	21.18	3,730
1963	Mar. 23, 1963	b16.76	290
1964	July 28, 1964	15.64	206
1965	Sept. 28, 1965	18.60	1,020
1966	Mar. 3, 1966	b18.89	785
1967	Mar. 24, 1967	b19.35	485
1968	June 26, 1968	16.98	520
1969	June 26, 1969	18.96	1,140
1970	May 14, 1970	15.14	128
1971	Mar. 31, 1971	b18.66	570
1972	Sept. 28, 1972	17.33	618
1973	Mar. 11, 1973	b19.43	800
1974	June 21, 1974	17.87	780
1975	Apr. 27, 1975	18.64	1,030

b Backwater from ice.

ROOT RIVER BASIN

137

5-3841. Duschee Creek near Lanesboro, Minn.

(Site No. 5)

Location.--Lat 43°39'40", long 91°58'10", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.6, T.102 N., R.9 W., at culvert on county highway, 4.0 miles south of Lanesboro, and 7.4 miles above mouth.

Drainage area.--3.85 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--10.74 ft, upstream; 10.70 ft, downstream.

Bankfull stage.--18 ft.

Basin characteristics.--Main-channel length, 3.05 miles; main-channel slope, 70.8 ft per mile; mean basin altitude, 1,099 ft; forest area, 12 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	June 25, 1959	14.11	185
1960	July 2, 1960	17.74	561
1961	Mar. 25, 1961	15.41	307
1962	Mar. 28, 1962	14.19	188
1963	Mar. 23, 1963	12.98	85
1964	May 8, 1964	15.01	267
1965	Sept. 19, 1965	15.68	333
1966	Mar. 3, 1966	12.82	74
1967	June 9, 1967	17.60	550
1968	May 15, 1968	14.68	236
1969	July 17, 1969	20.39	1,680
1970	June 13, 1970	12.36	47
1971	July 12, 1971	14.48	218
1972	July 31, 1972	17.03	480
1973	Mar. 11, 1973	13.00	73
1974	June 20, 1974	20.20	1,310
1975	Apr. 27, 1975	11.47	13

## ROOT RIVER BASIN

5-3841.5 Root River tributary near Whalan, Minn.

(Site No. 6)

Location.--Lat 43°43'03", long 91°56'39", in SE¼SW¼ sec.17, T.103 N., R.9 W., at culvert on private road, 1.3 miles southwest of Whalan.

Drainage area.--0.08 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--3.41 ft, upstream; 2.48 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 0.50 miles; main-channel slope, 243 ft per mile; mean basin altitude, 1,110 ft; forest area, 8 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	June 25, 1959	7.60	27
1960	Aug. 28, 1960	9.05	42
1961	Aug. 18, 1961	5.45	11
1962	Mar. 28, 1962	b5.85	6.1
1963	May 13, 1963	5.78	15
1964	May 8, 1964	4.69	4.2
1965	Sept. 19, 1965	6.80	22
1966	July 13, 1966	7.65	27
1967	June 9, 1967	9.82	169
1968	May 15, 1968	7.15	24
1969	May 17, 1969	4.78	4.8
1970	June 13, 1970	7.40	26
1971	July 12, 1971	6.28	19
1972	July 9, 1972	8.87	35
1973	Aug. 23, 1973	6.44	20
1974	June 20, 1974	9.85	136
1975	June 15, 1975	7.54	26

ROOT RIVER BASIN

139

5-3842. Gribben Creek near Whalan, Minn.

(Site No. 7)

Location.--Lat 43°42'26", long 91°54'50", in NE¼SE¼ sec.21, T.103 N., R.9 W., at bridge on county highway, 1.9 miles southeast of Whalan, and 2.4 miles above mouth.

Drainage area.--7.80 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--12.64 ft, upstream; 12.62 ft, downstream.

Bankfull stage.--19 ft.

Basin characteristics.--Main-channel length, 3.74 miles; main-channel slope, 101 ft per mile; mean basin altitude, 1,020 ft; forest area, 22 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	June 25, 1959	16.52	510
1960	July 2, 1960	22.17	4,880
1961	Mar. 25, 1961	16.83	562
1962	Mar. 28, 1962	16.95	581
1963	Mar. 23, 1963	15.11	221
1964	May 8, 1964	20.14	1,430
1965	Sept. 19, 1965	18.57	868
1966	Feb. 9, 1966	b15.43	247
1967	June 9, 1967	20.96	2,460
1968	May 15, 1968	19.76	1,170
1969	July 17, 1969	16.73	543
1970	Sept. 10, 1970	14.61	182
1971	July 12, 1971	18.50	855
1972	July 31, 1972	15.66	360
1973	Mar. 11, 1973	14.84	175
1974	June 20, 1974	22.24	5,200
1975	Apr. 27, 1975	15.01	200

b Backwater from ice.

## ROOT RIVER BASIN

5-3843. Big Springs Creek near Arendahl, Minn.

(Site No. 9)

Location.--Lat 43°49'26", long 91°57'00", in NE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.7, T.104 N., R.9 W.,  
at culvert on State Highway 250, 2.0 miles west of Arendahl.

Drainage area.--0.14 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--6.88 ft, upstream; 5.42 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 0.40 miles; main-channel slope,  
100 ft per mile; mean basin altitude, 1,185 ft; forest area, 7 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	June 25, 1959	8.32	9.0
1960	July 2, 1960	10.67	40
1961	Mar. 25, 1961	8.85	18
1962	Mar. 27, 1962	b9.19	19
1963	Mar. 23, 1963	8.07	6.2
1964	Apr. 13, 1964	7.68	2.0
1965	Apr. 6, 1965	8.92	18
1966	Mar. 31, 1966	8.99	19
1967	June 9, 1967	10.05	32
1968	June 18, 1968	9.63	28
1969	July 17, 1969	9.49	26
1970	June 18, 1970	8.13	7.6
1971	Mar. 31, 1971	8.69	16
1972	Mar. 17, 1972	b9.43	12
1973	Mar. 11, 1973	8.64	15
1974	June 20, 1974	11.61	256
1975	Apr. 28, 1975	8.60	15

ROOT RIVER BASIN

141

5-3844. Pine Creek near Arendahl, Minn.

(Site No. 8)

Location.--Lat 43°50'27", long 91°53'39", in SE<sup>1</sup>/<sub>4</sub>NE<sup>1</sup>/<sub>4</sub> sec.3, T.104 N., R.9 W., at bridge on County Highway 25, 1.3 miles northeast of Arendahl, and 4.9 miles above Hemingway Creek.

Drainage area.--28.1 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage at downstream side of bridge.

Basin characteristics.--Main-channel length, 11.4 miles; main-channel slope, 18.3 ft per mile; mean basin altitude, 1,074 ft; forest area, 5 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	Mar. 24, 1959	b13.52	1,020
1960	Aug. 28, 1960	14.16	h2,000
1961	Mar. 25, 1961	14.42	h2,380
1962	Mar. 27, 1962	b13.44	914
1963	Mar. 23, 1963	b12.21	476
1964	-	d	<80
1965	Apr. 6, 1965	13.32	1,140
1966	Mar. 4, 1966	12.30	590
1967	Mar. 26, 1967	13.53	1,290
1968	June 18, 1968	11.96	458
1969	Apr. 3, 1969	11.77	392
1970	June 18, 1970	12.45	652
1971	June 7, 1971	12.24	566
1972	Mar. 17, 1972	b13.44	974
1973	Mar. 11, 1973	12.93	900
1974	June 21, 1974	14.85	3,100
1975	Apr. 28, 1975	12.40	630

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

h Revised.

5-4570.8 Rose Creek tributary near Dexter, Minn.

(Site No. 147)

Location.--Lat 43°42'11", long 92°44'35", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec.22, T.103 N., R.16 W., at culvert on county highway, 0.2 mile above mouth, and 2.2 miles southwest of Dexter.

Drainage area.--1.17 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.62 ft, upstream; 5.37 ft, downstream.

Bankfull stage.--7 ft.

Basin characteristics.--Main-channel length, 1.27 miles; main-channel slope, 37.9 ft per mile; mean basin altitude, 1,370 ft; forest area, 2 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	Aug. 31, 1962	9.07	121
1963	May 10, 1963	7.70	56
1964	May 16, 1964	7.10	21
1965	July 9, 1965	10.31	201
1966	Mar. 31, 1966	9.08	122
1967	Mar. 24, 1967	8.31	86
1968	June 26, 1968	7.06	19
1969	June 26, 1969	10.21	194
1970	May 13, 1970	7.50	41
1971	Oct. 27, 1970	8.22	81
1972	Sept. 29, 1972	8.04	73
1973	Mar. 11, 1973	9.30	135
1974	Apr. 4, 1974	8.63	100
1975	Apr. 27, 1975	9.81	166



## DES MOINES RIVER BASIN

143

5-4747.5 Beaver Creek tributary No. 2 near Slayton, Minn.

(Site No. 102)

Location.--Lat 43°59'35", long 95°48'01", in NW¼NW¼ sec.17, T.106 N., R.41 W., at culvert on State Highway 30, 2.4 miles west of Slayton, and 3.2 miles above mouth.

Drainage area (revised).--3.53 sq mi. (Contributing area)  
5.10 sq mi. (Total area)

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--14.78 ft, upstream; 13.57 ft, downstream.

Bankfull stage.--16 ft.

Basin characteristics.--Main-channel length, 3.50 miles; main-channel slope, 43.7 ft per mile; mean basin altitude, 1,662 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	May 17, 1961	16.74	51
1962	Mar. 28, 1962	b21.22	211
1963	July 27, 1963	17.04	61
1964	Apr. 13, 1964	16.80	53
1965	May 9, 1965	18.48	128
1966	Mar. 3, 1966	b18.66	87
1967	Apr. 2, 1967	16.74	50
1968	Sept. 21, 1968	-	g40
1969	Apr. 6, 1969	19.38	182
1970	Apr. 5, 1970	b16.97	47
1971	Mar. 27, 1971	16.42	39
1972	July 8, 1972	16.56	44
1973	Mar. 14, 1973	16.28	34
1974	-	d	<10
1975	Apr. 27, 1975	18.93	154

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

g Estimated; gage height unknown.

## DES MOINES RIVER BASIN

5-4747.6 Beaver Creek tributary above Slayton, Minn.

(Site No. 101)

Location.--Lat 43°59'35", long 95°47'12", in NE¼NE¼ sec.17, T.106 N., R.41 W., at culvert on State Highway 30, 0.9 mile above mouth, and 1.7 miles west of Slayton.

Drainage area.--2.20 sq mi.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--15.00 ft, upstream; 14.63 ft, downstream.

Bankfull stage.--19 ft.

Basin characteristics.--Main-channel length, 4.70 miles; main-channel slope, 38.8 ft per mile; mean basin altitude, 1,676 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1961	May 17, 1961	17.52	43
1962	Mar. 28, 1962	b21.56	116
1963	July 27, 1963	17.91	56
1964	May 3, 1964	17.13	31
1965	May 9, 1965	18.12	63
1966	Mar. 3, 1966	b18.71	50
1967	Apr. 2, 1967	17.07	29
1968	July 30, 1968	16.87	23
1969	Apr. 7, 1969	20.14	137
1970	Apr. 5, 1970	b18.00	12
1971	June 29, 1971	18.25	68
1972	May 2, 1972	16.57	15
1973	Mar. 14, 1973	16.90	24
1974	Mar. 3, 1974	b17.04	14
1975	Apr. 27, 1975	19.21	103

5-4754. Warren Lake tributary near Windom, Minn.

(Site No. 23)

Location.--Lat 43°54'02", long 95°07'13", in SE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.14, T.105 N., R.36 W., at culvert on U.S. Highway 71, 0.2 mile above Warren Lake, and 2.4 miles north of Windom.

Drainage area.--1.39 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--3.28 ft, upstream; 2.08 ft, downstream.

Bankfull stage.--5 ft.

Basin characteristics.--Main-channel length, 2.45 miles; main-channel slope, 17.4 ft per mile; mean basin altitude, 1,401 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Mar. 29, 1960	8.02	156
1961	Mar. 25, 1961	4.63	23
1962	Mar. 28, 1962	5.40	46
1963	July 18, 1963	5.68	56
1964	Sept. 8, 1964	4.46	18
1965	June 22, 1965	5.44	47
1966	June 21, 1966	13.76	395
1967	June 16, 1967	5.19	40
1968	July 26, 1968	6.93	104
1969	Apr. 7, 1969	5.88	63
1970	Oct. 5, 1969	4.52	21
1971	June 29, 1971	5.41	47
1972	June 7, 1972	6.31	79
1973	-	d	<14
1974	Mar. 2, 1974	b5.78	28
1975	-	d	<15

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## DES MOINES RIVER BASIN

5-4758. Des Moines River tributary near Jackson, Minn.

(Site No. 69)

Location.--Lat' 43°41'36", long 95°01'26", in NW¼SE¼ sec.27, T.103 N., R.35 W., at culvert on county highway, 0.8 mile above mouth, and 5.3 miles north of Jackson.

Drainage area.--1.52 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--12.01 ft, upstream; 10.00 ft, downstream.

Bankfull stage.--16 ft.

Basin characteristics.--Main-channel length, 3.38 miles; main-channel slope, 20.6 ft per mile; mean basin altitude, 1,407 ft; forest area, 1 percent; area of lakes and swamps, 1 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Oct. 30, 1959	13.71	21
1961	Mar. 22, 1961	b13.77	5.9
1962	Mar. 28, 1962	b16.34	69
1963	June 9, 1963	14.72	49
1964	May 24, 1964	13.51	16
1965	Apr. 5, 1965	b17.86	38
1966	Mar. 28, 1966	14.46	41
1967	June 15, 1967	14.82	52
1968	-	d	< 3
1969	June 29, 1969	16.99	134
1970	July 13, 1970	14.74	50
1971	Mar. 27, 1971	15.03	59
1972	Mar. 12, 1972	b14.47	15
1973	June 18, 1973	13.09	7.6
1974	June 9, 1974	14.48	42
1975	June 22, 1975	13.75	22

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## DES MOINES RIVER BASIN

147

5-4759. Des Moines River tributary No. 2 near Lakefield, Minn.

(Site No. 68)

Location.--Lat 43°40'28", long 95°03'15", in SE $\frac{1}{4}$ SE $\frac{1}{4}$  sec.32, T.103 N., R.35 W.,  
at culvert on County Highway 19, 1.9 miles above mouth, and 5.8 miles east  
of Lakefield.

Drainage area.--5.18 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--3.50 ft, upstream; 3.19 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 4.52 miles; main-channel slope,  
12.1 ft per mile; mean basin altitude, 1,470 ft; forest area, 2 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.---

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Mar. 29, 1960	6.75	104
1961	Mar. 25, 1961	b6.90	96
1962	Mar. 28, 1962	b8.86	61
1963	June 9, 1963	7.00	119
1964	May 6, 1964	5.52	49
1965	Apr. 5, 1965	b10.46	112
1966	Mar. 28, 1966	b6.98	90
1967	June 15, 1967	6.50	92
1968	-	d	< 16
1969	June 29, 1969	10.44	271
1970	Apr. 5, 1970	5.67	48
1971	Mar. 27, 1971	7.96	155
1972	Mar. 12, 1972	b7.48	42
1973	June 18, 1973	4.90	22
1974	Mar. 3, 1974	b5.63	30
1975	June 22, 1975	c5.91	54

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

## DES MOINES RIVER BASIN

5-4760.1 Nelson Creek at Jackson, Minn.

(Site No. 155)

Location.--Lat 43°36'56", long 94°59'36", in NW¼NW¼ sec.25, T.102 N., R.35 W., in flume spillway at intersection of U.S. Highways 16 and 71 at south edge of Jackson, 0.2 mile upstream from mouth.

Drainage area.--6.19 sq mi.

Records available.--October 1963 to September 1975.

Gage.--Crest-stage gage. Datum of gage is 1,295.50 ft above mean sea level, datum of 1929.

Flume inlet elevation.--12.01 ft, upstream end.

Bankfull stage.--20 ft.

Basin characteristics.--Main-channel length, 4.10 miles; main-channel slope, 46.3 ft per mile; mean basin altitude, 1,403 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 30, 1959	-	2,690
1964	May 6, 1964	13.22	166
1965	Apr. 5, 1965	> 15.39	e670
		< 17.48	
1966	Mar. 14, 1966	b16.06	600
1967	June 15, 1967	14.03	412
1968	-	d	< 120
1969	June 29, 1969	16.67	1,480
1970	-	d	< 120
1971	May 31, 1971	14.41	542
1972	July 20, 1972	13.43	228
1973	-	d	< 100
1974	June 6, 1974	14.41	542
1975	Apr. 22, 1975	13.63	290

> Greater than.

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

## DES MOINES RIVER BASIN

149

5-4761. Story Brook near Petersburg, Minn.

(Site No. 67)

Location.--Lat 43°32'22", long 94°59'38", in SW $\frac{1}{4}$ NW $\frac{1}{4}$  sec.24, T.101 N., R.35 W., at bridge on U.S. Highway 71, 3.5 miles above mouth, and 3.8 miles west of Petersburg.

Drainage area.--25.8 sq mi.

Records available.--October 1959 to September 1972.

Gage.--Crest-stage gage at downstream side of bridge.

Low-steel elevation.--18.74 ft.

Bankfull stage.--17 ft.

Basin characteristics.--Main-channel length, 7.18 miles; main-channel slope, 23.2 ft per mile; mean basin altitude, 1,428 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	Mar. 29, 1960	11.03	1,030
1961	Mar. 25, 1961	11.06	1,050
1962	July 4, 1962	12.77	2,110
1963	July 18, 1963	7.82	177
1964	May 7, 1964	10.25	716
1965	Apr. 6, 1965	b12.75	1,200
1966	Mar. 28, 1966	a9.33	245
1967	June 15, 1967	10.38	763
1968	-	d	< 27
1969	June 29, 1969	13.73	2,500
1970	May 14, 1970	8.97	398
1971	Mar. 27, 1971	10.88	960
1972	July 20, 1972	7.90	203

< Less than.

a Backwater from debris.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## DES MOINES RIVER BASIN

5-4769. Fourmile Creek near Dunnell, Minn.

(Site No. 66)

Location.--Lat 43°34'57", long 94°46'26", in SW¼NW¼ sec.2, T.101 N., R.33 W., at bridge on State Highway 4, 0.6 mile above mouth, and 1.6 miles north of Dunnell.

Drainage area.--14.0 sq mi.

Records available.--October 1959 to present.

Gage.--Crest-stage gage at downstream side of bridge.

Low-steel elevation.--17.33 ft.

Bankfull stage.--13 ft.

Basin characteristics.--Main-channel length, 9.70 miles; main-channel slope, 17.2 ft per mile; mean basin altitude, 1,356 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1960	May 21, 1960	14.58	705
1961	Mar. 25, 1961	14.69	760
1962	July 4, 1962	16.15	2,200
1963	July 4, 1963	10.82	66
1964	May 7, 1964	c10.89	86
1965	Apr. 6, 1965	b14.68	370
1966	Mar. 28, 1966	c11.92	150
1967	Apr. 2, 1967	c11.38	111
1968	June 10, 1968	14.55	690
1969	June 29, 1969	15.53	1,420
1970	May 14, 1970	13.26	345
1971	May 31, 1971	13.26	345
1972	Mar. 11, 1972	b11.81	111
1973	June 18, 1973	11.35	123
1974	June 6, 1974	12.29	215
1975	Apr. 27, 1975	12.14	199

b Backwater from ice.

c Affected by shifting control.



## BIG SIOUX RIVER BASIN

151

6-4829.5 Mound Creek near Hardwick, Minn.

(Site No. 30)

Location.--Lat 43°48'18", long 96°12'47", in SE¼SE¼ sec.15, T.104 N., R.45 W.,  
at culvert on county highway, 2.2 miles northwest of Hardwick.

Drainage area.--2.47 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.62 ft, upstream; 5.08 ft, downstream.

Basin characteristics.--Main-channel length, 3.00 miles; main-channel slope,  
25.3 ft per mile; mean basin altitude, 1,690 ft; forest area, 1 percent;  
area of lakes and swamps; 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 28, 1959	10.24	99
1960	Apr. 3, 1960	10.49	106
1961	Mar. 14, 1961	c7.83	14
1962	Apr. 13, 1962	9.92	88
1963	-	d	< 5
1964	Apr. 27, 1964	7.38	20
1965	Apr. 6, 1965	b10.90	88
1966	Feb. 9, 1966	b10.22	82
1967	Apr. 2, 1967	8.35	43
1968	-	d	< 5
1969	June 29, 1969	11.48	433
1970	Apr. 5, 1970	7.79	29
1971	Mar. 27, 1971	7.90	31
1972	May 1, 1972	8.12	37
1973	Mar. 14, 1973	7.73	27
1974	-	d	< 5
1975	Apr. 9, 1975	b9.37	43

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

## BIG SIOUX RIVER BASIN

6-4829.6 Mound Creek tributary at Hardwick, Minn.

(Site No. 29)

Location.--Lat 43°46'05", long 96°12'44", in NE¼SE¼ sec.34, T.104 N., R.45 W., at culvert on U.S. Highway 75, 0.7 mile above mouth, and 0.9 mile southwest of Hardwick.

Drainage area.--0.19 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--5.38 ft, upstream; 5.00 ft, downstream.

Bankfull stage.--8 ft.

Basin characteristics.--Main-channel length, 0.66 miles; main-channel slope, 112 ft per mile; mean basin altitude, 1,682 ft; forest area, 1 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 28, 1959	10.07	260
1960	Apr. 4, 1960	7.18	60
1961	July 1, 1961	6.72	38
1962	July 2, 1962	7.25	63
1963	-	d	< 2
1964	Sept. 7, 1964	7.42	70
1965	Apr. 6, 1965	b10.08	172
1966	Feb. 9, 1966	b7.82	66
1967	June 19, 1967	6.47	23
1968	Apr. 3, 1968	6.22	9.2
1969	June 29, 1969	11.08	382
1970	June 16, 1970	6.15	6.6
1971	Mar. 27, 1971	6.54	28
1972	May 1, 1972	6.59	31
1973	Mar. 6, 1973	b7.48	24
1974	-	d	< 3
1975	Apr. 28, 1975	6.27	12

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

## BIG SIOUX RIVER BASIN

153

6-4830.5 Rock River tributary near Luverne, Minn.

(Site No. 28)

Location.--Lat 43°34'15", long 96°12'45", in NE¼NE¼ sec.10, T.101 N., R.45 W., at culvert on U.S. Highway 75, 5.8 miles south of Luverne.

Drainage area.--0.21 sq mi.

Records available.--October 1958 to September 1972

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--11.88 ft, upstream; 11.38 ft, downstream.

Bankfull stage.--14 ft.

Basin characteristics.--Main-channel length, 0.49 miles; main-channel slope, 100 ft per mile; mean basin altitude, 1,452 ft; forest area, 0 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 30, 1959	15.19	180
1960	July 17, 1960	14.24	107
1961	Mar. 14, 1961	b13.50	11
1962	July 2, 1962	14.82	152
1963	July 27, 1963	12.93	3.8
1964	July 11, 1964	13.23	22
1965	Apr. 6, 1965	b15.78	163
1966	Feb. 9, 1966	b13.68	18
1967	June 19, 1967	13.38	36
1968	-	d	< 3
1969	Apr. 6, 1969	13.3	28
1970	May 28, 1970	13.24	23
1971	June 7, 1971	14.76	146
1972	Mar. 11, 1972	b14.50	19

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

6-4832. Kanaranzi Creek tributary near Lismore, Minn.

(Site No. 27)

Location.--Lat 43°45'41", long 95°55'56", in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec.31, T.104 N., R.42 W., at culvert on county highway adjacent to State Highway 91, 60 ft above mouth and 1.2 miles northeast of Lismore.

Drainage area.--0.14 sq mi.

Records available.--October 1958 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--16.22 ft, upstream; 15.77 ft, downstream.

Bankfull stage.--18 ft.

Basin characteristics.--Main-channel length; 0.62 miles; main-channel slope, 66.0 ft per mile; mean basin altitude, 1,666 ft; forest area, 3 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 30, 1959	19.44	174
1960	May 16, 1960	17.84	62
1961	June 26, 1961	19.61	184
1962	Apr. 13, 1962	b18.52	72
1963	June 9, 1963	20.92	240
1964	July 2, 1964	17.59	49
1965	June 22, 1965	19.55	180
1966	Feb. 9, 1966	b18.23	56
1967	June 15, 1967	18.85	128
1968	July 30, 1968	17.46	42
1969	June 29, 1969	21.32	256
1970	June 16, 1970	17.53	46
1971	Mar. 27, 1971	b19.76	123
1972	July 12, 1972	18.35	93
1973	Sept. 29, 1973	17.19	29
1974	Apr. 3, 1974	17.17	28
1975	Apr. 9, 1975	b18.46	42

6-4832.1 Kanaranzi Creek tributary No. 2 near Wilmont, Minn.

(Site No. 172)

Location.--Lat 43°43'32", long 95°52'20", in SW $\frac{1}{4}$ NW $\frac{1}{4}$  sec.15, T.103 N., R.42 W., at culvert on County Highway 15, 3.5 miles southwest of Wilmont, and 3.7 miles above mouth.

Drainage area.--2.14 sq mi.

Records available.--October 1965 to present.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--2.60 ft, upstream; 2.35 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 3.42 miles; main-channel slope, 37.4 ft per mile; mean basin altitude, 1,693 ft; forest area, 0 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1966	Aug. 14, 1966	4.89	70
1967	Apr. 2, 1967	5.49	112
1968	July 30, 1968	a4.01	1.4
1969	June 29, 1969	12.03	1,230
1970	Apr. 5, 1970	5.82	135
1971	June 7, 1971	7.39	283
1972	May 1, 1972	4.74	133
1973	Mar. 14, 1973	b4.89	79
1974	Apr. 3, 1974	4.19	20
1975	Apr. 9, 1975	b6.79	46

a Backwater from debris.  
b Backwater from ice.

## LITTLE SIOUX RIVER BASIN

6-6035.2 Judicial ditch 28 tributary near Spafford, Minn.

(Site No. 25)

Location.--Lat 43°36'58", long 95°22'58", in NW¼NE¼ sec.27, T.102 N., R.38 W., at culvert on U.S. Highway 16, 0.4 mile west of Spafford, and 0.6 mile above mouth.

Drainage area.--2.66 sq mi.

Records available.--October 1958 to September 1972.

Gage.--Crest-stage gage upstream from culvert.

Culvert invert elevations.--4.85 ft, upstream; 5.12 ft, downstream.

Bankfull stage.--6 ft.

Basin characteristics.--Main-channel length, 2.77 miles; main-channel slope, 14.5 ft per mile; mean basin altitude, 1,491 ft; forest area, 0 percent; area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1959	May 30, 1959	8.31	149
1960	Apr. 13, 1960	7.55	90
1961	Mar. 27, 1961	b7.28	39
1962	Apr. 5, 1962	b7.25	50
1963	July 24, 1963	6.32	14
1964	May 6, 1964	6.26	10
1965	Apr. 6, 1965	b8.27	128
1966	Mar. 14, 1966	b7.52	25
1967	June 15, 1967	6.93	42
1968	June 24, 1968	6.43	16
1969	June 29, 1969	11.58	400
1970	Aug. 7, 1970	6.95	21
1971	Mar. 14, 1971	8.81	80
1972	Mar. 11, 1972	b7.29	40

## LITTLE SIOUX RIVER BASIN

157

6-6035.3 Little Sioux River near Spafford, Minn.

(Site No. 148)

Location.--Lat 43°36'08", long 95°15'27", in NE $\frac{1}{4}$ NE $\frac{1}{4}$  sec.34, T.102 N., R.37 W.,  
at bridge on county highway, 1.6 miles below Jackson County ditch No. 11,  
and 5.8 miles east of Spafford.

Drainage area.--41.1 sq mi.

Records available.--October 1961 to present.

Gage.--Crest-stage gage at downstream side of bridge.

Basin characteristics.--Main-channel length, 11.7 miles; main-channel slope,  
6.39 ft per mile; mean basin altitude, 1,435 ft; forest area, 1 percent;  
area of lakes and swamps, 0 percent.

Annual maximum data.--

<u>Water year</u>	<u>Date</u>	<u>Gage height (ft)</u>	<u>Discharge (cfs)</u>
1962	Apr. 6, 1962	b9.23	595
1963	July 18, 1963	7.66	118
1964	May 23, 1964	6.80	65
1965	Apr. 6, 1965	b11.08	2,700
1966	Mar. 14, 1966	b8.33	136
1967	June 15, 1967	8.52	310
1968	Apr. 23, 1968	5.92	32
1969	June 29, 1969	12.06	4,500
1970	Apr. 5, 1970	b7.70	70
1971	Mar. 27, 1971	b9.18	380
1972	Mar. 11, 1972	b8.80	134
1973	Mar. 14, 1973	b7.65	82
1974	Mar. 3, 1974	b7.65	58
1975	June 22, 1975	8.66	370

Table 1. - Maximum discharge at miscellaneous sites

Stream	Tributary to	Location	Drainage area (sq mi)	Date	Discharge (cfs)
Streams tributary to Lake Superior					
Schmidt Creek	Lake Superior	NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.17, T.51 N., R.12 W., at U.S. Highway 61, 0.5 mile upstream from mouth, and 0.6 mile northeast of French River, Minn.	4.9	9- 7-64	2,670
Mississippi River tributary basin					
Mississippi River tributary	Mississippi River	NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.1, T.41 N., R.32 W., at culvert on U.S. Highway 371, 0.3 mile south of Camp Ripley Junction, Minn., and 0.7 mile upstream from mouth.	1.5	7-22-72	215
Fletcher Creek basin					
Fletcher Creek	Mississippi River	At center of W $\frac{1}{4}$ sec.1, T.41 N., R.32 W., at box culvert on U.S. Highway 371, 0.2 mile upstream from mouth, and 0.6 mile south of Camp Ripley Junction, Minn.	19	7-22-72	924
Crow River basin					
South Fork Crow River	Crow River	SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec.31, T.117 N., R.29 W., at dam just upstream from State Highways 15 and 22 in Hutchinson, Minn., 6.2 miles upstream from McCuen Creek.	-	4-11-65	4,670
Rice Creek basin					
Rice Creek	Mississippi River	NW $\frac{1}{4}$ sec.14, T.30 N., R.24 W., at State Highway 47 in Fridley, Minn., about $\frac{1}{2}$ mile above mouth.	-	6- 8-65	606



Table 1. - Maximum discharge at miscellaneous sites--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Date	Discharge (cfs)
Minnehaha Creek basin					
Minnehaha Creek	Mississippi River	E½ sec.15, T.117 N., R.22 W., at bridge on County Highway 16 at Minnetonka Mills, Minn., 2.2 miles below outlet of Minnetonka Lake.	130	6- 1-65	*245
Minnehaha Creek	Mississippi River	In sec.18, T.28 N., R.24 W., at 50th Street in Edina, Minn.	-	5-31-65	368
Minnehaha Creek	Mississippi River	SE¼NE¼ sec.18, T.28 N., R.23 W., at bridge on Minnehaha Avenue in Minneapolis, Minn., 0.1 mile above Minnehaha Falls, and 0.8 mile above mouth.	-	5-31-65	500
Minnesota River basin					
Birch Coulee Creek tributary No. 1	Birch Coulee Creek	NE¼ sec.30, T.114 N., R.34 W., at culvert on county road, 1 mile upstream from Birch Coulee Creek, and 7 miles north of Morton, Minn.	0.62	6-11-71	155
Birch Coulee Creek	Minnesota River	SE¼ sec.29, T.114 N., R.34 W., at culvert on County Highway 50, 6 miles north of Morton, and 10 miles upstream from mouth.	14.8	6-11-71	1,890
Birch Coulee Creek tributary No. 2	Birch Coulee Creek	NE¼ sec.8, T.113 N., R.34 W., at culvert on county road, 1.5 miles upstream from Birch Coulee Creek, and 4 miles north of Morton, Minn.	1.59	6-11-71	513

\* Result of discharge measurement made near peak.

Table 1. - Maximum discharge at miscellaneous sites--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Date	Discharge (cfs)
Minnesota River basin--Continued					
Porter Creek	Sand Creek	Near north edge of sec.6, T.113 N., R.22 W., at culvert on County Highway 8, 1½ miles southwest of Lydia, and 6½ miles northeast of New Prague, Minn.	58.6	5-21-60	725
Sand Creek	Minnesota River	SE¼ sec.18, T.114 N., R.23 W., at bridge on State Highway 169, at north edge of Jordan, Minn.	238	5-21-60	8,650
Interstate 494 Storm Sewer	Minnesota River	NE¼ sec.31, T.28 N., R.23 W., at culvert under radar tower road of Headquarters Company, 3rd Missile Battalion at Fort Snelling, Minn.	0.49	8-29-64	482
Cannon River basin					
Turtle Creek	Straight River	On west line of sec.34, T.107 N., R.20 W., at bridge on U.S. Highway 65, 2½ miles above mouth, and 3 miles south of city limits of Owatonna, Minn.	-	5-31-61	2,930
Straight River	Cannon River	SW¼ sec.9, T.107 N., R.20 W., 0.9 mile above Maple Creek at Owatonna, Minn.	-	5-31-61	2,080
Zumbro River basin					
Willow Creek	Beaver Creek	SE¼ sec.23, T.106 N., R.14 W., at bridge on U.S. Highway 63, 2½ miles south of Rochester, Minn.	17.6	6- 4-58	6,240

Table 1. - Maximum discharge at miscellaneous sites--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Date	Discharge (cfs)
Zumbro River basin--Continued					
Cold Creek	Zumbro River	NE $\frac{1}{4}$ sec. 36, T.110 N., R.14 W., at culvert on State Highway 60, 0.2 mile upstream from mouth, and 0.7 mile northwest of Zumbro Falls.	45.9	5-28-70	19,800
Iowa River basin					
Rose Creek	Cedar River	NE $\frac{1}{4}$ sec. 6, T.102 N., R.16 W., at bridge on County Highway 20, $4\frac{1}{4}$ miles west of Elkton, Minn.	-	3-25-61	2,470
Big Sioux River basin					
Mound Creek	Rock River	NE $\frac{1}{4}$ sec. 24, T.103 N., R.45 W., at lower damsite in Mound Springs State Park, $4\frac{1}{4}$ miles north of Luverne, Minn.	16	5-28-59	1,480