

# SMALL-STREAM FLOOD INVESTIGATIONS IN MINNESOTA October 1958 to September 1977



U. S. GEOLOGICAL SURVEY  
Open-File Report 79-1061

Prepared in cooperation with the  
Minnesota Department of Transportation,  
Minnesota Department of Natural Resources,  
United States Army Corps of Engineers





UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

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October 1958 to September 1977

With floods from selected larger drainage areas

By George H. Carlson and Kurt T. Gunard

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### FACTORS FOR CONVERTING INCH POUND UNITS TO METRIC UNITS

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| <u>Multiply</u><br><u>Inch Pound</u>          | <u>By</u>     | <u>To obtain metric unit</u>                   |
|---|---------------|--|
|   | <u>Length</u> |  |
| feet (ft)                                     | .3048         | meters (m)                                     |
| miles (mi)                                    | 1.609         | kilometers (km)                                |
| feet per mile<br>(ft/mi)                      | .1894         | meters per<br>kilometer                        |
|   | <u>Area</u>   |  |
| square miles (mi <sup>2</sup> )               | 2.590         | square kilometers<br>(km <sup>2</sup> )        |
|   | <u>Flow</u>   |  |
| cubic feet per second<br>(ft <sup>3</sup> /s) | .02832        | cubic meters per<br>second (m <sup>3</sup> /s) |

# SMALL-STREAM FLOOD INVESTIGATIONS

## IN MINNESOTA

October 1958 to September 1977

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By George H. Carlson and Kurt T. Gunard

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### ABSTRACT

An investigation of flood flows from small drainage basins in Minnesota is being made to aid in the design of bridges, culverts and other highway drainage structures. Results of the investigation provide peak-flow data on streams generally with drainage areas less than 50 square miles, placing particular emphasis on those with drainage areas less than 10 square miles. Basin parameters being investigated for their effect on floods are drainage area, length of main stream, slope of main channel, basin altitude, forest cover, and storage area. All the 163 gaging stations included in the report are equipped with crest-stage gages, and 10 stations are equipped to record stage and precipitation continuously. The relative magnitude of flood flows for different hydrologic regions is shown in graphs that relate maximum discharge to drainage area. Station records contain location, drainage area, records available, type of gage, on-site structure elevations, bankfull stage, and annual maximum stage and discharge data. The data form the basis for statewide flood-frequency studies.

### 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". These reports are applicable to areas 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 begun in August 1958. This program was designed to provide flood data on streams generally with drainage areas less than 50 square miles, placing particular emphasis on those with drainage areas less than 10 square miles. Effort was oriented toward collecting hydrologic data that would form the basis for defining flood-frequency characteristics and provide information for detailed hydrologic studies.

In 1977, a comprehensive flood-frequency report was published utilizing all data collected in this program through the 1975 water year. These data were combined with annual peak data available from the entire stream-gaging program since its beginning in the early 1900's. The resulting report, titled "Techniques for estimating magnitude and frequency of floods in Minnesota", was published as U.S. Geological Survey Water-Resources Investigations 77-31.

Emphasis in the program has not changed, and collection of hydrologic data continues in the same manner as in the past. Additional years of record will improve flood-frequency estimates and may reduce standard errors of estimate.

This report, which is the seventh of a biennial series (see References), has been prepared to document the status of the program and to make available the hydrologic data collected through the 1977 water year. A general description of the program, methods of operation, and a presentation of the basic data are included in the report.

Also included in this report are peak data from selected stations funded by other programs in recent years. Though flood data have been collected at several stations, some on much larger drainage basins, it has never been made

available in a published summarized format. This series of reports affords a means of communicating the complete record of annual floods for these stations as well and will be an important supplement to future flood-frequency reports.

### Cooperation

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

Data from 25 additional crest-stage gage sites, operated under other cooperative programs, have been included in this report for the first time. Twenty-one of these sites are financed under a cooperative agreement between the Minnesota Department of Natural Resources and the U.S. Geological Survey. The remaining four sites are financed under an agreement with the U.S. Army Corps of Engineers.

### DESCRIPTION OF PROGRAM

The ideal basis for selecting design discharge is from frequency-discharge relationships defined for each site under consideration. However, installing gages on the vast number of sites in Minnesota is impractical, 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 can be developed for the entire State.

The program is planned so as to obtain hydrologic data for small watersheds to supplement data obtained in other stream-gaging programs in larger drainage areas. In general, streams with drainage areas less than 50 square miles are of interest in this program. 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 and was completed in October 1965. 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 present network of 124 stations, pending a network analysis of the entire Survey stream-gaging program in Minnesota. Results of this analysis may indicate that some stations should be discontinued and others established. The locations of gaging stations, for which data are tabulated in this report, are shown in figure 1.

Hydrologic data obtained under this program, and other data reported herein, consist primarily of the annual peak gage height and discharge at each active gaging station during the water year. 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 been equipped with continuously recording gages, from which discharge hydrographs can be derived, to show the total volume of runoff during floods. Most stations equipped with continuous recorders are also equipped with automatic tipping-bucket rain gages to obtain simultaneous records of water stage and precipitation. The recording equipment is not installed permanently, but will be operated at a site 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, depending 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 25 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.

The small-stream program also provides for the investigation of outstanding floods in ungaged areas. These investigations are confined to present or proposed highway crossings.

Many basin characteristics that may affect the magnitude of floods have been investigated in 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 topographic and soil conditions, provide adequate areal coverage, and include the desired range in drainage areas.

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 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 to protect it from destruction by high velocities, debris, or ice. Because of the flashy nature of runoff from many small watersheds, it is often necessary to rely on indirect methods of measuring discharge rather than the conventional current-meter measurement. Bridges or 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 technical 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 during floods, it covers the intake holes and rises inside the gage pipe. The granulated cork floats on the water rising inside the pipe; when the water recedes, a ring of cork is left on the wooden rod at the same elevation as the peak stage. After the 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. Rain is collected in the receiver and transferred to the tipping-bucket device, where it is measured in 0.1-inch increments. When 0.1 inch of rain accumulates, the bucket tips, closing an electrical circuit, which activates the counter and moves a second pen on the recorder chart.

Recording both precipitation and stream 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 inspections are made at each gaging station through most of the year at approximately monthly intervals. Additional inspections are made during the spring snowmelt and during periods of intense thundershowers. Inspections are discontinued during winter when flood peaks normally do not occur, unless it is known that runoff has been significant in the basin. At each inspection, 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. A plot of the water-surface profile is made from the data.

As two or more peak flows may occur between inspections to a gaging station, a higher peak may wash off the cork lines left by previously recorded lower peaks. As a result, the peak 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 recorded.

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 monthly.

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 on 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 methods are utilized. 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, where applicable. Hydrologists 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 determining 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 backwater from ice during runoff in early spring. For this reason, gaging stations are inspected more frequently during spring snowmelt than at other times in order to assess ice conditions, from which backwater corrections can be estimated.

Permanent bench marks are established at each gaging station 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, to determine the backwater-free, or effective stage for each peak. A curve of relation between stage and discharge is established when sufficient discharge measurements become available. The highest effective stage for the water year is applied to this curve to determine the maximum discharge. The dates on which peak flows occur are determined from precipitation data collected in the drainage basins and by correlation with time-oriented precipitation and stage-hydrographs 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 made to provide peak stage and discharge. Also, precipitation data may be collected from local sources in the immediate area. 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 19 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 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 eight hydrologic regions, as illustrated in figure 1. These region boundaries are intended to enclose areas having similar hydrologic characteristics. The region boundaries are considered provisional and may require revision when additional flood data indicate another complete analysis needs to be made.

Table 1. - Maximum discharge at miscellaneous sites

| Stream                             | Tributary to      | Location  | Drainage area (mi <sup>2</sup> ) | Date    | Discharge (ft <sup>3</sup> /s) |
|------------------------------------|-------------------|---|----------------------------------|---------|--------------------------------|
| 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 $\frac{1}{4}$ mile above mouth.   | -                                | 6- 8-65 | 606                            |

Table 1. - Maximum discharge at miscellaneous sites--Continued

| Stream                             | Tributary to       | Location  | Drainage area<br>(mi <sup>2</sup> ) | Date    | Discharge<br>(ft <sup>3</sup> /s) |
|------------------------------------|--------------------|---|-------------------------------------|---------|-----------------------------------|
| 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 (mi. <sup>2</sup> ) | Date    | Discharge (ft <sup>3</sup> /s) |
|----------------------------------|-----------------|---|-----------------------------------|---------|--------------------------------|
| 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 | SE¼SE¼ 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 | NE¼SE¼ 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    | SW¼SE¼ 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<br>(mi <sup>2</sup> ) | Date    | Discharge<br>(ft <sup>3</sup> /s) |
|-------------------------------|--------------|--|-------------------------------------|---------|-----------------------------------|
| 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                             |

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 to drainage area. These data for each of the several hydrologic regions are shown in figures 2-9, 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. 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 where they have been determined, 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. The word "revised" appears in parenthesis after the drainage area value only in the first report of the biennial series following the revision.

For years, when information was insufficient to determine the annual maximum discharge, 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 at the on-site drainage structure. Information on recovery of this datum can be obtained from the Minnesota District Office of the U.S. Geological Survey, 702 Post Office Building, St. Paul, Minn. 55101. At some sites, the elevation of the gage referenced to the National Geodetic Vertical Datum of 1929 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 an upper 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--(1) the part number and (2) the station number. The first two digits designate 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 last six digits 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 Department of Transportation.

Drainage area - That area measured in a horizontal plane, enclosed by a topographic divide, within which direct surface runoff from precipitation normally flows by gravity into a stream, above a specified point. This may include closed basins and other areas which do not contribute directly to surface runoff.

Contributing drainage area - The net drainage area enclosed by a topographic divide which contributes directly to surface runoff above a specified point.

Bankfull stage - That gage height at which the stream begins to flow overbank 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. 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 and 85 percent of the distance along the main channel from the gaging station to the divide.

Mean basin altitude - The altitude, in feet, referenced to National Geodetic Vertical Datum of 1929, computed as the mean of altitudes at the 10 and 85 percent points along the main stream channel.

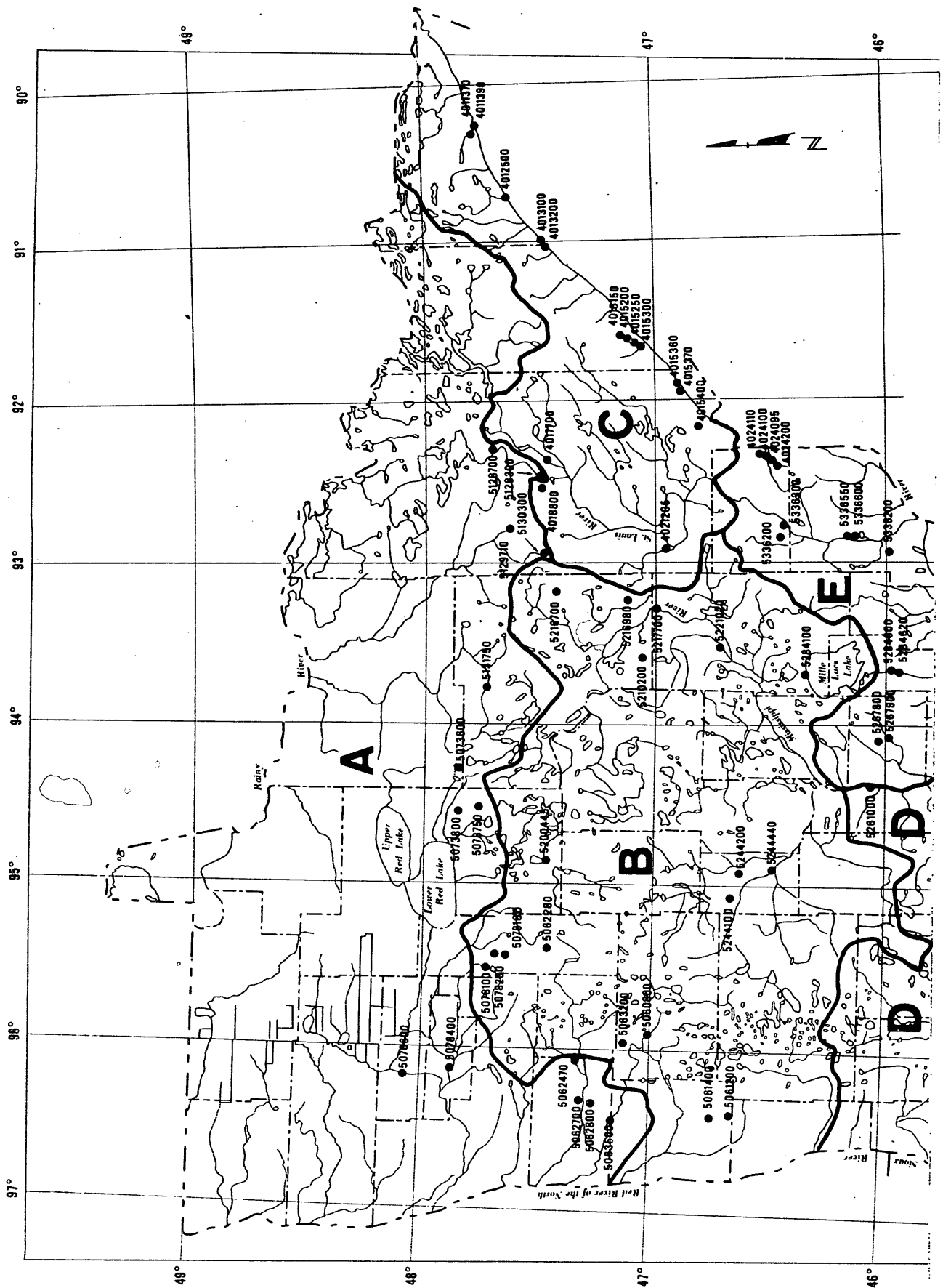
Forest area - Area expressed as percentage of the drainage area covered by forests, as shown on topographic maps and determined by the grid method.

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

## REFERENCES

- Guetzkow, L. C., 1973, Small-stream investigations in Minnesota, October 1958 to September 1971: U.S. Geological Survey open-file report, 160 p.
- 1977, Techniques for estimating magnitude and frequency of floods in Minnesota: U.S. Geological Survey Water-Resources Investigations 77-31, 33 p.
- Guetzkow, L. C., and Carlson, G. H., 1969, Small-stream investigations in Minnesota, October 1958 to September 1967: U.S. Geological Survey open-file report, 174 p.
- Guetzkow, L. C., and Gunard, K. T., 1967, Small-stream flood investigations in Minnesota, October 1958 to September 1965: U.S. Geological Survey open-file report, 162 p.
- 1975, Small-stream flood investigations in Minnesota, October 1958 to September 1973: U.S. Geological Survey open-file report, 161 p.
- 1977, Small-stream flood investigations in Minnesota, October 1958 to September 1975: U.S. Geological Survey Open-file Report 77-39, 161 p.
- Gunard, K. T., and Guetzkow, L. C., 1971, Small-stream flood investigations in Minnesota, October 1958 to September 1969: U.S. Geological Survey open-file report, 174 p.



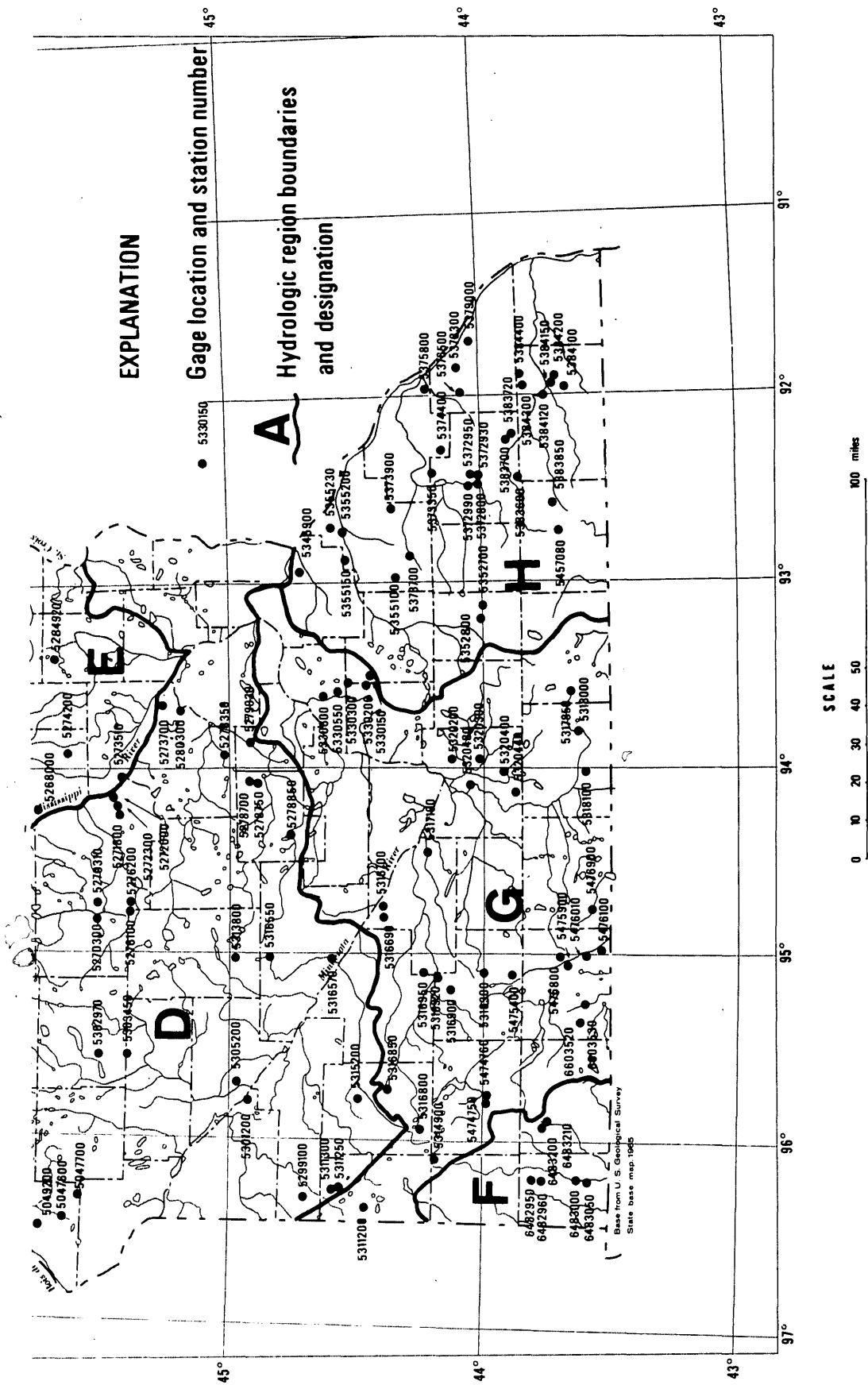


Figure 1 — Map of Minnesota showing location of gaging stations and hydrologic regions.

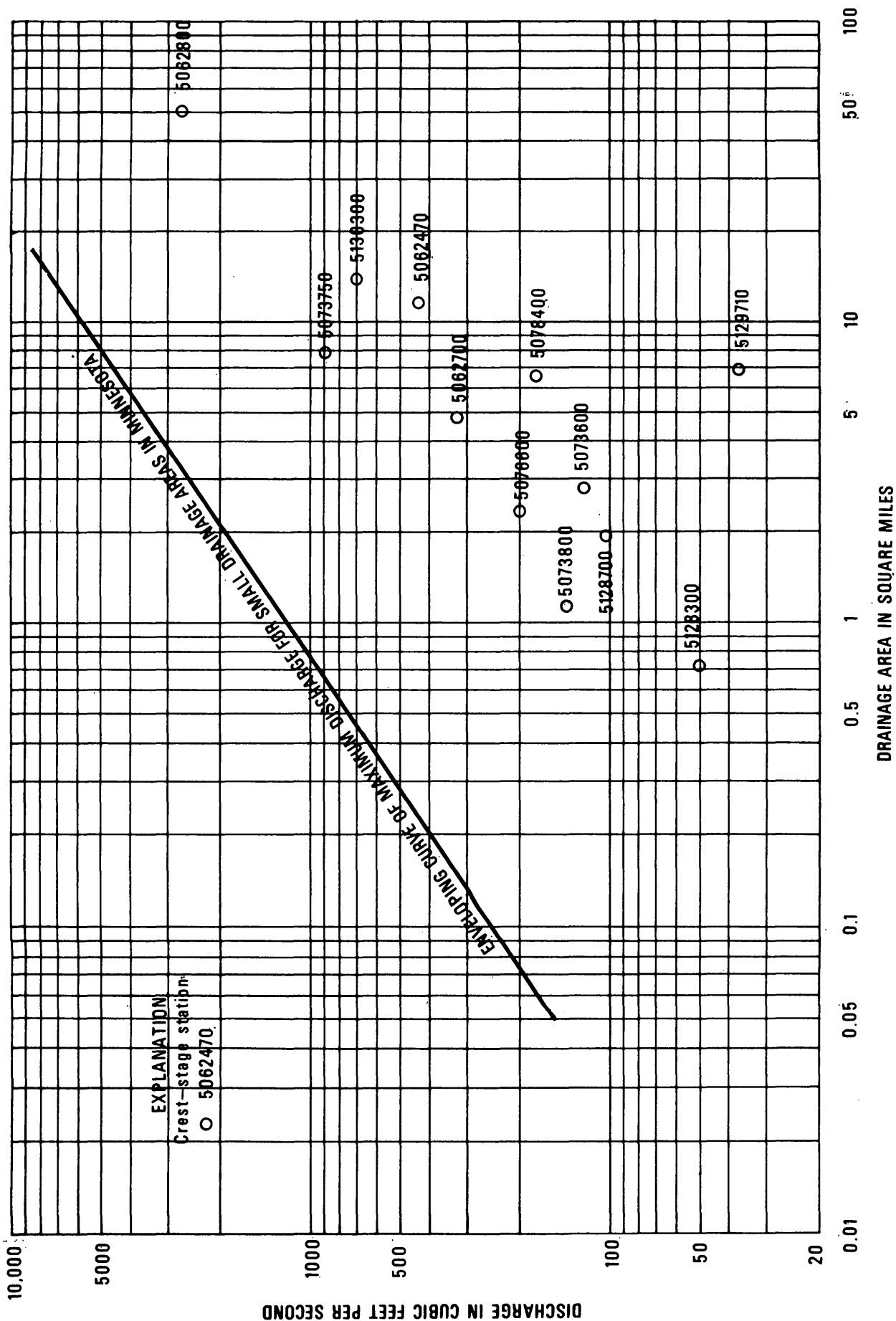


Figure 2.—Maximum discharge from small drainage areas in hydrologic region A

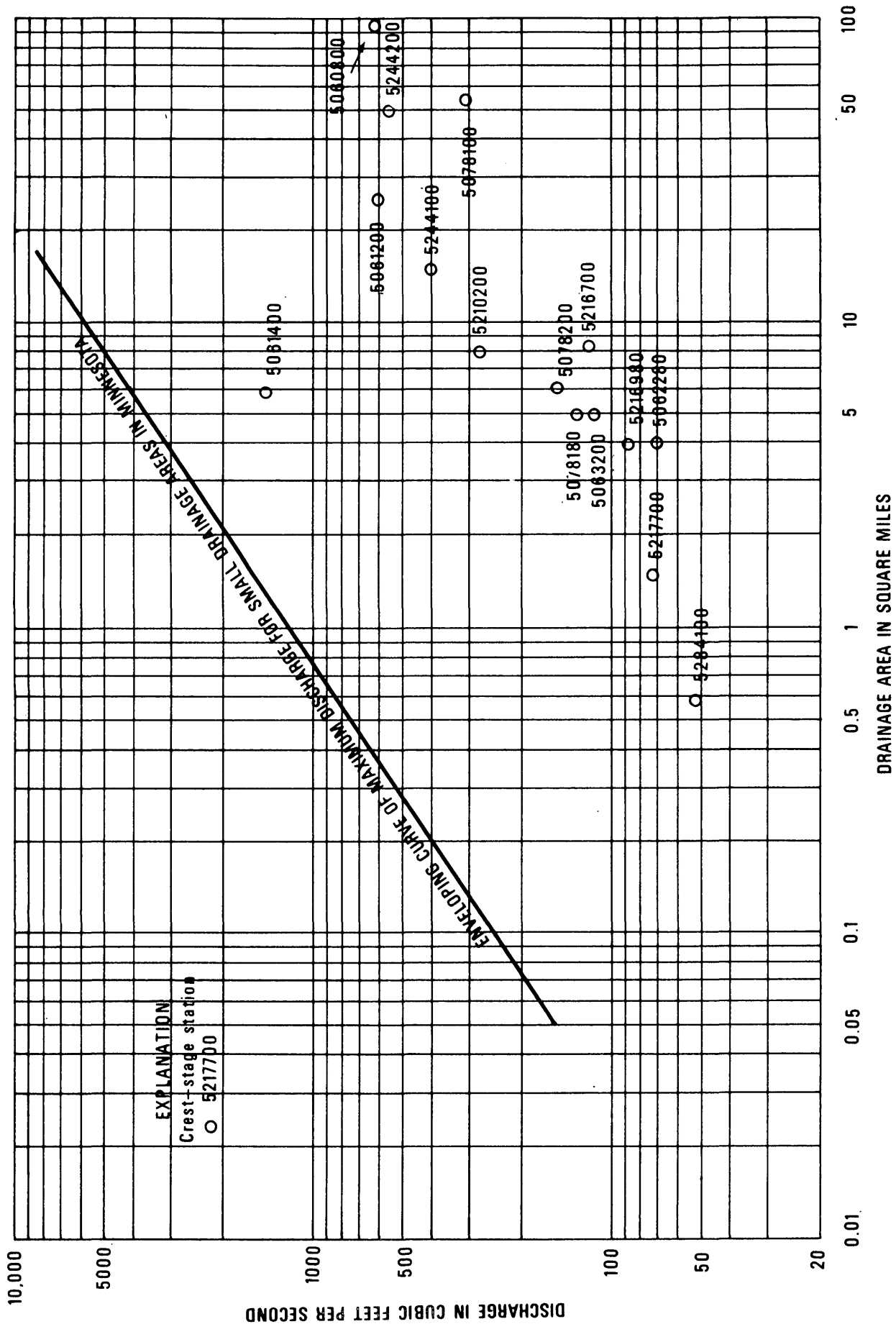


Figure 3.—Maximum discharge from small drainage areas in hydrologic region B

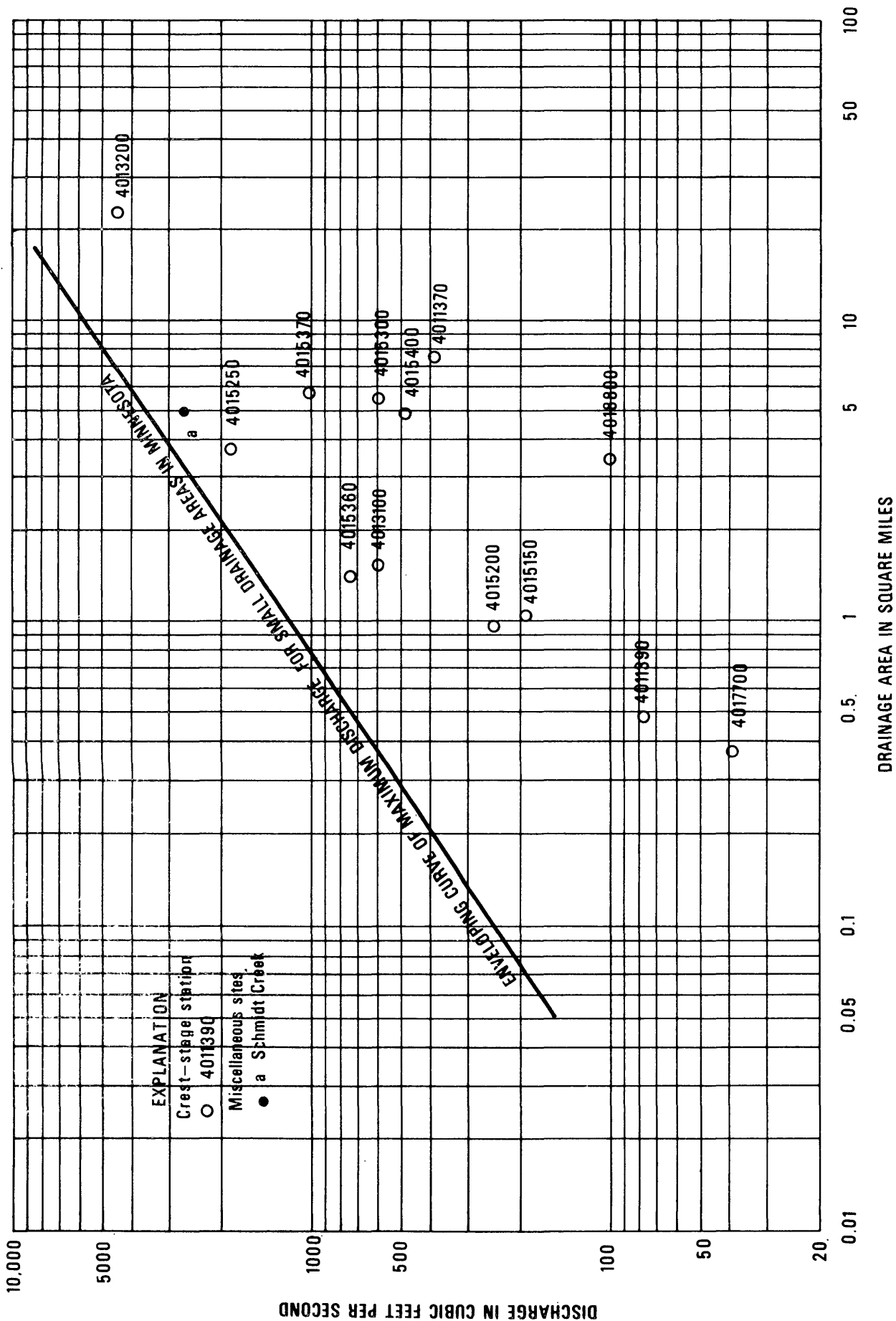


Figure 4 .— Maximum discharge from small drainage areas in hydrologic region C



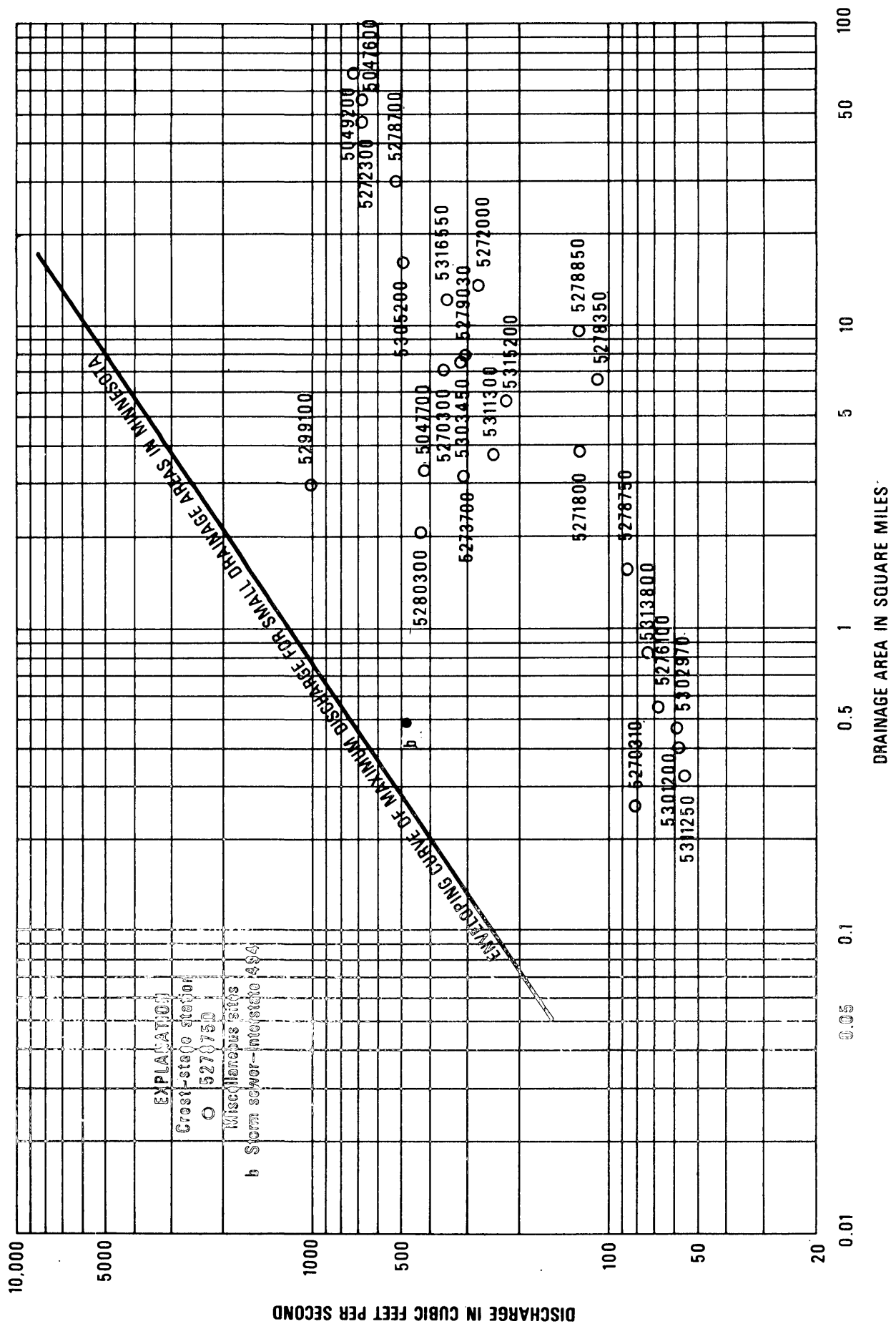


Figure 5.—Maximum discharge from small drainage areas in hydrologic region D

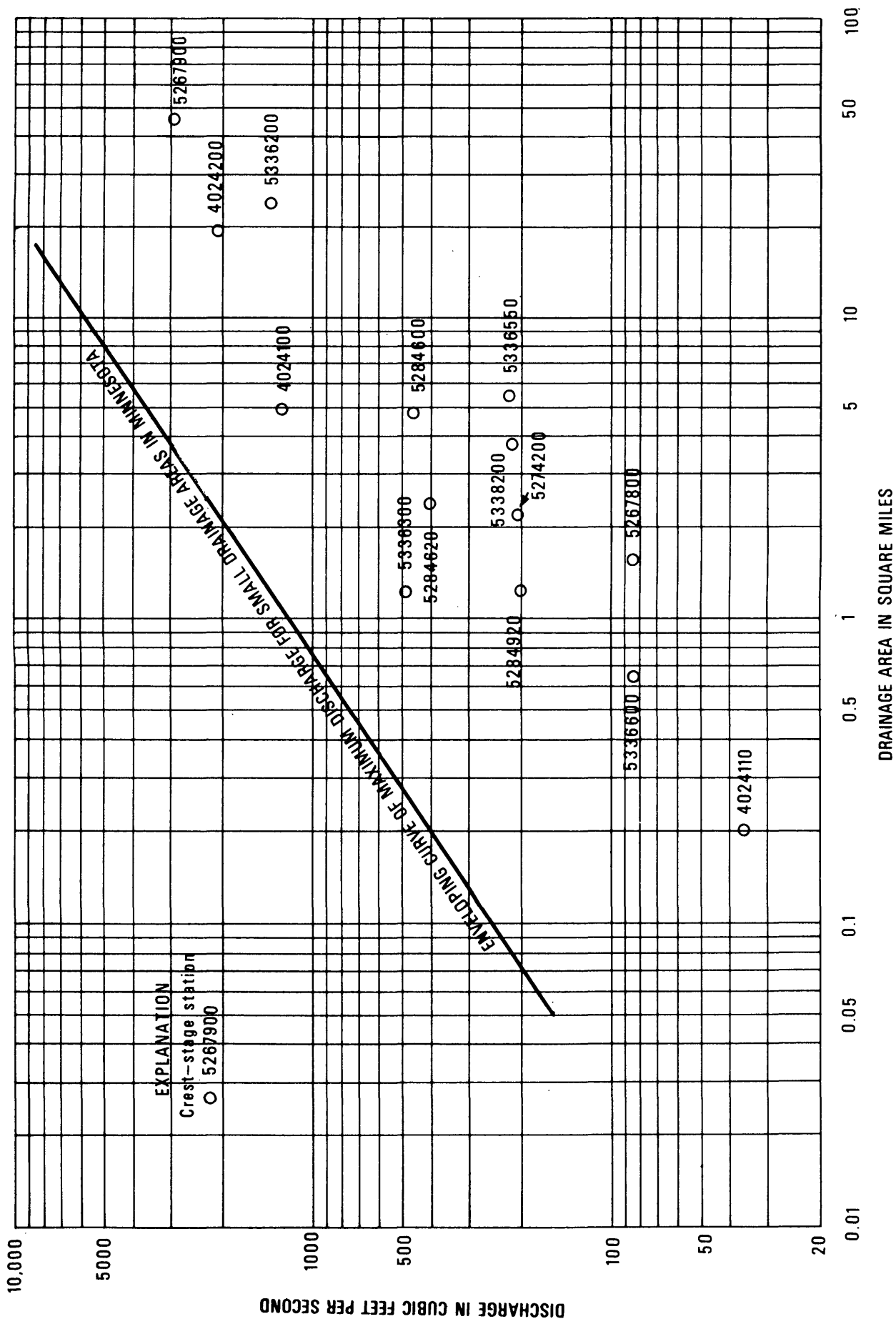


Figure 6.— Maximum discharge from small drainage areas in hydrologic region E

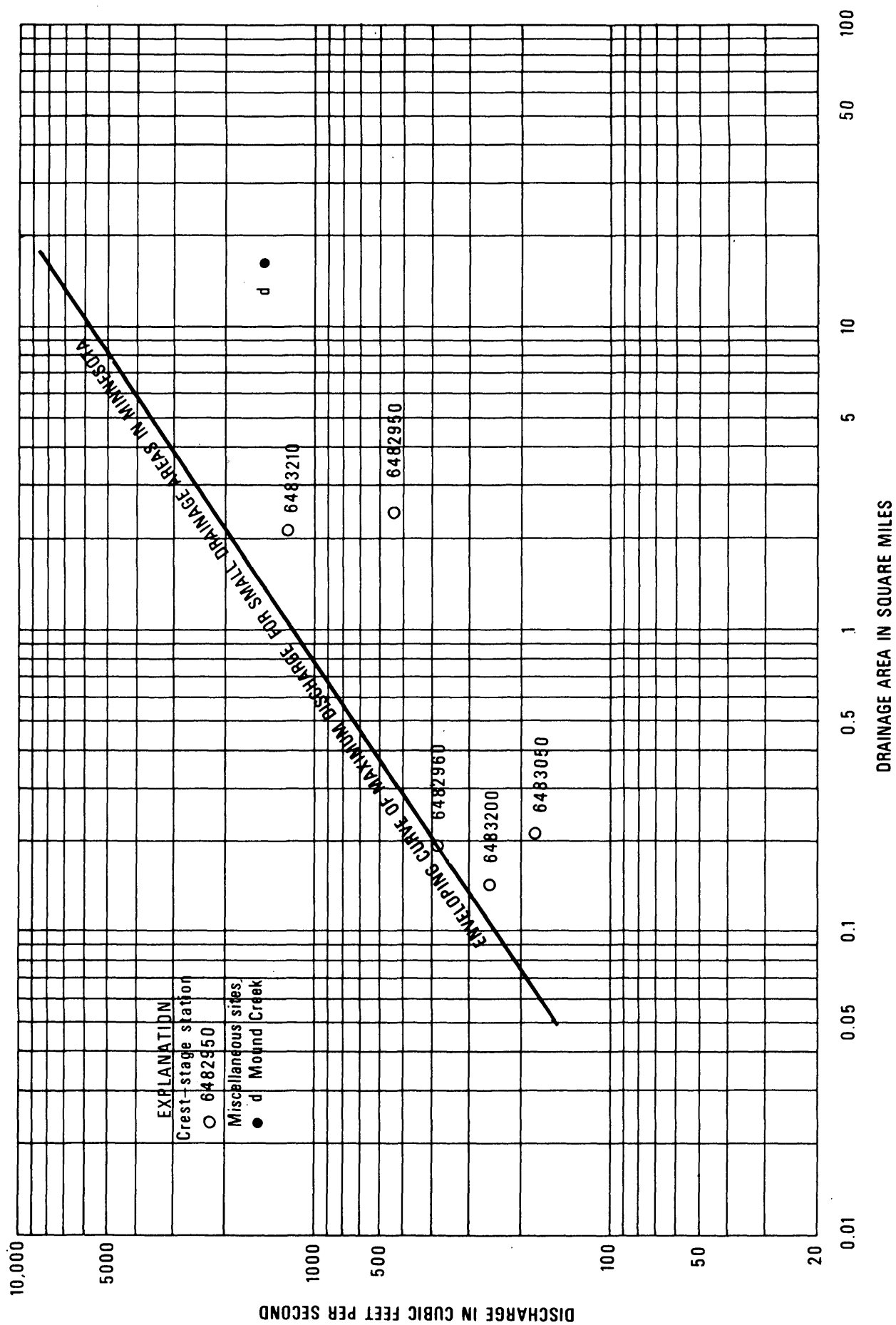


Figure 7.—Maximum discharge from small drainage areas in hydrologic region F

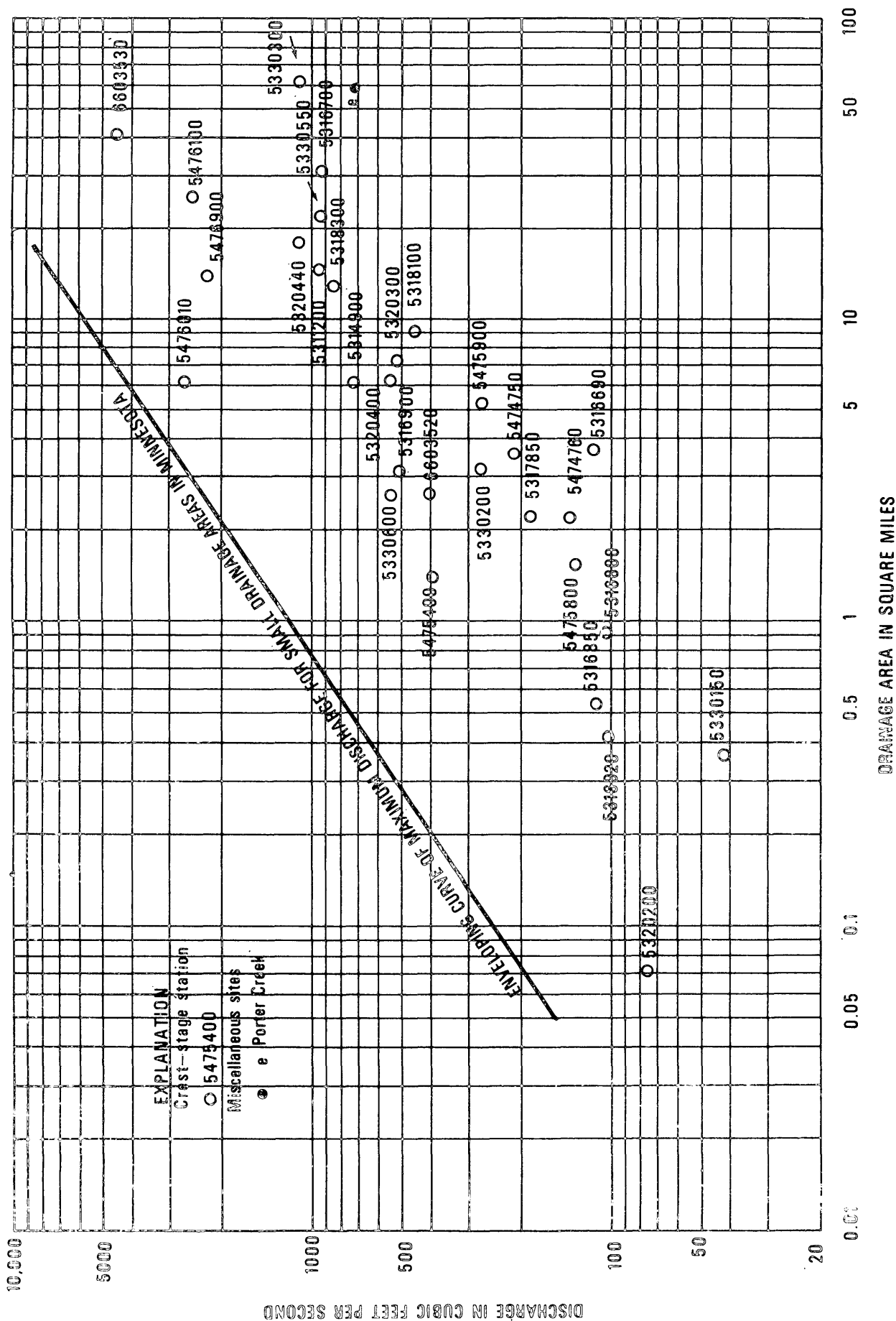


Figure 8.—Maximum discharge from small drainage areas in hydrologic region G

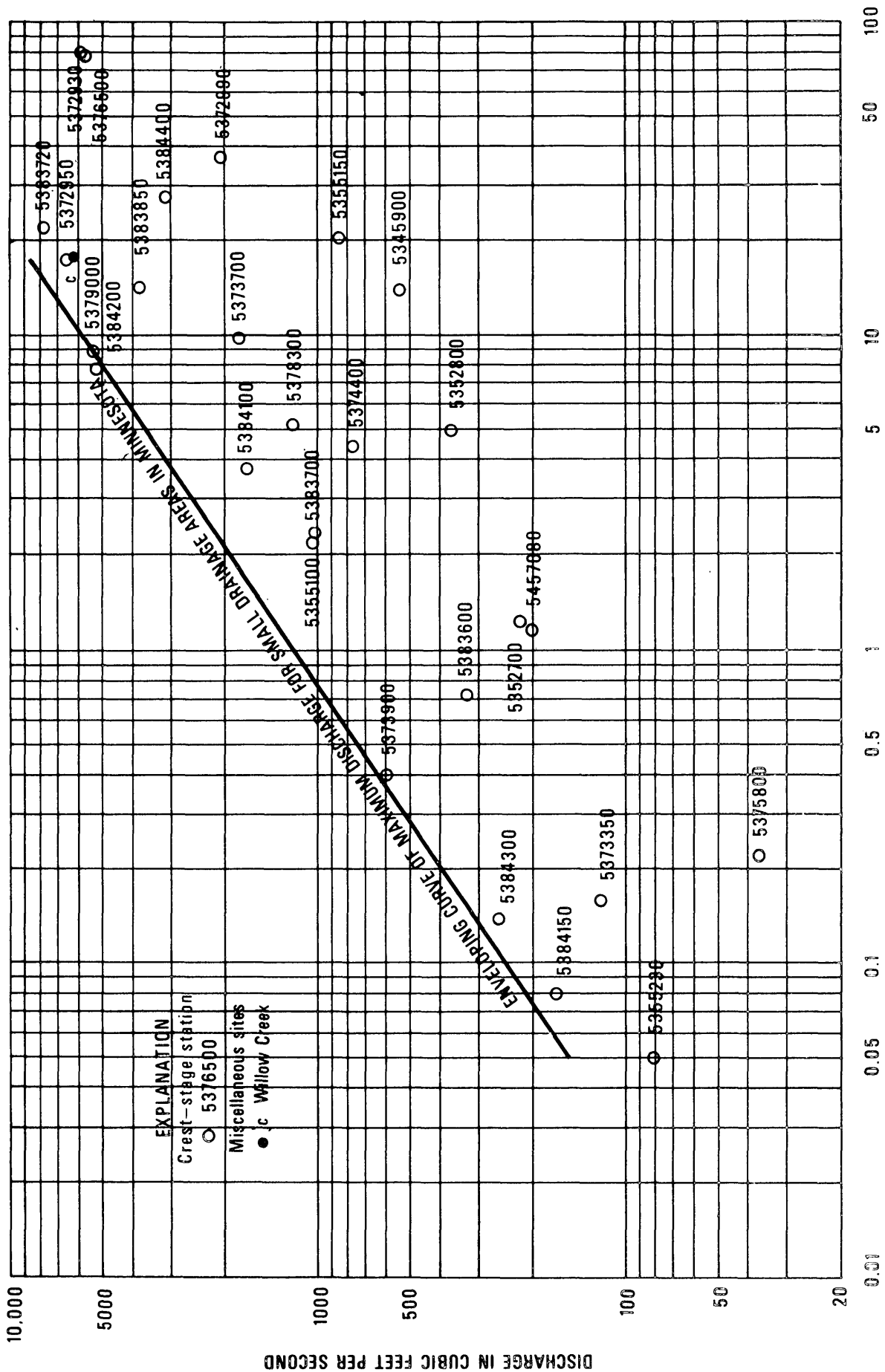


Figure 9.—Maximum discharge from small drainage areas in hydrologic region M

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04011370 Little Devil Track River near Grand Marais, MN

(Site No. 132)

Location.--Lat 47°47'09", long 90°19'44", in NE 1/4 NW 1/4 sec.9, T.61 N., R.1 E., Cook County, Hydrologic Unit 04010101, at culvert on County Highway 12, 1.6 miles above mouth, and 2.5 miles north of Grand Marais.

Drainage area.--7.49 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1961              | 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                                  |
| 1976              | Apr. 16, 1976 | 18.48                   | 213                                 |
| 1977              | Sept.24, 1977 | 22.33                   | 388                                 |

a Backwater from debris.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04011390 Little Devil Track River tributary near Grand Marais, MN

(Site No. 170)

Location.--Lat 47°47'17", long 90°19'20", in SE 1/4 SE 1/4 sec.4, T.61 N., R.1 E., Cook County, Hydrologic Unit 04010101, at culvert on County Highway 55, 0.2 mile above mouth, and 2.8 miles north of Grand Marais.

Drainage area.--0.47 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 16, 1976 | 10.31                   | 7.7                                 |
| 1977              | Sept.24, 1977 | 16.75                   | 77                                  |

b Backwater from ice.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04012500 Poplar River at Lutsen, MN

Location.---Lat 47°38'23", long 90°42'31", in SW 1/4 NE 1/4 sec.33, T.60 N., R.3 W., Cook County, Hydrologic Unit 04010101, 350 ft upstream from bridge on U.S. Highway 61 at Lutsen, and 0.3 mile upstream from mouth.

Drainage area.---112 mi<sup>2</sup>.

Records available.---May to November 1911, August 1912 to September 1917, July 1928 to September 1947, August 1952 to September 1961, October 1971 to present. Continuous records available October 1912 to September 1917, July 1928 to September 1947, and August 1952 to September 1961.

Gage.---Water-stage recorder and concrete control. Datum of gage is 697.89 ft, National Geodetic Vertical Datum of 1929. May 6 to November 1911, nonrecording gage at site 1,250 ft downstream, August 22, 1912 to September 30, 1917 at site 900 ft downstream at different datum, July 17, 1928 to March 30, 1937, at site 150 ft downstream at datum 6.90 ft lower.

Remarks.---Prior to 1915, some regulation by dams about 2.5 miles upstream.

## Annual maximum data.---

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1913              | Apr. 25, 1913 | 3.08                    | 462                                 |
| 1914              | Aug. 11, 1914 | 3.75                    | 773                                 |
| 1915              | June 13, 1915 | 2.95                    | 412                                 |
| 1916              | Apr. 25, 1916 | 4.70                    | 1,390                               |
| 1917              | June 19, 1917 | 3.72                    | 756                                 |
| 1930              | May 9, 1930   | 8.0                     | 850                                 |
| 1931              | Nov. 21, 1930 | 7.55                    | 760                                 |
| 1932              | May 10, 1932  | 6.35                    | 521                                 |
| 1934              | May 7, 1934   | 8.32                    | 914                                 |
| 1935              | Apr. 30, 1935 | 8.02                    | 854                                 |
| 1936              | May 7, 1936   | 7.96                    | 842                                 |
| 1937              | May 1, 1937   | 10.02                   | 1,250                               |
| 1938              | Apr. 29, 1938 | 5.25                    | 908                                 |
| 1939              | May 1, 1939   | 5.36                    | 1,090                               |
| 1940              | Apr. 30, 1940 | 4.10                    | 481                                 |
| 1941              | Apr. 14, 1941 | b4.94                   | 850                                 |
| 1942              | May 15, 1942  | 4.84                    | 835                                 |
| 1943              | June 3, 1943  | 5.44                    | 1,150                               |
| 1944              | June 5, 1944  | 5.31                    | 1,060                               |
| 1945              | Mar. 28, 1945 | 4.97                    | 1,220                               |
| 1946              | ---           | 3.79                    | 505                                 |
| 1947              | May 3, 1947   | ---                     | e1,200                              |

b Backwater from ice.

e Estimated.



## 04012500 Poplar River at Lutsen, MN--Continued

Annual maximum data.--Continued

| <u>Water year</u> | <u>Date</u>    | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|----------------|-------------------------|-------------------------------------|
| 1953              | May 31, 1953   | 4.35                    | 548                                 |
| 1954              | May 1, 1954    | 6.23                    | 1,880                               |
| 1955              | Apr. 21, 1955  | 4.49                    | 564                                 |
| 1956              | May 14, 1956   | 5.55                    | 1,290                               |
| 1957              | Apr. 25, 1957  | 5.48                    | 1,170                               |
| 1958              | June 5, 1958   | 3.84                    | 238                                 |
| 1959              | Aug. 26, 1959  | 4.70                    | 742                                 |
| 1960              | Apr. 25, 1960  | 5.24                    | 1,050                               |
| 1961              | Apr. 21, 1961  | 5.56                    | 1,300                               |
| 1972              | May 2, 1972    | 5.51                    | 1,260                               |
| 1973              | May 26, 1973   | 5.17                    | 1,000                               |
| 1974              | May 12, 1974   | 4.98                    | 1,050                               |
| 1975              | May 3, 1975    | 4.69                    | 640                                 |
| 1976              | Apr. 19, 1976  | 6.21                    | 1,860                               |
| 1977              | Sept. 25, 1977 | 8.09                    | 4,780                               |

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04013100 Lake Superior tributary near Taconite Harbor, MN

(Site No. 161)

Location.--Lat 47°29'14, long 90°59'19", in SW 1/4 SE 1/4 sec.20, T.58 N., R.5 W., Cook County, Hydrologic Unit 04010101, at culvert on U.S. Highway 61, 0.2 mile above mouth, and 3.7 miles southwest of Taconite Harbor.

Drainage area.--1.56 mi<sup>2</sup>.

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.

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 (ft<sup>3</sup>/s)</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, 1973   | 10.47                   | 129                                 |
| 1975              | Apr. 28, 1975  | 7.94                    | 54                                  |
| 1976              | Apr. 7, 1976   | 7.48                    | 42                                  |
| 1977              | Sept. 24, 1977 | 14.60                   | 416                                 |

b Backwater from ice.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04013200 Caribou River near Little Marais, MN

(Site No. 130)

Location.--Lat 47°27'51", long 91°01'50", in NW 1/4 SE 1/4 sec.36, T.58 N., R.6 W., Lake County, Hydrologic Unit 04010101, at culvert on U.S. Highway 61, 0.2 mile above mouth, and 5.2 miles northeast of Little Marais.

Drainage area.--22.7 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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 | 16.38                   | 1,230                               |
| 1973              | June 4, 1973  | 12.92                   | 463                                 |
| 1974              | May 11, 1974  | 13.88                   | 655                                 |
| 1975              | Apr. 23, 1975 | 12.69                   | 422                                 |
| 1976              | Apr. 16, 1976 | 12.67                   | 417                                 |
| 1977              | Sept.24, 1977 | 27.00                   | 4,430                               |

b Backwater from ice.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04015150 Crow Creek near Silver Creek, MN

(Site No. 58)

Location.--Lat 47°08'30", long 91°34'38", in SW 1/4 SW 1/4 sec.23, T.54 N., R.10 W., Lake County, Hydrologic Unit 04010102, at culvert on County Highway 3, 2.3 miles northeast of Silver Creek, and 4.0 miles above mouth.

Drainage area.--1.07 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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  | 11.34                   | 196                                 |
| 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

04015200 Encampment River tributary at Silver Creek, MN

(Site No. 59)

Location.--Lat 47°07'01", long 91°36'04", in NE 1/4 SE 1/4 sec.33, T.54 N., R.10 W., Lake County, Hydrologic Unit 04010102, at culvert on County Highway 3, 0.3 mile north of Silver Creek, and 1.4 miles above mouth.

Drainage area.--0.96 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Apr. 9, 1976   | c6.90                   | 22                                  |
| 1977              | Sept. 24, 1977 | 8.42                    | 60                                  |

b Backwater from ice.

c Affected by shifting control.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04015250 Silver Creek tributary near Two Harbors, MN

(Site No. 169)

Location.--Lat 47°04'40", long 91°36'49", in SW 1/4 NE 1/4 sec.16, T.53 N., R.10 W., Lake County, Hydrologic Unit 04010102, at culvert on County Highway 3, 1.0 mile above mouth, and 4.5 miles northeast of Two Harbors.

Drainage area.--3.72 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                   | (/)                                 |
| 1976              | June 15, 1976  | 2.77                    | (/)                                 |
| 1977              | Sept. 24, 1977 | 5.95                    | 318                                 |

/ Discharge not determined.

b Backwater from ice.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04015300 Little Stewart River near Two Harbors, MN

(Site No. 57)

Location.--Lat 47°03'52", long 91°40'03", in SE 1/4 NE 1/4 sec.24, T.53 N., R.11 W., Lake County, Hydrologic Unit 04010102, at culvert on county highway, 2.0 miles above mouth, and 2.7 miles north of Two Harbors.

Drainage area.--5.54 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 31, 1976 | b11.38                  | 143                                 |
| 1977              | Sept.24, 1977 | 13.24                   | 377                                 |

b Backwater from ice.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04015360 Lake Superior tributary No. 2 at French River, MN

(Site No. 160)

Location.--Lat 46°53'43", long 91°54'31", in SW 1/4 SE 1/4 sec.18, T.51 N., R.12 W., St. Louis County, Hydrologic Unit 04010102, at culvert on U.S. Highway 61, 0.35 mile above mouth, and 0.7 mile west of French River.

Drainage area.--1.41 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Apr. 6, 1976  | 17.62                   | 51                                  |
| 1977              | Sept.24, 1977 | 23.63                   | 283                                 |

b Backwater from ice.



# STREAMS TRIBUTARY TO LAKE SUPERIOR

04015370 Talmadge River at Duluth, MN

(Site No. 159)

Location.--Lat 46°53'20", long 91°55'21", in SE 1/4 NE 1/4 sec.24, T.51 N., R.13 W., St. Louis County, Hydrologic Unit 04010102, 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 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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              | Apr. 15, 1973 | b14.11                  | h152                                |
| 1974              | Oct. 9, 1973  | 16.42                   | h470                                |
| 1975              | Apr. 27, 1975 | 14.69                   | 252                                 |
| 1976              | Apr. 1, 1976  | 13.70                   | 140                                 |
| 1977              | Sept.24, 1977 | 15.94                   | 415                                 |

b Backwater from ice.

h Revised.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04015400 Miller Creek at Duluth, MN

(Site No. 56)

Location.--Lat 46°49'01", long 92°10'42", in SE 1/4 NE 1/4 sec.13, T.50 N., R.15 W., St. Louis County, Hydrologic Unit 04010201, at culvert on U.S. Highway 53, 0.2 mile northwest of Duluth city limits.

Drainage area.--4.92 mi<sup>2</sup>.

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.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>    | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 2, 1976   | 15.23                   | 120                                 |
| 1977              | Sept. 24, 1977 | 18.16                   | 360                                 |

b Backwater from ice.

c Affected by shifting control.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04017700 McKinley Lake tributary at McKinley, MN

(Site No. 54)

Location.--Lat 47°30'41", long 92°25'11", in SW 1/4 NE 1/4 sec.18, T.58 N., R.16 W., St. Louis County, Hydrologic Unit 04010201, at culvert on State Highway 135, at west edge of McKinley.

Drainage area.--0.37 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 9, 1976   | b7.19                   | 2.0                                 |
| 1977              | Aug. 27, 1977  | 11.65                   | 39                                  |

b Backwater from ice.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04018800 East Two River tributary at Virginia, MN

(Site No. 40)

Location.--Lat 47°31'54", long 92°33'51", in NE 1/4 NE 1/4 sec.12, T.58 N., R.18 W., St. Louis County, Hydrologic Unit 04010201, 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 mi<sup>2</sup>. (Contributing area)  
4.26 mi<sup>2</sup>. (Total area)

Records available.--October 1958 to September 1972.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,421.72 ft, National Geodetic Vertical 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 (ft<sup>3</sup>/s)</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

04021205 Floodwood River above Floodwood, MN

Location.--Lat 46°17'15", long 92°53'40", in NE 1/4 NW 1/4 sec.32, T.52 N., R.20 W., St. Louis County, Hydrologic Unit 04010201, at bridge on County Highway 835, 500 ft west of State Highway 73, and 2 miles north of Floodwood.

Records available.--October 1971 to present.

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

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1972              | Apr. 19, 1972 | 19.78                   | 1,590                               |
| 1973              | May 11, 1973  | 14.95                   | 857                                 |
| 1974              | Oct. 13, 1973 | 17.96                   | 1,300                               |
| 1975              | May 1, 1975   | 19.91                   | 2,030                               |
| 1976              | Apr. 6, 1976  | 15.23                   | 1,020                               |
| 1977              | Sept.27, 1977 | 12.78                   | 491                                 |

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04024095 Nemadji River near Holyoke, MN

Location.--Lat 46°31'04", long 92°23'22", in NE 1/4 NE 1/4 sec.32, T.47 N., R.16 W., Carlton County, Hydrologic Unit 04010301, at bridge on State Highway 23, 3.5 miles north of Holyoke.

Drainage area.--118 mi<sup>2</sup>.

Records available.--October 1971 to present.

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

Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1972              | Sept.29, 1972 | 15.31                   | 3,250                               |
| 1973              | Mar. 11, 1973 | b11.25                  | 1,270                               |
| 1974              | June 9, 1974  | 12.55                   | 2,000                               |
| 1975              | Apr. 23, 1975 | 12.20                   | 1,850                               |
| 1976              | Apr. 1, 1976  | b14.69                  | 1,650                               |
| 1977              | Sept.24, 1977 | d                       | e900                                |

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04024100 Rock Creek near Blackhoof, MN

(Site No. 128)

Location.--Lat 46°32'10", long 92°22'12", in SW 1/4 SE 1/4 sec.21, T.47 N., R.16 W., Carlton County, Hydrologic Unit 04010301, at culvert on State Highway 23, 4.0 miles above mouth, and 4.4 miles east of Blackhoof.

Drainage area.--4.94 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | June 18, 1976 | 15.12                   | 282                                 |
| 1977              | Sept.24, 1977 | 16.20                   | 375                                 |

b Backwater from ice.

# STREAMS TRIBUTARY TO LAKE SUPERIOR

04024110 Rock Creek tributary near Blackhoof, MN

(Site No. 129)

Location.--Lat 46°32'14", long 92°22'05", in NE 1/4 SE 1/4 sec.21, T.47 N., R.16 W., Carlton County, Hydrologic Unit 04010301, at culvert on State Highway 23, 0.1 mile above mouth, and 4.5 miles east of Blackhoof.

Drainage area.--0.20 mi<sup>2</sup>.

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 mile; 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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 1, 1976  | b9.71                   | 5.3                                 |
| 1977              | Sept.24, 1977 | 9.71                    | 14                                  |

b Backwater from ice.



# STREAMS TRIBUTARY TO LAKE SUPERIOR

04024200 South Fork Nemadji River near Holyoke, MN

(Site No. 127)

Location.--Lat 46°29'38", long 92°24'36", in SE 1/4 SE 1/4 sec.6, T.46 N., R.16 W., Carlton County, Hydrologic Unit 04010301, at culvert on State Highway 23, 1.7 miles below Clear Creek, and 2.0 miles northwest of Holyoke.

Drainage area.--19.4 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 1, 1976  | b11.20                  | 244                                 |
| 1977              | Sept.24, 1977 | 12.51                   | 688                                 |

b Backwater from ice.

# RED RIVER OF THE NORTH BASIN

05047600 West Branch Mustinka River near Graceville, MN

(Site No. 157)

Location.--Lat 45°37'43", long 96°26'35", in NW 1/4 NW 1/4 sec.22, T.125 N., R.46 W., Traverse County, Hydrologic Unit 09020102, at culverts on county highway, 4.1 miles north of Graceville.

Drainage area.--56.7 mi<sup>2</sup>. (Contributing area)  
81.2 mi<sup>2</sup>. (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 (ft<sup>3</sup>/s)</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

05047700 West Branch Mustinka River tributary near Graceville, MN

(Site No. 156)

Location.--Lat 45°36'53", long 96°19'47", in NE 1/4 NW 1/4 sec.28, T.125 N., R.45 W., Traverse County, Hydrologic Unit 09020102, at culvert on county highway, 6.0 miles northeast of Graceville.

Drainage area.--3.37 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 24, 1976  | b8.13                   | 24                                  |
| 1977              | Mar. 12, 1977  | b9.73                   | 26                                  |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# RED RIVER OF THE NORTH BASIN

05049200 Eighteenmile Creek near Wheaton, MN

(Site No. 158)

Location.--Lat 45°47'18", long 96°31'52", on west quarter of line between secs.24 and 25, T.127 N., R.47 W., Traverse County, Hydrologic Unit 09020102, at culvert on County Highway 67, 1.4 miles above mouth, and 2.0 miles southwest of Wheaton.

Drainage area.--68.5 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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              | Apr. 9, 1969  | ---                     | e2,400                              |
| 1970              | Apr. 8, 1970  | 4.83                    | 37                                  |
| 1971              | Mar. 14, 1971 | b9.24                   | 58                                  |
| 1972              | May 21, 1972  | 6.74                    | 188                                 |
| 1973              | May 24, 1973  | 6.74                    | 188                                 |
| 1974              | Mar. 14, 1974 | b4.07                   | 8.1                                 |
| 1975              | Apr. 16, 1975 | b8.82                   | 320                                 |
| 1976              | Mar. 24, 1976 | b8.48                   | 157                                 |
| 1977              | Apr. 19, 1977 | 5.38                    | 47                                  |

b Backwater from ice.

e Estimated:

# RED RIVER OF THE NORTH BASIN

05060800 Buffalo River near Callaway, MN

(Site No. 46)

Location.--Lat 47°01'17", long 95°54'43", in SW 1/4 SW 1/4 sec.17, T.141 N., R.41 W., Becker County, Hydrologic Unit 09020106, at culvert on U.S. Highway 59, 2.7 miles north of Callaway.

Drainage area.--94.5 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 29, 1976 | b11.90                  | 160                                 |
| 1977              | ---           | d                       | e40                                 |

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# RED RIVER OF THE NORTH BASIN

05061200 Whisky Creek at Barnesville, MN

(Site No. 123)

Location.--Lat 46°39'35", long 96°23'54", in SE 1/4 SW 1/4 sec.20, T.137 N., R.45 W., Clay County, Hydrologic Unit 09020106, at culvert on State Highway 34, 0.7 mile above Blue Eagle Lake, and 1.0 mile northeast of Barnesville.

Drainage area.--25.3 mi<sup>2</sup>. (Contributing area)  
62.5 mi<sup>2</sup>. (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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 23, 1976 | 5.94                    | 82                                  |
| 1977              | May 30, 1977  | 4.43                    | 117                                 |

b Backwater from ice.

# RED RIVER OF THE NORTH BASIN

05061400 Hay Creek above Downer, MN

(Site No. 124)

Location.--Lat 46°44'37", long 96°25'12", in NW 1/4 NW 1/4 sec.30, T.138 N., R.45 W., Clay County, Hydrologic Unit 09020106, at culvert on county road, 3.1 miles east of Downer.

Drainage area.--5.81 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                               |
| 1976              | Mar. 23, 1976 | 6.75                    | ( $\neq$ )                          |
| 1977              | July 5, 1977  | 7.02                    | ( $\neq$ )                          |

$\neq$  Discharge not determined.

c Affected by shifting control.

h Revised.

# RED RIVER OF THE NORTH BASIN

05062280 Mosquito Creek near Bagley, MN

(Site No. 120)

Location.--Lat 47°27'02", long 95°22'55", in SW 1/4 NW 1/4 sec.21, T.146 N., R.37 W., Clearwater County, Hydrologic Unit 09020108, at culvert on State Highway 92, 5.0 miles south of Bagley.

Drainage area.--3.98 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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 | c8.06                   | 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                                  |
| 1976              | Mar. 30, 1976 | b9.05                   | 33                                  |
| 1977              | Mar. 12, 1977 | b8.50                   | 8                                   |

b Backwater from ice.

c Affected by shifting control.



# RED RIVER OF THE NORTH BASIN

05062470 Marsh Creek tributary near Mahanomen, MN

(Site No. 121)

Location.--Lat 47°19'31", long 96°04'41", in SE 1/4 SW 1/4 sec.36, T.145 N., R.43 W., Norman County, Hydrologic Unit 09020108, at culvert on State Highway 31, 0.1 mile above mouth, and 5.2 miles west of Mahanomen.

Drainage area.--11.9 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 30, 1976 | b11.76                  | 102                                 |
| 1977              | July 16, 1977 | c9.61                   | 61                                  |

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

e Estimated.

# RED RIVER OF THE NORTH BASIN

05062700 Wild Rice River tributary near Twin Valley, MN

(Site No. 122)

Location.--Lat 47°17'47", long 96°19'42", in SW 1/4 SE 1/4 sec.12, T.144 N., R.45 W., Norman County, Hydrologic Unit 09020107, at culvert on State Highway 31, 1.2 miles above mouth, and 4.1 miles northwest of Twin Valley.

Drainage area.--4.72 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 30, 1976  | b12.25                  | 61                                  |
| 1977              | Sept. 24, 1977 | 11.10                   | 20                                  |

b Backwater from ice.

c Affected by shifting control.

# RED RIVER OF THE NORTH BASIN

05062800 Coon Creek near Twin Valley, MN

(Site No. 141)

Location.--Lat 47°15'51", long 96°20'34", in NE 1/4 NE 1/4 sec.26, T.144 N., R.45 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 28, 1.3 miles above mouth, and 4.0 miles west of Twin Valley.

Drainage area.--50.8 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                               |
| 1976              | Mar. 30, 1976 | b10.93                  | 460                                 |
| 1977              | Sept.24, 1977 | d                       | e40                                 |

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# RED RIVER OF THE NORTH BASIN

05063200 Spring Creek tributary near Ogema, MN

(Site No. 154)

Location.--Lat 47°07'22", long 95°57'35", in SE 1/4 SE 1/4 sec.11, T.142 N., R.42 W., Becker County, Hydrologic Unit 09020108, at culvert on county highway, 2.0 miles northwest of Ogema.

Drainage area.--4.99 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 30, 1976 | b6.79                   | 37                                  |
| 1977              | ---           | d                       | e8                                  |

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# RED RIVER OF THE NORTH BASIN

05063500 South Branch Wild Rice River near Borup, MN

Location.--Lat 47°11'40", long 96°34'40", in NW 1/4 NW 1/4 sec.24, T.143 N., R.47 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 193, 3.5 miles upstream from Wild Rice River and 4 miles northwest of Borup.

Drainage area.--254 mi<sup>2</sup>.

Records available.--March 1944 to September 1949, October 1971 to present.  
Continuous records available March 1944 to September 1949. Miscellaneous discharge measurements 1966, 1967.

Gage.--Crest-stage gage at downstream side of bridge. Prior to Sept. 1949, nonrecording gage at different datum.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1944              | July 12, 1944 | 11.17                   | 852                                 |
| 1945              | Mar. 19, 1945 | 10.86                   | 792                                 |
| 1946              | Mar. 19, 1946 | ---                     | 984                                 |
| 1947              | Apr. 13, 1947 | 12.86                   | 1,150                               |
| 1948              | Apr. 5, 1948  | ---                     | 522                                 |
| 1949              | July 6, 1949  | 7.10                    | 319                                 |
| 1972              | Apr. 13, 1972 | 16.74                   | 950                                 |
| 1973              | Sept. 5, 1973 | 11.09                   | 250                                 |
| 1974              | Apr. 12, 1974 | b19.02                  | 1,100                               |
| 1975              | July 1, 1975  | 20.59                   | 3,700                               |
| 1976              | Mar. 28, 1976 | 17.85                   | 760                                 |
| 1977              | Mar. 30, 1977 | ---                     | e60                                 |

b Backwater from ice.

e Estimated.

# RED RIVER OF THE NORTH BASIN

05073600 South Branch Battle River at Northome, MN

(Site No. 52)

Location.--Lat 47°52'17", long 94°17'45", in NW 1/4 NE 1/4 sec.25, T.151 N., R.29 W., Koochiching County, Hydrologic Unit 09020302, at culvert on U.S. Highway 71, 0.7 mile west of Northome, and 3.1 miles above Battle Lake.

Drainage area.--2.80 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 5, 1976  | b15.25                  | 34                                  |
| 1977              | Aug. 27, 1977 | 13.48                   | 20                                  |

b Backwater from ice.

c Affected by shifting control.

# RED RIVER OF THE NORTH BASIN

05073750 Spring Creek near Blackduck, MN

(Site No. 51)

Location.--Lat 47°46'23", long 94°31'22", in NW 1/4 NW 1/4 sec.32, T.150 N., R.30 W., Beltrami County, Hydrologic Unit 09020302, at culvert on County Highway 304, 3.1 miles north of Blackduck, and 3.2 miles above mouth.

Drainage area.--7.96 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 4, 1976  | 13.22                   | 50                                  |
| 1977              | Aug. 27, 1977 | 12.71                   | 31                                  |

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

b Backwater from ice.

# RED RIVER OF THE NORTH BASIN

05073800 Perry Creek tributary near Shooks, MN

(Site No. 50)

Location.--Lat 47°52'00", long 94°32'52", in NW 1/4 SW 1/4 sec.30, T.151 N., R.30 W., Beltrami County, Hydrologic Unit 09020302, at culvert on State Highway 72, 5.2 miles west of Shooks.

Drainage area.--1.14 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 4, 1976  | b7.06                   | 20                                  |
| 1977              | Aug. 27, 1977 | 6.34                    | 13                                  |

a Backwater from debris.

b Backwater from ice.

c Affected by shifting control.



# RED RIVER OF THE NORTH BASIN

05076600 Red Lake River tributary near Thief River Falls, MN

(Site No. 140)

Location.--Lat 48°04'44", long 96°12'15", in SW 1/4 SE 1/4 sec.8, T.153 N., R.43 W., Pennington County, Hydrologic Unit 09020303, at culvert on County Highway 7, 0.5 mile above mouth, and 3.1 miles south of Thief River Falls.

Drainage area.--2.33 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 23, 1976 | b9.54                   | 52                                  |
| 1977              | May 18, 1977  | 7.48                    | 89                                  |

\* 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

05078100 Lost River at Gonvick, MN

(Site No. 47)

Location.--Lat 47°44'14", long 95°31'05", in NE 1/4 SE 1/4 sec.9, T.149 N., R.38 W., Clearwater County, Hydrologic Unit 09020305, at culvert on State Highway 92 at west edge of Gonvick, and 3.8 miles below Pine Lake.

Drainage area.--53.6 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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

05078180 Silver Creek near Clearbrook, MN

(Site No. 49)

Location.--Lat 47°38'43", long 95°26'33", in NW 1/4 NW 1/4 sec.13, T.148 N., R.38 W., Clearwater County, Hydrologic Unit 09020305, at culvert on county highway, 3.4 miles south of Clearbrook.

Drainage area.--4.96 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                  | (/)                                 |
| 1976              | Mar. 29, 1976 | 8.46                    | (/)                                 |
| 1977              | Mar. 12, 1977 | b6.25                   | (/)                                 |

/ Discharge not determined.

b Backwater from ice.

# RED RIVER OF THE NORTH BASIN

05078200 Silver Creek tributary at Clearbrook, MN

(Site No. 48)

Location.--Lat 47°41'49", long 95°25'50", in SW 1/4 NW 1/4 sec.29, T.149 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, at culvert on county highway at north edge of Clearbrook, 0.9 mile above mouth.

Drainage area.--6.02 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 30, 1976 | c10.59                  | 48                                  |
| 1977              | Aug. 27, 1977 | c10.10                  | 23                                  |

b Backwater from ice.

c Affected by shifting control.

# RED RIVER OF THE NORTH BASIN

05078400 Clearwater River tributary near Plummer, MN

(Site No. 119)

Location.--Lat 47°52'34", long 96°08'35", in SE 1/4 SE 1/4 sec.22, T.151 N., R.43 W., Red Lake County, Hydrologic Unit 09020305, at culvert on county highway, 1.2 miles above mouth, and 5.3 miles southwest of Plummer.

Drainage area.--6.51 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                   | ( $\neq$ )                          |
| 1974              | Apr. 12, 1974  | b13.24                  | ( $\neq$ )                          |
| 1975              | Apr. 28, 1975  | 11.54                   | ( $\neq$ )                          |
| 1976              | Mar. 30, 1976  | 11.42                   | ( $\neq$ )                          |
| 1977              | ---            | d                       | ( $\neq$ )                          |

$\neq$  Discharge not determined.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

f Backwater from aquatic growth.

# LAKE OF THE WOODS BASIN

05128300 Pike River near Gilbert, MN

(Site No. 171)

Location.--Lat 47°29'34", long 92°29'15", in NE 1/4 SW 1/4 sec.22, T.58 N., R.17 W., St. Louis County, Hydrologic Unit 09030002 at culvert on State Highway 135, 1.1 miles west of Gilbert.

Drainage area.--0.73 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Apr. 9, 1976  | 6.97                    | 11                                  |
| 1977              | Aug. 27, 1977 | 7.48                    | 20                                  |

c Affected by shifting control.

# LAKE OF THE WOODS BASIN

05128700 Pike River tributary near Wahlsten, MN

(Site No. 133)

Location.--Lat 47°43'04", long 92°17'12", in SW 1/4 SW 1/4 sec.32, T.61 N., R.15 W., St. Louis County, Hydrologic Unit 09030002, at culvert on State Highway 135, 1.2 miles south of Wahlsten, and 2.7 miles above mouth.

Drainage area.--1.93 mi<sup>2</sup>. (Contributing area)  
2.64 mi<sup>2</sup>. (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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Apr. 9, 1976  | b8.56                   | 43                                  |
| 1977              | Aug. 27, 1977 | 7.47                    | 68                                  |

\* Unusual.

b Backwater from ice.

c Affected by shifting control.

# LAKE OF THE WOODS BASIN

05129710 Johnson Creek near Britt, MN

(Site No. 134)

Location.--Lat 47°39'40", long 92°38'03", in NW 1/4 NE 1/4 sec.28, T.60 N., R.18 W., St. Louis County, Hydrologic Unit 09030005, 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 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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

05130300 Boriin Creek near Chisholm, MN

(Site No. 39)

Location.--Lat 47°36'14", long 92°51'58", in SE 1/4 SE 1/4 sec.9, T.59 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, at culvert on State Highway 73, 1.2 miles above mouth, and 7.8 miles north of Chisholm.

Drainage area.--13.7 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 7, 1976   | b12.00                  | 125                                 |
| 1977              | Aug. 27, 1977  | 12.27                   | 216                                 |

b Backwater from ice.

c Affected by shifting control.

# LAKE OF THE WOODS BASIN

05131750 Big Fork River near Bigfork, MN

Location.--Lat 47°44'56", long 93°46'31", in SW 1/4 NE 1/4 sec.27, T.61 N., R.27 W., Itasca County, Hydrologic Unit 09030006, at bridge on State Highway 6, 5.5 miles west of Big Fork.

Drainage area.--602 mi<sup>2</sup>.

Records available.--October 1972 to present.

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

Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1973              | Apr. 21, 1973 | 10.92                   | 900                                 |
| 1974              | June 7, 1974  | 13.37                   | 1,800                               |
| 1975              | Apr. 29, 1975 | 13.97                   | 2,030                               |
| 1976              | Apr. 6, 1976  | 12.13                   | 1,340                               |
| 1977              | Sept.26, 1977 | d                       | e550                                |

d Peak stage did not reach bottom of gage.

e Estimated.

# MISSISSIPPI RIVER MAIN STEM

05200445 Mississippi River at Bemidji, MN

Location.--Lat 47°27'04", long 94°54'23", in NW 1/4 NW 1/4 sec.20, T.146 N., R.33 W., Beltrami County, Hydrologic Unit 07010101, at bridge on County Highway 11, 1.5 miles southwest of intersection of U.S. Highway 2 and County Highway 7 in Bemidji.

Drainage area.--400 mi<sup>2</sup>.

Records available.--October 1972 to present. Miscellaneous discharge measurements 1950, 1964-65.

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

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1973              | Sept. 9, 1973 | 11.71                   | 495                                 |
| 1974              | Apr. 20, 1974 | 12.33                   | 979                                 |
| 1975              | Apr. 22, 1975 | 12.46                   | 1,170                               |
| 1976              | Apr. 5, 1976  | 11.61                   | 553                                 |
| 1977              | Sept.25, 1977 | d                       | e190                                |

d Peak stage did not reach bottom of gage.  
e Estimated.

# SMITH CREEK BASIN

05210200 Smith Creek near Hill City, MN

(Site No. 118)

Location.--Lat 47°04'58", long 93°34'59", in SE 1/4 NW 1/4 sec.13, T.53 N., R.26 W., Itasca County, Hydrologic Unit 07010101, at culvert on U.S. Highway 169, 6.2 miles north of Hill City.

Drainage area.--8.00 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 3, 1976  | 4.39                    | 28                                  |
| 1977              | Sept.24, 1977 | 4.03                    | 21                                  |

c Affected by shifting control.

# SWAN RIVER BASIN

05216700 O'Brien Creek near Nashwauk, MN

(Site No. 42)

Location.--Lat 47°22'59", long 93°08'08", in NE 1/4 NE 1/4 sec.33, T.57 N., R.22 W., Itasca County, Hydrologic Unit 07010103, at culvert on U.S. Highway 169, 1.5 miles east of Nashwauk, and 3.0 miles above Welcome Creek.

Drainage area.--8.26 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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 | a8.00                   | 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

05216980 Swan River tributary at Warba, MN

(Site No. 116)

Location.--Lat 47°07'11", long 93°15'00", in SE 1/4 NW 1/4 sec.34, T.54 N., R.23 W., Itasca County, Hydrologic Unit 07010103, at culvert on U.S. Highway 2, 0.9 mile above mouth, and 1.1 miles southeast of Warba.

Drainage area.--3.95 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Apr. 3, 1976  | 5.08                    | 13                                  |
| 1977              | Sept. 9, 1977 | 5.34                    | 21                                  |

b Backwater from ice.

c Affected by shifting control.

# BLUFF CREEK BASIN

05217700 Bluff Creek near Jacobson, MN

(Site No. 117)

Location.--Lat 47°00'19", long 93°17'30", in SW 1/4 NW 1/4 sec.8, T.52 N., R.23 W., Aitkin County, Hydrologic Unit 07010103, at culvert on State Highway 200, 1.2 miles west of Jacobson.

Drainage area.--1.50 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 31, 1976  | b7.19                   | 9                                   |
| 1977              | Sept. 24, 1977 | d                       | e20                                 |

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

e Estimated.

# WILLOW RIVER BASIN

05221020 Willow River below Palisade, MN

Location.--Lat 46°42'36", long 93°33'21", in NW 1/4 NE 1/4 sec.30, T.49 N., R.25 W., Aitkin County, Hydrologic Unit 07010103, at bridge on County Highway 3, 3.2 miles west of Palisade.

Drainage area.--445 mi<sup>2</sup>.

Records available.--October 1971 to present. Miscellaneous measurements 1964-65.

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

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1972              | Apr. 24, 1972 | 14.69                   | 2,340                               |
| 1973              | Mar. 1973     | 11.42                   | 1,180                               |
| 1974              | Oct. 17, 1973 | 16.00                   | 2,870                               |
| 1975              | May 1, 1975   | 17.21                   | 3,700                               |
| 1976              | Apr. 6, 1976  | 13.21                   | 1,790                               |
| 1977              | Sept.10, 1977 | d                       | e500                                |

d Peak stage did not reach bottom of gage.

e Estimated.



# CROW WING RIVER BASIN

05244100 Kitten Creek near Sebeka, MN

(Site No. 136)

Location.--Lat 46°40'33", long 95°04'46", in SE 1/4 SE 1/4 sec.15, T.137 N., R.35 W., Wadena County, Hydrologic Unit 07010106, at culvert on county highway, 3.3 miles above mouth, and 3.2 miles north of Sebeka.

Drainage area.--14.7 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 31, 1976 | 8.70                    | 49                                  |
| 1977              | Apr. 17, 1977 | c10.03                  | 21                                  |

c Affected by shifting control.

# CROW WING RIVER BASIN

05244200 Cat River near Nimrod, MN

(Site No. 135)

Location.--Lat 46°37'49", long 94°55'51", in SW 1/4 SW 1/4 sec.36, T.137 N., R.34 W., Wadena County, Hydrologic Unit 07010106, at bridge on State Highway 227, 2.5 miles west of Nimrod, and 3.0 miles above mouth.

Drainage area.--49.2 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 2, 1976  | 4.94                    | 64                                  |
| 1977              | Aug. 31, 1977 | c4.77                   | 59                                  |

c Affected by shifting control.

# CROW WING RIVER BASIN

05244440 Leaf River near Aldrich, MN

Location.--Lat 46°27'25", long 94°50'29", in SW 1/4 SW 1/4 sec.34, T.135 N., R.33 W., Wadena County, Hydrologic Unit 07010107, at bridge on County Highway 29, 3.3 miles upstream from mouth, and 7 miles northeast of Aldrich.

Drainage area.--860 mi<sup>2</sup>.

Records available.--October 1971 to present. Miscellaneous discharge measurements 1965, 1968.

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

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1972              | Apr. 25, 1972 | 14.96                   | 3,250                               |
| 1973              | Mar. 27, 1973 | 13.09                   | 1,430                               |
| 1974              | Oct. 13, 1973 | 15.83                   | 4,440                               |
| 1975              | Apr. 21, 1975 | 15.44                   | 3,950                               |
| 1976              | Mar. 30, 1976 | 12.08                   | 950                                 |
| 1977              | Sept.25, 1977 | ---                     | e450                                |

e Estimated.

# MISSISSIPPI RIVER MAIN STEM

05261000 Mississippi River near Fort Ripley, MN

Location.--Lat 46°10'50", long 94°21'56", in SE 1/4 NW 1/4 sec.27, T.43 N., R.32 W., Crow Wing County, Hydrologic Unit 07010104, at left bank 600 ft upstream from Nokasippi River, and 1.0 mile north of Fort Ripley.

Drainage area.--11,010 mi<sup>2</sup>.

Records available.--June 1909 to September 1910 (gage heights and discharge measurements only), June to October 1929 (continuous record), October 1971 to present. Gage-heights records collected at same site since 1906 are contained in reports of U.S. Weather Bureau.

Gage.--Crest-stage gage at downstream side of old bridge abutment. Datum of crest-stage gage is 1,134.14 ft, National Geodetic Vertical Datum of 1929. June 1909 to September 1910, at datum 0.7 ft lower.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1972              | July 25, 1972 | 1,145.70                | 22,200                              |
| 1973              | Mar. 17, 1973 | 1,144.47                | 12,200                              |
| 1974              | Apr. 17, 1974 | 1,147.13                | 27,000                              |
| 1975              | Apr. 28, 1975 | 1,146.53                | 24,800                              |
| 1976              | Apr. 3, 1976  | 1,142.70                | 12,800                              |
| 1977              | Sept.29, 1977 | d                       | e5,500                              |

d Peak stage did not reach bottom of gage.

e Estimated.

# PLATTE RIVER BASIN

05267800 Big Mink Creek tributary near Lastrup, MN

(Site No. 138)

Location.--Lat 46°01'58", long 94°06'13", in NW 1/4 SW 1/4 sec.14, T.41 N., R.30 W., Morrison County, Hydrologic Unit 07010201, at culvert on State Highway 25, 1.4 miles above mouth, and 2.1 miles west of Lastrup.

Drainage area.--1.53 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 29, 1976 | b9.33                   | 11                                  |
| 1977              | Mar. 12, 1977 | b8.82                   | 3.0                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# PLATTE RIVER BASIN

05267900 Hillman Creek near Pierz, MN

(Site No. 162)

Location.---Lat 45°58'27", long 94°04'21", in NE 1/4 SE 1/4 sec.9, T.40 N., R.30 W., Morrison County, Hydrologic Unit 07010201, at bridge on county highway, 1.1 miles above mouth, and 1.5 miles east of Pierz.

Drainage area.---46.7 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 29, 1976  | b14.58                  | 450                                 |
| 1977              | Sept. 24, 1977 | 12.24                   | 48                                  |

b Backwater from ice.

# PLATTE RIVER BASIN

05268000 Platte River above Royalton, MN

Location.--Lat 45°50'43", long 94°17'40", in SE 1/4 NW 1/4 sec.26, T.39 N., R.32 W., Morrison County, Hydrologic Unit 07010201, at bridge on County Highway 27, 0.6 mile north of Royalton, and 6.6 miles upstream from mouth.

Drainage area.--335 mi<sup>2</sup>.

Records available.--May 1929 to September 1936, October 1971 to present.  
Continuous records available May 1929 to September 1936.

Gage.--Crest-stage gage at downstream side of bridge. Non-recording gage May 1929 to September 1936 at site 0.6 mile downstream at different datum.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1929              | May 18, 1929  | 2.37                    | 132                                 |
| 1930              | May 14, 1930  | 5.75                    | 1,280                               |
| 1931              | May 30, 1931  | 5.90                    | 1,330                               |
| 1932              | Apr. 10, 1932 | 4.00                    | 543                                 |
| 1933              | Apr. 1, 1933  | b2.60                   | 167                                 |
| 1934              | Apr. 7, 1934  | 3.70                    | 272                                 |
| 1935              | Mar. 25, 1935 | ---                     | 228                                 |
| 1936              | May 3, 1936   | 6.36                    | 1,450                               |
| 1972              | July 26, 1972 | 7.84                    | 6,850                               |
| 1973              | Mar. 16, 1973 | 3.75                    | 2,280                               |
| 1974              | ---           | d                       | <1,800                              |
| 1975              | Apr. 28, 1975 | 4.26                    | 2,710                               |
| 1976              | Mar. 29, 1976 | 3.55                    | 2,100                               |
| 1977              | Sept.29, 1977 | d                       | e850                                |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# SAUK RIVER BASIN

05270300 Sauk River tributary at Spring Hill, MN

(Site No. 97)

Location.--Lat 45°31'22", long 94°48'31", in SW 1/4 NE 1/4 sec.27, T.124 N., R.33 W., Stearns County, Hydrologic Unit 07010202, at culvert on State Highway 4, 1.0 mile east of Spring Hill, and 2.7 miles above mouth.

Drainage area.--7.06 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 25, 1976 | 10.42                   | 127                                 |
| 1977              | Mar. 12, 1977 | b13.27                  | 81                                  |

b Backwater from ice.



# SAUK RIVER BASIN

05270310 Sauk River tributary No. 2 near St. Martin, MN

(Site No. 142)

Location.--Lat 45°31'44", long 94°44'50", in SE 1/4 SE 1/4 sec.19, T.124 N., R.32 W., Stearns County, Hydrologic Unit 07010202, at culvert on county highway, 4.2 miles northwest of St. Martin.

Drainage area.--0.26 mi<sup>2</sup> (Revised).

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, 0.68 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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | July 30, 1976  | 7.06                    | 7                                   |
| 1977              | Aug. 31, 1977  | 7.50                    | 13                                  |

b Backwater from ice.

# JOHNSON CREEK BASIN

05271800 Johnson Creek tributary at Luxemburg, MN

(Site No. 167)

Location.--Lat 45°26'30", long 94°14'46", in NW 1/4 NE 1/4 sec.30, T.123 N., R.28 W., Stearns County, Hydrologic Unit 07010203, at culverts on State Highway 15, 0.8 mile south of Luxemburg.

Drainage area.--3.82 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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 | b7.67                   | 26                                  |
| 1973              | Mar. 11, 1973 | b7.14                   | 13                                  |
| 1974              | May 10, 1974  | 6.57                    | 11                                  |
| 1975              | Apr. 27, 1975 | 7.43                    | 35                                  |
| 1976              | Mar. 28, 1976 | b7.89                   | 30                                  |
| 1977              | July 23, 1977 | 7.71                    | 46                                  |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# JOHNSON CREEK BASIN

05272000 Johnson Creek tributary No. 2 near St. Augusta, MN

(Site No. 165)

Location.--Lat 45°26'52", long 94°12'00", in NE 1/4 SE 1/4 sec.21, T.123 N., R.28 W., Stearns County, Hydrologic Unit 07010203, at culvert on county highway, 0.7 mile above mouth, and 3.1 miles southwest of St. Augusta.

Drainage area.--13.4 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                    | (/)                                 |
| 1975              | Apr. 27, 1975  | 9.12                    | (/)                                 |
| 1976              | Mar. 28, 1976  | b7.00                   | (/)                                 |
| 1977              | Aug. 28, 1977  | 7.84                    | (/)                                 |

/ Discharge not determined.

b Backwater from ice.

# JOHNSON CREEK BASIN

05272300 Johnson Creek near St. Augusta, MN

(Site No. 166)

Location.--Lat 45°27'49", long 94°09'19", in NW 1/4 SW 1/4 sec.13, T.123 N., R.28 W., Stearns County, Hydrologic Unit 07010203, at bridge on County Highway 7, 1.0 mile south of St. Augusta, and 3.3 miles above mouth.

Drainage area.--46.7 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 28, 1976  | b13.23                  | 262                                 |
| 1977              | Aug. 28, 1977  | 13.05                   | 265                                 |

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

# MISSISSIPPI RIVER MAIN STEM

05273510 Mississippi River at Clearwater, MN

Location.--Lat 45°25'15", long 94°02'37", in NW 1/4 SW 1/4 sec.23, T.34 N., R.30 W., Sherburne County, Hydrologic Unit 07010203, on left bank 700 ft upstream from bridge, on State Highway 24 at Clearwater.

Records available.--October 1971 to present.

Gage.--Crest-stage gage upstream from bridge. Zero of crest-stage gage is at 937.81 ft, National Geodetic Vertical Datum of 1929.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1972              | July 26, 1972 | 18.66                   | 33,500                              |
| 1973              | Mar. 18, 1973 | b15.29                  | 17,600                              |
| 1974              | Oct. 16, 1973 | 15.48                   | 23,800                              |
| 1975              | Apr. 30, 1975 | 19.28                   | 35,600                              |
| 1976              | Apr. 4, 1976  | d                       | e17,000                             |
| 1977              | Sept.30, 1977 | d                       | e6,500                              |

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# OTSEGO CREEK BASIN

05273700 Otsego Creek near Otsego, MN

(Site No. 164)

Location.--Lat 45°17'19", long 93°38'59", in SW 1/4 NE 1/4 sec.13, T.121 N., R.24 W., Wright County, Hydrologic Unit 07010203, at culvert on County Highway 39, 1.3 miles above mouth, and 1.9 miles west of Otsego.

Drainage area.--3.11 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 23, 1976 | b4.94                   | 70                                  |
| 1977              | July 3, 1977  | 4.96                    | 123                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# ELK RIVER BASIN

05274200 Stony Brook tributary near Foley, MN

(Site No. 96)

Location.--Lat 45°38'42", long 93°54'54", in NE 1/4 NW 1/4 sec.2, T.36 N., R.29 W., Benton County, Hydrologic Unit 07010203, at culvert on State Highway 25, 0.3 mile above mouth, and 1.5 miles south of Foley.

Drainage area.--2.26 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 28, 1976 | b9.54                   | 33                                  |
| 1977              | Apr. 15, 1977 | 7.95                    | 30                                  |

b Backwater from ice.

# CROW RIVER BASIN

05276100 North Fork Crow River tributary near Paynesville, MN

(Site No. 98)

Location.--Lat 45°23'29", long 94°46'56", in SW 1/4 NW 1/4 sec.12, T.122 N., R.33 W., Kandiyohi County, Hydrologic Unit 07010204, at culvert on county highway, 1.2 miles above mouth, and 3.0 miles west of Paynesville.

Drainage area.--0.55 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 23, 1976  | b17.84                  | 12                                  |
| 1977              | Aug. 31, 1977  | 18.30                   | 41                                  |

b Backwater from ice.



# CROW RIVER BASIN

05276200 North Fork Crow River at Paynesville, MN

Location.--Lat 45°23'09", long 94°42'41", in SW 1/4 SE 1/4 sec.9, T.122 N., R.32 W., Stearns County, Hydrologic Unit 07010204, at bridge on county road at northeast edge of Paynesville city limits.

Records available.--October 1972 to present.

Gage.--Crest-stage gage at downstream side of bridge. Datum of crest-stage gage is 1,140.02 ft, National Geodetic Vertical Datum of 1929.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1973              | Mar. 16, 1973 | b5.17                   | 765                                 |
| 1974              | ---           | d                       | e300                                |
| 1975              | Apr. 28, 1975 | 6.47                    | 1,320                               |
| 1976              | Mar. 28, 1976 | b7.30                   | 535                                 |
| 1977              | Aug. 31, 1977 | 3.15                    | 374                                 |

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# CROW RIVER BASIN

05278350 Fountain Creek near Montrose, MN

(Site No. 153)

Location.--Lat 45°01'20", long 93°56'29", in NE 1/4 NW 1/4 sec.22, T.118 N., R.26 W., Wright County, Hydrologic Unit 07010204, at culvert on County Highway 30, 3.3 miles southwest of Montrose.

Drainage area.--6.73 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | b6.26                   | 43                                  |
| 1977              | Mar. 12, 1977 | b5.83                   | 30                                  |

b Backwater from ice.

# CROW RIVER BASIN

05278700 Otter Creek near Lester Prairie, MN

(Site No. 115)

Location.--Lat 44°54'23", long 94°04'24", in SE 1/4 SE 1/4 sec.28, T.117 N., R.27 W., McLeod County, Hydrologic Unit 07010205, at culvert on State Highway 7, 2.1 miles northwest of Lester Prairie, and 4.4 miles above mouth.

Drainage area.--30.2 mi<sup>2</sup>.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert. Prior to Aug. 12, 1979, 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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 20, 1976 | b7.82                   | 65                                  |
| 1977              | Mar. 12, 1977 | b6.45                   | 35                                  |

b Backwater from ice.

c Affected by shifting control.

# CROW RIVER BASIN

05278750 Otter Creek tributary near Lester Prairie, MN

(Site No. 151)

Location.--Lat 44°53'34", long 94°04'24", in SE 1/4 SE 1/4 sec.33, T.117 N., R.27 W., McLeod County, Hydrologic Unit 07010205, at culvert on County Highway 63, 1.7 miles northwest of Lester Prairie, and 3.3 miles above mouth.

Drainage area.--1.54 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976 | b7.59                   | 6.6                                 |
| 1977              | Apr. 15, 1977 | 7.88                    | 22                                  |

b Backwater from ice.

# CROW RIVER BASIN

05278850 Buffalo Creek tributary near Brownton, MN

(Site No. 113)

Location.--Lat 44°45'55", long 94°22'33", in NE 1/4 SE 1/4 sec.13, T.115 N., R.30 W., McLeod County, Hydrologic Unit 07010205, at culvert on State Highway 15, 0.6 mile above mouth, and 2.6 miles northwest of Brownton.

Drainage area.--9.45 mi<sup>2</sup>.

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 mi<sup>2</sup> of drainage area is lake storage.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976 | b13.65                  | 19                                  |
| 1977              | ---           | d                       | <7                                  |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# CROW RIVER BASIN

05279030 South Fork Crow River tributary near Mayer, MN

(Site No. 152)

Location.--Lat 44°54'21", long 93°53'51", in NW 1/4 NE 1/4 sec.36, T.117 N., R.26 W., Carver County, Hydrologic Unit 07010205, at culvert on State Highway 7, 0.7 mile above mouth, and 1.4 miles north of Mayer.

Drainage area.--7.74 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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

05280300 School Lake Creek tributary near St. Michael, MN

(Site No. 163)

Location.--Lat 45°12'09", long 93°41'31", in NW 1/4 SE 1/4 sec.15, T.120 N., R.24 W., Wright County, Hydrologic Unit 07010204, at culvert on county highway, 0.2 mile above mouth, and 1.5 miles southwest of St. Michael.

Drainage area.--2.04 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 20, 1976 | b8.69                   | 36                                  |
| 1977              | Mar. 12, 1977 | b8.38                   | 22                                  |

b Backwater from ice.

# RUM RIVER BASIN

05284100 Mille Lacs Lake tributary near Wealthwood, MN

(Site No. 137)

Location.--Lat 46°21'26", long 93°41'43", in NW 1/4 NE 1/4 sec.25, T.45 N., R.27 W., Aitkin County, Hydrologic Unit 07010207, at culvert on State Highway 18, 0.2 mile above mouth, and 2.0 miles west of Wealthwood.

Drainage area.--0.58 mi<sup>2</sup> (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, 0.82 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 (ft<sup>3</sup>/s)</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

05284600 Robinson Brook near Onamia, MN

(Site No. 95)

Location.--Lat 45°58'22", long 93°39'42", in NE 1/4 SE 1/4 sec.11, T.40 N., R.27 W., Mille Lacs County, Hydrologic Unit 07010207, at culvert on U.S. Highway 169, 0.2 mile above mouth, and 6.8 miles south of Onamia.

Drainage area.--4.79 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 29, 1976 | 14.41                   | 76                                  |
| 1977              | Mar. 12, 1977 | b15.88                  | 10                                  |

b Backwater from ice.

c Affected by shifting control.

g Estimated; gage height unknown.

# RUM RIVER BASIN

05284620 Rum River tributary near Onamia, MN

(Site No. 94)

Location.--Lat 45°57'29", long 93°39'43", in NE 1/4 SE 1/4 sec.14, T.40 N., R.27 W., Mille Lacs County, Hydrologic Unit 07010207, at culvert on U.S. Highway 169, 0.3 mile above mouth, and 7.8 miles south of Onamia.

Drainage area.--2.37 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 29, 1976 | 8.61                    | 59                                  |
| 1977              | July 4, 1977  | 6.99                    | 20                                  |

b Backwater from ice.

# RUM RIVER BASIN

05284920 Stanchfield Creek tributary near Day, MN

(Site No. 126)

Location.---Lat 45°41'29", long 93°23'45", in NW 1/4 SE 1/4 sec.13, T.37 N., R.25 W., Isanti County, Hydrologic Unit 07010207, at culvert on County Highway 60, 0.5 mile above mouth, and 1.5 miles southwest of Day.

Drainage area.---1.26 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 29, 1976  | b7.30                   | 40                                  |
| 1977              | Mar. 12, 1977  | b6.61                   | 30                                  |

b Backwater from ice.

e Estimated.

# MINNESOTA RIVER BASIN

05299100 Lazarus Creek tributary near Canby, MN

(Site No. 79)

Location.--Lat 44°43'04", long 96°19'42", in NE 1/4 NW 1/4 sec.6, T.114 N., R.45 W., Yellow Medicine County, Hydrologic Unit 07020003, at culvert on State Highway 68, 2.7 miles west of Canby, and 4.2 miles above mouth.

Drainage area.--2.97 mi<sup>2</sup>.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,283.12 ft, National Geodetic Vertical 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 (ft<sup>3</sup>/s)</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 | b12.10                  | 74                                  |
| 1976              | Mar. 23, 1976 | b11.52                  | 61                                  |
| 1977              | June 16, 1977 | 11.36                   | 169                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

f Backwater from aquatic growth.

# MINNESOTA RIVER BASIN

05301200 Minnesota River tributary near Montevideo, MN

(Site No. 80)

Location.--Lat 44°56'08", long 95°48'12", in SW 1/4 SE 1/4 sec.16, T.117 N., R.41 W., Lac qui Parle County, Hydrologic Unit 07020004, at culvert on U.S. Highway 212, 0.1 mile above mouth, and 4.0 miles west of Montevideo.

Drainage area.--0.40 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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

05302970 Outlet Creek tributary near Starbuck, MN

(Site No. 150)

Location (revised).--Lat 45°31'35", long 95°33'43", in NW 1/4 NW 1/4 sec.27, T.127 N., R.39 W., Pope County, Hydrologic Unit 07020005, at culvert on State Highway 29, 0.2 mile above mouth, and 6.6 miles south of Starbuck.

Drainage area.--0.47 mi<sup>2</sup>. (Contributing area)  
0.57 mi<sup>2</sup>. (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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | 7.49                    | 10                                  |
| 1977              | May 30, 1977  | 6.91                    | 2.9                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# MINNESOTA RIVER BASIN

05303450 Hassel Creek near Clontarf, MN

(Site No. 149)

Location.--Lat 45°24'03", long 95°34'13", in SW 1/4 SE 1/4 sec.4, T.122 N., R.39 W., Swift County, Hydrologic Unit 07020005, at culvert on State Highway 29, 0.2 mile above Lake Hassel, and 5.6 miles east of Clontarf.

Drainage area.--7.53 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 23, 1976 | b8.41                   | 37                                  |
| 1977              | Mar. 12, 1977 | b9.63                   | 43                                  |

b Backwater from ice.

# MINNESOTA RIVER BASIN

05305200 Spring Creek near Montevideo, MN

(Site No. 38)

Location.--Lat 44°58'41", long 95°42'57", in NW 1/4 NW 1/4 sec.5 T.117 N., R.40 W., Chippewa County, Hydrologic Unit 07020005, at culvert on State Highway 29, 1.2 miles above mouth, and 2.0 miles north of Montevideo.

Drainage area.--16.0 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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 29, 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                                  |
| 1976              | Mar. 23, 1976  | 12.53                   | 15                                  |
| 1977              | Mar. 12, 1977  | b17.20                  | 164                                 |

b Backwater from ice.



# MINNESOTA RIVER BASIN

05311200 North Branch Yellow Medicine River near Ivanhoe, MN

(Site No. 75)

Location.--Lat 44°27'32", long 96°21'27", in NE 1/4 NW 1/4 sec.2, T.111 N., R.46 W., Lincoln County, Hydrologic Unit 07020004, at culvert on State Highway 19, 5.3 miles west of Ivanhoe.

Drainage area.--14.8 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | b12.64                  | 14                                  |
| 1977              | June 16, 1977 | 13.58                   | 112                                 |

b Backwater from ice.

f Backwater from aquatic growth.

# MINNESOTA RIVER BASIN

05311250 North Branch Yellow Medicine River tributary near Wilno, MN

(Site No. 77)

Location.--Lat 44°33'12", long 96°16'33", in SE 1/4 NE 1/4 sec.33, T.133 N., R.45 W., Lincoln County, Hydrologic Unit 07020004, at culvert on U.S. Highway 75, 2.1 miles above mouth, and 4.3 miles northwest of Wilno.

Drainage area.--0.33 mi<sup>2</sup>.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,636.33 ft, National Geodetic Vertical 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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | b10.20                  | 12                                  |
| 1977              | Mar. 12, 1977 | b9.49                   | 16                                  |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# MINNESOTA RIVER BASIN

05311300 North Branch Yellow Medicine River tributary No. 2 near Porter, MN

(Site No. 78)

Location.--Lat 44°35'39", long 96°16'34", in SE 1/4 NE 1/4 sec.16, T.113 N., R.45 W., Lincoln County, Hydrologic Unit 07020004, at culvert on U.S. Highway 75, 6.2 miles southwest of Porter.

Drainage area.--3.70 mi<sup>2</sup>.

Records available.--October 1959 to September 1975.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,521.97 ft, National Geodetic Vertical 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 (ft<sup>3</sup>/s)</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                                  |

b Backwater from ice.

# MINNESOTA RIVER BASIN

05313800 Kandiyohi County ditch 16 near Blomkest, MN

(Site No. 35)

Location.--Lat 44°58'48", long 95°02'36", in SW 1/4 SW 1/4 sec.35, T.118 N., R.35 W., Kandiyohi County, Hydrologic Unit 07020004, at culvert on U.S. Highway 71, 2.8 miles northwest of Blomkest.

Drainage area.--0.83 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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

05314900 Redwood River at Ruthton, MN

(Site No. 31)

Location.--Lat 44°10'53", long 96°06'07", in NW 1/4 NW 1/4 sec.11, T.108 N., R.44 W., Pipestone County, Hydrologic Unit 07020006, at culvert on State Highway 23, 0.3 mile north of Ruthton.

Drainage area.--6.18 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | b14.41                  | 28                                  |
| 1977              | June 16, 1977 | c14.89                  | 148                                 |

a Backwater from debris.

b Backwater from ice.

c Affected by shifting control.

# MINNESOTA RIVER BASIN

05315200 Prairie Ravine near Marshall, MN

(Site No. 33)

Location.--Lat 44°29'44", long 95°47'48", in SE 1/4 NE 1/4 sec.20, T.112 N., R.41 W., Lyon County, Hydrologic Unit 07020006, at culvert on U.S. Highway 59, 2.7 miles north of Marshall.

Drainage area.--5.63 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 18, 1976 | b7.52                   | 16                                  |
| 1977              | May 17, 1977  | 8.70                    | 131                                 |

b Backwater from ice.

c Affected by shifting control.

# MINNESOTA RIVER BASIN

05316550 West Fork Beaver Creek near Olivia, MN

(Site No. 34)

Location.--Lat 44°50'56", long 95°01'53", in SE 1/4 SW 1/4 sec.14, T.116 N., R.35 W., Renville County, Hydrologic Unit 07020004, 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 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | b7.95                   | 50                                  |
| 1977              | Mar. 12, 1977 | b8.84                   | 68                                  |

b Backwater from ice.

c Affected by shifting control.

# MINNESOTA RIVER BASIN

05316570 Beaver Creek at Beaver Falls, MN

Location.--Lat 44°35'03", long 95°02'49", in NE 1/4 NW 1/4 sec.22, T.113 N., R.35 W., Renville County, Hydrologic Unit 07020004, at bridge in Beaver Falls, 2.2 miles upstream from mouth, and 3.8 miles northwest of Morton.

Drainage area.--194 mi<sup>2</sup>.

Records available.--October 1971 to present. Miscellaneous discharge measurements 1966 to 1968.

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

Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1972              | May 30, 1972  | 10.03                   | 779                                 |
| 1973              | ---           | d                       | <500                                |
| 1974              | Oct. 10, 1973 | 9.27                    | 531                                 |
| 1975              | Apr. 23, 1975 | b10.02                  | 675                                 |
| 1976              | Mar. 20, 1976 | d                       | e250                                |
| 1977              | Mar. 12, 1977 | b9.70                   | 605                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.



# MINNESOTA RIVER BASIN

05316690 Spring Creek tributary near Sleepy Eye, MN

(Site No. 173)

Location.--Lat 44°23'54", long 94°45'35", in NW 1/4 sec.25, T.111 N., R.33 W., Brown County, Hydrologic Unit 07020007, at culvert on county highway, 0.1 mile above mouth, and 7.5 miles north of Sleepy Eye.

Drainage area.--3.69 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | 3.74                    | 15                                  |
| 1977              | June 16, 1977 | 5.89                    | 74                                  |

b Backwater from ice.

# MINNESOTA RIVER BASIN

05316700 Spring Creek near Sleepy Eye, MN

(Site No. 22)

Location.--Lat 44°24'12", long 94°44'41", in NE 1/4 SE 1/4 sec.24, T.111 N., R.33 W., Brown County, Hydrologic Unit 07020007, at culvert on county highway, 4.3 miles above mouth, and 7.5 miles north of Sleepy Eye.

Drainage area.--31.3 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 20, 1976 | 9.52                    | 61                                  |
| 1977              | June 16, 1977 | c12.00                  | 234                                 |

b Backwater from ice.

c Affected by shifting control.

# MINNESOTA RIVER BASIN

05316800 Cottonwood River tributary near Balaton, MN

(Site No. 32)

Location.--Lat 44°14'24", long 95°57'22", in NW 1/4 NW 1/4 sec.19, T.109 N., R.42 W., Lyon County, Hydrologic Unit 07020008, at culvert on U.S. Highway 14, 4.0 miles west of Balaton.

Drainage area.--0.91 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | b7.39                   | 18                                  |
| 1977              | June 16, 1977 | 6.99                    | 84                                  |

b Backwater from ice.

h Revised.

# MINNESOTA RIVER BASIN

05316850 Meadow Creek tributary near Marshall, MN

(Site No. 99)

Location.--Lat 44°22'42", long 95°45'20", in SE 1/4 NE 1/4 sec.34, T.111 N., R.41 W., Lyon County, Hydrologic Unit 07020008, at culvert on U.S. Highway 59, 1.2 miles above mouth, and 4.5 miles south of Marshall.

Drainage area.--0.54 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |

b Backwater from ice.

# MINNESOTA RIVER BASIN

05316900 Dry Creek near Jeffers, MN

(Site No. 72)

Location.--Lat 44°07'21", long 95°12'13", in NE 1/4 NE 1/4 sec.31, T.108 N., R.36 W., Cottonwood County, Hydrologic Unit 07020008, at culvert on County Highway 10, 4.5 miles north of Jeffers.

Drainage area.--3.13 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | b5.71                   | 31                                  |
| 1977              | June 16, 1977 | 6.86                    | 187                                 |

b Backwater from ice.

c Affected by shifting control.

# MINNESOTA RIVER BASIN

05316920 Cottonwood River tributary No. 2 near Sanborn, MN

(Site No. 74)

Location.--Lat 44°10'34", long 95°07'15", in SW 1/4 NW 1/4 sec.12, T.108 N., R.36 W., Cottonwood County, Hydrologic Unit 07020008, at culvert on U.S. Highway 71, 2.4 miles south of Sanborn.

Drainage area.--0.42 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1966              | Apr. 19, 1966 | 6.06                    | 72                                  |
| 1967              | Apr. 2, 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                                  |
| 1976              | Mar. 20, 1976 | b6.13                   | 10                                  |
| 1977              | June 16, 1977 | 6.84                    | 103                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

f Backwater from aquatic growth.

# MINNESOTA RIVER BASIN

05316950 Cottonwood River near Springfield, MN

Location.--Lat 44°12'12", long 95°02'53", on line between secs.33 and 34, T. 109 N., R.35 W., Brown County, Hydrologic Unit 07020008, at bridge on County Highway 2, 1.3 miles downstream from Mound Creek, 1.0 mile upstream from Coal Mine Creek, and about 3.5 miles southwest of Springfield.

Records available.--November 1972 to present. Annual peak for 1969 available from miscellaneous flood data collected prior to activation of station.

Gage.--Crest-stage gage located at downstream side of bridge. Zero of upper crest-stage gage is at 1,000.06 ft, National Geodetic Vertical Datum of 1929.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1969              | Apr. 8, 1969  | 31.55                   | 18,300                              |
| 1973              | Mar. 13, 1973 | b20.05                  | 1,940                               |
| 1974              | Apr. 15, 1974 | d                       | e520                                |
| 1975              | Apr. 23, 1975 | b21.11                  | 3,050                               |
| 1976              | Mar. 20, 1976 | 20.20                   | 1,320                               |
| 1977              | Mar. 12, 1977 | b21.28                  | 2,260                               |

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# MINNESOTA RIVER BASIN

05317190 Little Cottonwood River at Searles, MN

Location.--Lat 44°14'19", long 94°26'04", in NE 1/4 NE 1/4 sec.21, T.109 N., R.30 W., Brown County, Hydrologic Unit 07020007, at bridge on State Highway 15, 0.75 mile north of Searles, and 3 miles south of New Ulm.

Records available.--October 1971 to present. Annual peak for 1969 from miscellaneous flood data collected prior to activation of station.

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

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1969              | Apr. 7, 1969  | ---                     | 2,310                               |
| 1972              | June 8, 1972  | 6.04                    | (/)                                 |
| 1973              | Mar. 13, 1973 | d                       | e600                                |
| 1974              | Apr. 15, 1974 | d                       | e220                                |
| 1975              | Apr. 24, 1975 | d                       | e700                                |
| 1976              | Mar. 22, 1976 | b3.58                   | 360                                 |
| 1977              | June 16, 1977 | 4.35                    | (/)                                 |

/ Discharge not determined.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.



# MINNESOTA RIVER BASIN

05317850 Foster Creek near Alden, MN

(Site No. 16)

Location.--Lat 43°39'31", long 93°35'30", in NE 1/4 NE 1/4 sec.9, T.102 N., R.23 W., Freeborn County, Hydrologic Unit 07020009, at culvert on U.S. Highway 16, 1.2 miles southwest of Alden.

Drainage area.--2.26 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 12, 1976 | 6.11                    | 80                                  |
| 1977              | June 30, 1977 | 7.25                    | 115                                 |

f Backwater from aquatic growth.

# MINNESOTA RIVER BASIN

05318000 East Branch Blue Earth River near Bricelyn, MN

Location.--Lat 43°37'50", long 93°47'25", in NE 1/4 NE 1/4 sec.23, T.102 N., R.25 W., Faribault County, Hydrologic Unit 07020009, at bridge on county highway, 2 miles upstream from Bursh Creek, 3 miles downstream from South Walnut Lake, and 5 miles northeast of Bricelyn.

Drainage area.--132 mi<sup>2</sup>.

Records available.--March 1951 to September 1970, March 1972 to present.  
Continuous records available March 1951 to September 1970.

Gage.--Crest-stage gage at downstream side of bridge. Datum of gage is 1,131.86 ft, National Geodetic Vertical Datum of 1929. March 1951 to September 1970 nonrecording gage at same site and datum.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1951              | Apr. 7, 1951  | 10.68                   | 1,320                               |
| 1952              | Apr. 1, 1952  | 9.57                    | 776                                 |
| 1953              | Mar. 21, 1953 | 7.15                    | 231                                 |
| 1954              | June 24, 1954 | 8.04                    | 274                                 |
| 1955              | July 8, 1955  | 7.12                    | 196                                 |
| 1956              | Apr. 1, 1956  | 7.04                    | 207                                 |
| 1957              | June 30, 1957 | 5.57                    | 62                                  |
| 1958              | Apr. 27, 1958 | c5.13                   | 56                                  |
| 1959              | June 3, 1959  | c6.37                   | 81                                  |
| 1960              | May 23, 1960  | 10.36                   | 935                                 |
| 1961              | May 28, 1961  | 9.08                    | 502                                 |
| 1962              | Mar. 30, 1962 | 10.65                   | 1,150                               |
| 1963              | July 19, 1963 | 7.21                    | 211                                 |
| 1964              | May 14, 1964  | 6.24                    | 128                                 |
| 1965              | Apr. 7, 1965  | 11.70                   | 1,260                               |
| 1966              | Apr. 3, 1966  | 7.70                    | 268                                 |
| 1967              | June 16, 1967 | 10.04                   | 725                                 |
| 1968              | July 27, 1968 | 9.47                    | 469                                 |
| 1969              | Mar. 26, 1969 | b10.62                  | 792                                 |
| 1970              | May 29, 1970  | ---                     | e140                                |
| 1973              | Mar. 13, 1973 | b9.40                   | 524                                 |
| 1974              | July 11, 1974 | c9.21                   | 432                                 |
| 1975              | May 29, 1975  | c9.94                   | 690                                 |
| 1976              | Mar. 12, 1976 | c5.92                   | 80                                  |
| 1977              | June 16, 1977 | 5.53                    | 74                                  |

b Backwater from ice.

c Affected by shifting control.

e Estimated.

# MINNESOTA RIVER BASIN

05318100 East Branch Blue Earth River tributary near Blue Earth, MN

(Site No. 65)

Location.--Lat 43°37'09", long 94°01'03", in SW 1/4 SE 1/4 sec.24, T.102 N., R.27 W., Faribault County, Hydrologic Unit 07020009, at culvert on County Highway 13, 0.5 mile above mouth, and 4.3 miles east of Blue Earth.

Drainage area.--9.20 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 12, 1976 | 4.53                    | 73                                  |
| 1977              | June 16, 1977 | c3.38                   | 16                                  |

a Backwater from debris.

b Backwater from ice.

c Affected by shifting control.

# MINNESOTA RIVER BASIN

05318300 Watonwan River near Delft, MN

(Site No. 70)

Location.--Lat 43°59'55", long 95°07'11", in NE 1/4 SE 1/4 sec.11, T.106 N., R.36 W., Cottonwood County, Hydrologic Unit 07020010, at culvert on U.S. Highway 71, 1.7 miles northwest of Delft.

Drainage area.--13.0 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | c14.87                  | 45                                  |
| 1977              | June 16, 1977 | c14.76                  | 41                                  |

b Backwater from ice.

c Affected by shifting control.

f Backwater from aquatic growth.

# MINNESOTA RIVER BASIN

05320200 Le Sueur River tributary near Mankato, MN

(Site No. 19)

Location.--Lat 44°07'29", long 93°57'33", in SE 1/4 SW 1/4 sec.28, T.108 N., R.26 W., Blue Earth County, Hydrologic Unit 07020011, at culvert on State Highway 22, 0.2 mile above mouth, and 1.5 miles southeast of Mankato Airport.

Drainage area.--0.073 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976 | b20.00                  | 9.0                                 |
| 1977              | June 16, 1977 | 19.77                   | 12                                  |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# MINNESOTA RIVER BASIN

05320300 Cobb River tributary near Mapleton, MN

(Site No. 18)

Location.--Lat 44°01'05", long 93°57'30", in SW 1/4 NE 1/4 sec.4, T.106 N., R.26 W., Blue Earth County, Hydrologic Unit 07020011, at culvert on State Highway 22, 1.0 mile above mouth, and 6.3 miles north of Mapleton.

Drainage area.--7.25 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Nov. 10, 1975 | 14.64                   | 76                                  |
| 1977              | June 16, 1977 | 14.86                   | 86                                  |

b Backwater from ice.

# MINNESOTA RIVER BASIN

05320400 Maple River tributary near Mapleton, MN

(Site No. 20)

Location.--Lat 43°55'18", long 94°01'17", in SE 1/4 SW 1/4 sec.1, T.105 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, at culvert on State Highway 30, 0.9 mile above mouth, and 3.3 miles west of Mapleton.

Drainage area.--6.22 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 12, 1976 | b17.33                  | 43                                  |
| 1977              | June 16, 1977 | 17.74                   | 190                                 |

b Backwater from ice.

e Estimated.

# MINNESOTA RIVER BASIN

05320440 Judicial ditch 49 near Amboy, MN

(Site No. 21)

Location.--Lat 43°53'17", long 94°07'38", in NW 1/4 sec.19, T.105 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, at culvert on State Highway 30, 1.6 miles east of Amboy, and 4.3 miles above mouth.

Drainage area.--18.0 mi<sup>2</sup>.

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.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</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 | 16.92                   | 288                                 |
|                   | July 23, 1968 |                         |                                     |
| 1969              | Oct. 9, 1968  | 15.83                   | 314                                 |
|                   | Oct. 17, 1968 |                         |                                     |
| 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

05320480 Maple River near Rapidan, MN

Location.--Lat 44°03'54", long 94°01'32", in SW 1/4 sec.13, T.107 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, at bridge on County Highway 35, 3.0 miles southeast of Rapidan, and 3.3 miles upstream from mouth.

Drainage area.--310 mi<sup>2</sup>.

Records available.--November 1971 to present.

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

Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1972              | ---           | d                       | <1,400                              |
| 1973              | Mar. 14, 1973 | 8.07                    | 2,760                               |
| 1974              | Mar. 3, 1974  | b8.60                   | 2,670                               |
| 1975              | June 15, 1975 | 7.40                    | 2,090                               |
| 1976              | Mar. 14, 1976 | d                       | e900                                |
| 1977              | Mar. 12, 1977 | b7.82                   | 510                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# MINNESOTA RIVER BASIN

05330150 Sand Creek tributary near Montgomery, MN

(Site No. 106)

Location.--Lat 44°25'41", long 93°30'31", in NE 1/4 NE 1/4 sec.18, T.111 N., R.22 W., Rice County, Hydrologic Unit 07020012, at culvert on State Highway 21, 3.5 miles east of Montgomery.

Drainage area.--0.36 mi<sup>2</sup>.

Records available.--October 1960 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,097.3 ft, National Geodetic Vertical 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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976  | 7.44                    | 4.2                                 |
| 1977              | July 24, 1977  | 7.97                    | 12                                  |

b Backwater from ice.

# MINNESOTA RIVER BASIN

05330200 Rice Lake tributary near Montgomery, MN

(Site No. 105)

Location.--Lat 44°25'42", long 93°32'10", in NE 1/4 NW 1/4 sec.13, T.111 N., R.23 W., Le Sueur County, Hydrologic Unit 07020012, at culvert on State Highway 21, 1.8 miles above Rice Lake, and 2.5 miles east of Montgomery.

Drainage area.--3.16 mi<sup>2</sup>.

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, National Geodetic Vertical 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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976  | b6.83                   | 29                                  |
| 1977              | Sept. 23, 1977 | 7.04                    | 45                                  |

b Backwater from ice.

# MINNESOTA RIVER BASIN

05330300 Sand Creek near New Prague, MN

(Site No. 104)

Location.--Lat 44°32'37", long 93°32'16", in NE 1/4 NW 1/4 sec.1, T.112 N., R.23 W., Le Sueur County, Hydrologic Unit 07020012, at culvert on State Highways 13 and 19, 1.9 miles east of New Prague.

Drainage area.--62.4 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 12, 1976  | b10.30                  | 144                                 |
| 1977              | Apr. 2, 1977   | 9.34                    | 86                                  |

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

# MINNESOTA RIVER BASIN

05330550 Raven Stream tributary near New Prague, MN

(Site No. 109)

Location.--Lat 44°34'21", long 93°35'58", in NW 1/4 sec.28, T.113 N., R.23 W., Scott County, Hydrologic Unit 07020012, at culvert on county road, 1.6 miles above mouth, and 2.3 miles northwest of New Prague.

Drainage area.--22.1 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 12, 1976 | b10.99                  | 110                                 |
| 1977              | Mar. 12, 1977 | b12.25                  | 94                                  |

b Backwater from ice.

# MINNESOTA RIVER BASIN

05330600 Sand Creek tributary No. 2 near Jordan, MN

(Site No. 110)

Location.--Lat 44°37'45", long 93°36'33", in NW 1/4 NE 1/4 sec.5, T.113 N., R.23 W., Scott County, Hydrologic Unit 07020012, at culvert on State Highway 21, 0.8 mile above mouth, and 2.8 miles south of Jordan.

Drainage area.--2.62 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976 | 12.45                   | 26                                  |
| 1977              | Mar. 12, 1977 | b12.48                  | 18                                  |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# ST. CROIX RIVER BASIN

05336200 Glaisby Brook near Kettle River, MN

(Site No. 93)

Location.--Lat 46°27'19", long 92°51'34", in SE 1/4 NW 1/4 sec.22, T.46 N., R.20 W., Carlton County, Hydrologic Unit 07030003, 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 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Apr. 3, 1976  | 5.83                    | 428                                 |
| 1977              | Sept.26, 1977 | 4.52                    | 228                                 |

b Backwater from ice.

c Affected by shifting control.

# ST. CROIX RIVER BASIN

05336300 Moose River tributary at Moose Lake, MN

(Site No. 92)

Location.--Lat 46°27'17", long 92°47'14", in SE 1/4 NE 1/4 sec.19, T.46 N., R.19 W., Carlton County, Hydrologic Unit 07030003, at culvert on State Highway 27, 0.9 mile above mouth, and 1.2 miles west of Moose Lake.

Drainage area.--1.23 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | July 19, 1976  | c8.02                   | 37                                  |
| 1977              | Sept. 24, 1977 | c8.67                   | 67                                  |

b Backwater from ice.

c Affected by shifting control.



# ST. CROIX RIVER BASIN

05336550 Wolf Creek tributary near Sandstone, MN

(Site No. 91)

Location.--Lat 46°09'45", long 92°51'58", in NE 1/4 SE 1/4 sec.33, T.43 N., R.20 W., Pine County, Hydrologic Unit 07030003, at culvert on U.S. Highway 61, 0.2 mile above mouth, and 2.2 miles north of Sandstone.

Drainage area.--5.64 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 31, 1976  | b17.47                  | 44                                  |
| 1977              | Sept. 24, 1977 | c15.94                  | 14                                  |

b Backwater from ice.

c Affected by shifting control.

# ST. CROIX RIVER BASIN

05336600 Kettle River tributary at Sandstone, MN

(Site No. 90)

Location.--Lat 46°08'46", long 92°51'57", in SE 1/4 SE 1/4 sec.4, T.42 N., R.20 W., Pine County, Hydrologic Unit 07030003, at culvert on U.S. Highway 61 at Sandstone, and 0.2 mile above mouth.

Drainage area.--0.65 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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 | b7.53                   | 7.8                                 |
| 1974              | Oct. 12, 1973 | 7.72                    | 22                                  |
| 1975              | Apr. 16, 1975 | b9.20                   | 32                                  |
| 1976              | Mar. 31, 1976 | b8.22                   | 16                                  |
| 1977              | Aug. 31, 1977 | 7.78                    | 24                                  |

b Backwater from ice.

f Backwater from aquatic growth.

# ST. CROIX RIVER BASIN

05338200 Mission Creek near Hinckley, MN

(Site No. 89)

Location.--Lat 45°59'52", long 92°56'44", in SW 1/4 SW 1/4 sec.25, T.41 N., R.21 W., Pine County, Hydrologic Unit 07030004, at culvert on U.S. Highway 23, 1.2 miles south of Hinckley.

Drainage area.--3.84 mi<sup>2</sup>.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 990.94 ft, National Geodetic Vertical Datum of 1929.

Culvert invert elevations.--11.88 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 (ft<sup>3</sup>/s)</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, 1973   | 13.10                   | 26                                  |
| 1974              | Oct. 12, 1973  | 14.70                   | 122                                 |
| 1975              | Apr. 16, 1975  | b14.56                  | 76                                  |
| 1976              | Mar. 31, 1976  | b15.03                  | 45                                  |
| 1977              | Sept. 24, 1977 | 13.31                   | 34                                  |

b Backwater from ice.

# VERMILLION RIVER BASIN

05345900 Vermillion River tributary near Hastings, MN

(Site No. 81)

Location.---Lat 44°43'19", long 92°56'03", in NE 1/4 SE 1/4 sec.35, T.115 N., R.18 W., Dakota County, Hydrologic Unit 07040001, at culvert on county highway, 2.0 miles above mouth, and 4.1 miles west of Hastings.

Drainage area.---14.3 mi<sup>2</sup>. (Contributing area)  
22.5 mi<sup>2</sup>. (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 (ft<sup>3</sup>/s)</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                                  |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# CANNON RIVER BASIN

05352700 Turtle Creek tributary No. 2 near Pratt, MN

(Site No. 62)

Location.--Lat 44°00'02", long 93°08'30", in NW 1/4 SW 1/4 sec.8, T.106 N., R.19 W., Steele County, Hydrologic Unit 07040002, at culvert on U.S. Highway 218, 1.0 mile above mouth, and 1.7 miles southeast of Pratt.

Drainage area.--1.26 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976  | b15.98                  | 33                                  |
| 1977              | Mar. 12, 1977  | b16.53                  | 11                                  |

a Backwater from debris.

b Backwater from ice.

# CANNON RIVER BASIN

05352800 Turtle Creek tributary near Steele Center, MN

(Site No. 61)

Location.---Lat 44°00'26", long 93°12'20", in NW 1/4 NW 1/4 sec.11, T.106 N., R.20 W., Steele County, Hydrologic Unit 07040002, at culvert on township road, 1.3 miles above mouth, and 1.6 miles northeast of Steele Center.

Drainage area.---5.01 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976  | b5.79                   | 52                                  |
| 1977              | ---            | d                       | e6.0                                |

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# CANNON RIVER BASIN

05355100 Little Cannon River tributary near Kenyon, MN

(Site No. 88)

Location.--Lat 44°20'45", long 92°58'47", in NE 1/4 SE 1/4 sec.9, T.110 N., R.18 W., Goodhue County, Hydrologic Unit 07040002, at culvert on State Highway 56, 0.3 mile above mouth, and 5.3 miles north of Kenyon.

Drainage area.--2.20 mi<sup>2</sup>.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,026.0 ft, National Geodetic Vertical 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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 20, 1976 | b12.49                  | 84                                  |
| 1977              | ---           | d                       | e30                                 |

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# CANNON RIVER BASIN

05355150 Pine Creek near Cannon Falls, MN

(Site No. 83)

Location.--Lat 44°32'27", long 92°53'40", in NE 1/4 NE 1/4 sec.6, T.112 N., R.17 W., Goodhue County, Hydrologic Unit 07040002, at culvert on State Highway 20, 2.0 miles above mouth, and 2.1 miles north of Cannon Falls.

Drainage area.--20.2 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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 | c1.14                   | 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                                 |
| 1976              | Mar. 12, 1976 | b3.94                   | 211                                 |
| 1977              | Apr. 21, 1977 | 1.80                    | 46                                  |

b Backwater from ice.

c Affected by shifting control.



# CANNON RIVER BASIN

05355200 Cannon River at Welch, MN

Location.--Lat 44°33'50", long 92°43'55", in NW 1/4 SW 1/4 sec.27, T.113 N., R.16 W., Goodhue County, Hydrologic Unit 07040002, on right bank 0.3 mile downstream from highway at Welch, and 1.8 miles upstream from Belle Creek.

Drainage area.--1,320 mi<sup>2</sup>.

Records available.--June 1909 to January 1914 (no winter records 1909-11), November 1930 to September 1971, October 1973 to present. Continuous records available June 1909 to January 1914, November 1930 to September 1971.

Gage.--Water-stage recorder. Datum of gage is 699.16 ft, National Geodetic Vertical Datum of 1929. Prior to November 11, 1930, nonrecording gage on highway bridge at site 0.3 mile upstream, at datum 3.00 ft lower. November 11, 1920 to October 11, 1938, water-stage recorder at site 0.3 mile upstream at present datum.

Remarks.--Maximum stage know 17.1 ft, present datum, in April 1888, from floodmark at mill about 2,400 ft upstream.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>    | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|----------------|-------------------------|-------------------------------------|
| 1911              | June 4, 1911   | 6.9                     | 701                                 |
| 1912              | Oct. 17, 1911  | 12.85                   | 5,300                               |
| 1913              | Mar. 24, 1913  | 10.4                    | 3,120                               |
| 1931              | June 24, 1931  | 4.92                    | 1,190                               |
| 1932              | Apr. 7, 1932   | ---                     | 4,270                               |
| 1933              | Jan. 22, 1933  | 11.44                   | 10,500                              |
| 1934              | Apr. 3, 1934   | 7.38                    | 3,980                               |
| 1935              | Aug. 8, 1935   | 8.22                    | 4,290                               |
| 1936              | Mar. 23, 1936  | 17.04                   | 11,300                              |
| 1937              | Mar. 4, 1937   | b7.24                   | 2,690                               |
| 1938              | Sept. 10, 1938 | 8.55                    | 5,940                               |
| 1939              | Mar. 23, 1939  | 11.14                   | 10,800                              |
| 1940              | July 11, 1940  | ---                     | 2,330                               |
| 1941              | Mar. 29, 1941  | 8.33                    | 5,510                               |
| 1942              | Sept. 18, 1942 | 9.99                    | 8,230                               |
| 1943              | Mar. 27, 1943  | 8.76                    | 6,240                               |
| 1944              | May 4, 1944    | 10.85                   | 9,980                               |
| 1945              | Mar. 14, 1945  | 10.33                   | 8,840                               |
| 1946              | Mar. 14, 1946  | 7.52                    | 4,470                               |
| 1947              | Apr. 11, 1947  | 8.68                    | 6,090                               |
| 1948              | Mar. 20, 1948  | b11.77                  | 9,050                               |
| 1949              | Mar. 24, 1949  | 8.11                    | 5,230                               |
| 1950              | Mar. 27, 1950  | 10.17                   | 9,200                               |

b Backwater from ice.

## CANNON RIVER BASIN

05355200 Cannon River at Welch, MN--Continued

Annual maximum data.--Continued

| <u>Water year</u> | <u>Date</u>   | <u>Gage-height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1951              | July 21, 1951 | 11.68                   | 14,600                              |
| 1952              | Apr. 2, 1952  | 12.00                   | 15,800                              |
| 1953              | July 25, 1953 | 7.44                    | 4,200                               |
| 1954              | June 20, 1954 | 11.30                   | 13,200                              |
| 1955              | July 8, 1955  | 9.59                    | 8,150                               |
| 1956              | Apr. 3, 1956  | 7.28                    | 4,800                               |
| 1957              | Aug. 14, 1957 | 8.11                    | 5,840                               |
| 1958              | June 4, 1958  | 7.27                    | 4,780                               |
| 1959              | June 26, 1959 | 6.80                    | 4,220                               |
| 1960              | May 23, 1960  | 10.16                   | 9,420                               |
| 1961              | Mar. 26, 1961 | 7.47                    | 5,020                               |
| 1962              | Mar. 30, 1962 | 9.20                    | 6,900                               |
| 1963              | July 16, 1963 | 4.67                    | 1,780                               |
| 1964              | Sept. 9, 1964 | 4.50                    | 1,660                               |
| 1965              | Apr. 8, 1965  | 14.01                   | 36,100                              |
| 1966              | Feb. 10, 1966 | b13.93                  | 20,800                              |
| 1967              | Mar. 25, 1967 | 10.58                   | 10,000                              |
| 1968              | July 14, 1968 | 6.75                    | 3,380                               |
| 1969              | Apr. 5, 1969  | 10.29                   | 9,370                               |
| 1970              | May 28, 1970  | 992                     | 6,480                               |
| 1971              | Apr. 1, 1971  | 9.03                    | 6,700                               |
| 1972              | Mar. 20, 1972 | 6.63                    | 3,490                               |
| 1973              | May 3, 1973   | 10.71                   | 10,500                              |
| 1974              | Apr. 6, 1974  | 6.52                    | 3,390                               |
| 1975              | Apr. 29, 1975 | 9.23                    | 7,000                               |
| 1976              | Mar. 12, 1976 | 6.91                    | 3,780                               |
| 1977              | Mar. 12, 1977 | 4.41                    | 1,590                               |

b Backwater from ice.

# CANNON RIVER BASIN

05355230 Cannon River tributary near Welch, MN

(Site No. 84)

Location.--Lat 44°36'04", long 92°42'34", in SW 1/4 SW 1/4 sec.11, T.113 N., R.16 W., Goodhue County, Hydrologic Unit 07040002, at culvert on U.S. Highway 61, 1.2 miles above mouth, and 2.7 miles northeast of Welch.

Drainage area.--0.05 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976 | ---                     | g3                                  |
| 1977              | Mar. 11, 1977 | b8.09                   | 5                                   |

b Backwater from ice.

g Estimated; gage height unknown.

# ZUMBRO RIVER BASIN

05372800 South Fork Zumbro River on Belt Line at Rochester, MN

Location.--Lat 44°00'26", long 92°28'19", in SE 1/4 SW 1/4 sec.2, T.106 N., R.14 W., Olmsted County, Hydrologic Unit 07040004, on west-bound lane of U.S. Highway 14 at Rochester, and 1.5 miles upstream from Bear Creek.

Drainage area.--155 mi<sup>2</sup>.

Records available.--July 1968 to present.

Gage.--Crest-stage gage at downstream side of highway bridge. Datum of gage is 994.63 ft, National Geodetic Vertical Datum of 1929.

Bankfull stage.--2.0 ft.

Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1969              | ---           | d                       | <2,500                              |
| 1970              | May 28, 1970  | 998.20                  | 2,520                               |
| 1971              | Mar. 31, 1971 | 997.99                  | 2,200                               |
| 1972              | Mar. 15, 1972 | b995.81                 | 645                                 |
| 1973              | Mar. 10, 1973 | 1001.78                 | 6,020                               |
| 1974              | Apr. 4, 1974  | 999.18                  | 3,160                               |
| 1975              | Apr. 28, 1975 | 997.22                  | 1,680                               |
| 1976              | Mar. 12, 1976 | 998.47                  | 2,570                               |
| 1977              | June 16, 1977 | 995.28                  | 640                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# ZUMBRO RIVER BASIN

05372930 Bear Creek on Belt Line at Rochester, MN

Location.--Lat 44°00'29", long 92°26'44", in SW 1/4 SE 1/4 sec.1, T.106 N., R.14 W., Olmsted County, Hydrologic Unit 07040004, at bridge on west-bound land of U.S. Highway 14 at Rochester, and 1.2 miles upstream from mouth.

Drainage area.--80 mi<sup>2</sup>.

Records available.--July 1968 to present.

Gage.--Crest-stage gage at downstream side of highway bridge. Datum of gage is 993.74 ft, National Geodetic Vertical Datum of 1929.

Bankfull stage.--5.0 ft.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1969              | Apr. 4, 1969  | 997.50                  | 870                                 |
| 1970              | ---           | d                       | e650                                |
| 1971              | Mar. 31, 1971 | 997.16                  | 780                                 |
| 1972              | Mar. 15, 1972 | 996.74                  | 670                                 |
| 1973              | Mar. 10, 1973 | 1000.11                 | 1,870                               |
| 1974              | June 21, 1974 | 1003.39                 | 5,800                               |
| 1975              | Apr. 28, 1975 | 996.90                  | 718                                 |
| 1976              | Mar. 12, 1976 | 1000.41                 | 2,240                               |
| 1977              | June 16, 1977 | 995.40                  | 350                                 |

d Peak stage did not reach bottom of gage.

e Estimated.

# ZUMBRO RIVER BASIN

05372950 Silver Creek at Rochester, MN

Location.--Lat 44°01'44", long 92°25'44", near center of sec.31, T.107 N., R.13 W., Olmsted County, Hydrologic Unit 07040004, at bridge on county highway at east edge of Rochester, and 1.7 miles upstream from mouth.

Drainage area.--17.3 mi<sup>2</sup>.

Records available.--July 1968 to present.

Gage.--Crest-stage gage at downstream side of bridge. Datum of gage is 1007.99 ft, National Geodetic Vertical Datum of 1929.

Bankfull stage.--5.0 ft.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1969              | Apr. 4, 1969  | 10.62                   | 428                                 |
| 1970              | June 17, 1970 | 10.93                   | 510                                 |
| 1971              | July 12, 1971 | 12.87                   | 1,210                               |
| 1972              | Mar. 15, 1972 | ---                     | e150                                |
| 1973              | Mar. 10, 1973 | 12.91                   | 1,290                               |
| 1974              | June 21, 1974 | 15.65                   | 6,580                               |
| 1975              | June 18, 1975 | 9.84                    | 259                                 |
| 1976              | Mar. 12, 1976 | 11.46                   | 670                                 |
| 1977              | June 16, 1977 | 10.33                   | 360                                 |

e Estimated.

# ZUMBRO RIVER BASIN

05372990 Cascade Creek at Rochester, MN

Location.--Lat 44°01'51", long 92°28'18", in SE 1/4 NW 1/4 sec.35, T.107 N., R.14 W., Olmsted County, Hydrologic Unit 07040004, at bridge on 7th St. NW at Rochester, and 0.6 mile upstream from mouth.

Drainage area.--37.0 mi<sup>2</sup>.

Records available.--July 1968 to present.

Gage.--Crest-stage gage at downstream side of bridge. Datum of gage is 977.84 ft, National Geodetic Vertical Datum of 1929.

Bankfull stage.--10.0 ft.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1969              | Apr. 4, 1969  | 979.02                  | 450                                 |
| 1970              | June 17, 1970 | 978.80                  | 401                                 |
| 1971              | June 7, 1971  | 980.63                  | 880                                 |
| 1972              | Mar. 15, 1972 | d                       | e170                                |
| 1973              | Mar. 10, 1973 | 982.15                  | 1,430                               |
| 1974              | June 21, 1974 | 932.52                  | 2,050                               |
| 1975              | June 18, 1975 | 978.00                  | 240                                 |
| 1976              | Mar. 12, 1976 | 981.01                  | 1,000                               |
| 1977              | Mar. 29, 1977 | 978.29                  | 302                                 |

d Peak stage did not reach bottom of gage.

e Estimated.

# ZUMBRO RIVER BASIN

05373350 Zumbro River tributary near South Troy, MN

(Site No. 143)

Location.--Lat 44°11'16", long 92°25'22", in SE 1/4 NE 1/4 sec.6, T.108 N., R.13 W., Olmsted County, Hydrologic Unit 07040004, at culvert on county road, 0.8 mile above mouth, and 1.3 miles south of South Troy.

Drainage area.--0.16 mi<sup>2</sup>.

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, 0.48 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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Aug. 17, 1976 | 8.19                    | 27                                  |
| 1977              | June 5, 1977  | 8.37                    | 30                                  |

b Backwater from ice.



# ZUMBRO RIVER BASIN

05373700 Spring Creek near Wanamingo, MN

(Site No. 87)

Location.--Lat 44°17'13", long 92°52'17", in SE 1/4 SE 1/4 sec.32, T.110 N., R.17 W., Goodhue County, Hydrologic Unit 07040004, at culvert on County Highway 1, 3.5 miles above mouth, and 4.2 miles southwest of Wanamingo.

Drainage area.--9.93 mi<sup>2</sup>.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,106.15 ft, National Geodetic Vertical 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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Aug. 17, 1976  | c9.62                   | 145                                 |
| 1977              | ---            | d                       | e50                                 |

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

e Estimated.

# ZUMBRO RIVER BASIN

05373900 Trout Brook tributary near Goodhue, MN

(Site No. 86)

Location.--Lat 44°21'30", long 92°36'58", in NE 1/4 SE 1/4 sec.4, T.110 N., R.15 W., Goodhue County, Hydrologic Unit 07040004, at culvert on State Highway 58, 0.8 mile above mouth, and 3.0 miles south of Goodhue.

Drainage area.--0.40 mi<sup>2</sup>.

Records available.--October 1959 to present.

Gage.--Crest-stage gage upstream from culvert. Datum of gage is 1,082.0 ft, National Geodetic Vertical 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, 0.97 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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Aug. 17, 1976  | 7.19                    | 95                                  |
| 1977              | Mar. 11, 1977  | b9.61                   | 31                                  |

b Backwater from ice.

c Affected by shifting control.

# ZUMBRO RIVER BASIN

05374400 Long Creek near Potsdam, MN

(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., Wabasha County, Hydrologic Unit 07040004, at culvert on county highway, 2.6 miles northeast of Potsdam.

Drainage area.--4.46 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 12, 1976 | 15.70                   | 130                                 |
| 1977              | June 5, 1977  | 18.92                   | 361                                 |

b Backwater from ice.

# EAST INDIAN CREEK BASIN

05375800 East Indian Creek tributary near Weaver, MN

(Site No. 1)

Location.--Lat 44°13'41", long 91°58'35", in NW 1/4 SE 1/4 sec.23, T.109 N., R.10 W., Wabasha County, Hydrologic Unit 07040003, at culvert on County Highway 14, 0.3 mile above mouth, and 2.5 miles northwest of Weaver.

Drainage area.--0.22 mi<sup>2</sup>.

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, 0.75 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 (ft<sup>3</sup>/s)</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                                 |

b Backwater from ice.

# WHITEWATER RIVER BASIN

05376500 South Fork Whitewater River near Altura, MN

Location.--Lat 44°04'10", long 91°58'49", in SE 1/4 sec.14, T.107 N., R.10 W., Winona County, Hydrologic Unit 07040003, on left bank, 500 ft upstream from highway bridge, 2 miles west of Altura, and 2.4 miles upstream from Keefer Creek.

Drainage area.--76.8 mi<sup>2</sup>.

Records available.--October 1939 to present. Continuous records available October, 1939 to September, 1971.

Gage.--Water-stage recorder. Datum of gage is 761.80 ft, adjustment of 1912.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>    | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|----------------|-------------------------|-------------------------------------|
| 1940              | July 10, 1940  | 9.35                    | 4,240                               |
| 1941              | Sept. 15, 1941 | 4.94                    | 1,080                               |
| 1942              | June 28, 1942  | 8.06                    | 3,080                               |
| 1943              | July 5, 1943   | 6.58                    | 1,800                               |
| 1944              | Mar. 23, 1944  | 4.03                    | 738                                 |
| 1945              | July 21, 1945  | 7.87                    | 2,910                               |
| 1946              | Mar. 6, 1946   | b4.92                   | 976                                 |
| 1947              | Aug. 31, 1947  | 10.61                   | 5,460                               |
| 1948              | Mar. 18, 1948  | 5.08                    | 1,160                               |
| 1949              | Mar. 24, 1949  | 6.88                    | 2,060                               |
| 1950              | Mar. 26, 1950  | 9.84                    | 4,710                               |
| 1951              | July 21, 1951  | 9.36                    | 4,250                               |
| 1952              | Mar. 31, 1952  | 8.55                    | 3,520                               |
| 1953              | May 10, 1953   | 5.92                    | 1,480                               |
| 1954              | Apr. 26, 1954  | 3.72                    | 544                                 |
| 1955              | July 8, 1955   | 7.02                    | 2,180                               |
| 1956              | Apr. 2, 1956   | 7.11                    | 2,250                               |
| 1957              | July 16, 1957  | 5.86                    | 1,440                               |
| 1958              | Feb. 25, 1958  | b4.47                   | 576                                 |
| 1959              | Mar. 25, 1959  | 5.53                    | 1,140                               |
| 1960              | Mar. 27, 1960  | 5.74                    | 1,400                               |
| 1961              | Mar. 25, 1961  | 9.65                    | 4,530                               |
| 1962              | Mar. 28, 1962  | 10.01                   | 4,870                               |
| 1963              | July 17, 1963  | 4.74                    | 954                                 |
| 1964              | Mar. 12, 1964  | 2.11                    | 136                                 |
| 1965              | Apr. 7, 1965   | 7.23                    | 2,360                               |
| 1966              | Feb. 9, 1966   | 8.95                    | 3,880                               |
| 1967              | Mar. 24, 1967  | 8.02                    | 3,050                               |
| 1968              | June 21, 1968  | 3.53                    | 391                                 |
| 1969              | Apr. 3, 1969   | 4.77                    | 971                                 |
| 1970              | June 13, 1970  | 6.95                    | 1,920                               |

b Backwater from ice.

# WHITEWATER RIVER BASIN

05376500 South Fork Whitewater River near Altura, MN--Continued

Annual maximum data.--Continued.

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1971              | Mar. 31, 1971 | 5.29                    | 1,060                               |
| 1972              | Mar. 17, 1972 | 5.23                    | 1,010                               |
| 1973              | Mar. 11, 1973 | 6.42                    | 1,640                               |
| 1974              | June 21, 1974 | 10.84                   | 5,620                               |
| 1975              | July 5, 1975  | 5.39                    | 1,090                               |
| 1976              | Mar. 12, 1976 | 7.78                    | 2,760                               |
| 1977              | June 5, 1977  | 6.32                    | 1,660                               |

# GARVIN BROOK BASIN

05378300 Straight Valley Creek near Rollingstone, MN

(Site No. 4)

Location.--Lat 44°05'09", long 91°50'34", in SE 1/4 NE 1/4 sec.12, T.107 N., R.9 W., Winona County, Hydrologic Unit 07040003, at bridge on county highway, 0.2 mile above mouth, and 1.5 miles southwest of Rollingstone.

Drainage area.--5.16 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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 | ---                     | g60                                 |
| 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                                 |
| 1976              | Mar. 12, 1976 | 14.62                   | 496                                 |
| 1977              | June 4, 1977  | 16.33                   | 827                                 |

g Estimated; gage height unknown.

# GILMORE CREEK BASIN

05379000 Gilmore Creek at Winona, MN

(Site No. 168)

Location.--Lat 44°02'40", long 91°41'25", in N 1/2 sec.29, T.107 N., R.7 W., Winona County, Hydrologic Unit 07040003, about 1,500 ft above bridge carrying U.S. Highway 14 at west edge of Winona and 2-1/4 miles above mouth.

Drainage area.--8.95 mi<sup>2</sup>.

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, 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 (ft<sup>3</sup>/s)</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                   | h53                                 |
| 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                                 |

c Affected by shifting control.

h Revised.



# GILMORE CREEK BASIN

05379000 Gilmore Creek at Winona, MN--Continued

Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 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

05383600 North Branch Root River tributary near Stewartville, MN

(Site No. 13)

Location.--Lat 43°51'20", long 92°26'50", near center of sec.36, T.105 N., R.14 W., Olmsted County, Hydrologic Unit 07040008, at culvert on State Highway 30, 2.0 miles east of Stewartville, and 2.3 miles above mouth.

Drainage area.--0.73 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976  | 6.31                    | 35                                  |
| 1977              | June 5, 1977   | 7.49                    | 71                                  |

b Backwater from ice.

# ROOT RIVER BASIN

05383700 Mill Creek tributary near Chatfield, MN

(Site No. 10)

Location.--Lat 43°53'57", long 92°14'16", in SW 1/4 NW 1/4 sec.14, T.105 N., R.12 W., Olmsted County, Hydrologic Unit 07040008, at culvert on county highway, 0.8 mile above mouth, and 4.5 miles northwest of Chatfield.

Drainage area.--2.36 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |

b Backwater from ice.

# ROOT RIVER BASIN

05383720 Mill Creek near Chatfield, MN

(Site No. 144)

Location.--Lat 43°53'01", long 92°13'46", in SE 1/4 NW 1/4 sec.23, T.105 N., R.12 W., Olmsted County, Hydrologic Unit 07040008, at bridge on county highway, 3.4 miles northwest of Chatfield, and 4.8 miles above mouth.

Drainage area.--22.4 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                   | (/)                                 |
| 1976              | Mar. 12, 1976  | 14.08                   | (/)                                 |
| 1977              | May 16, 1977   | 11.46                   | (/)                                 |

/ Discharge not determined.

b Backwater from ice.

# ROOT RIVER BASIN

05383850 South Fork Bear Creek near Grand Meadow, MN

(Site No. 146)

Location.--Lat 43°43'24", long 92°35'24", in NE 1/4 SE 1/4 sec.14, T.103 N., R.15 W., Mower County, Hydrologic Unit 07040008, 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 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                               |
| 1976              | Mar. 12, 1976 | b18.27                  | 600                                 |
| 1977              | May 16, 1977  | 15.16                   | 130                                 |

b Backwater from ice.

# ROOT RIVER BASIN

05384100 Duschee Creek near Lanesboro, MN

(Site No. 5)

Location.--Lat 43°39'40", long 91°58'10", in SW 1/4 SW 1/4 sec.6, T.102 N., R.9 W., Fillmore County, Hydrologic Unit 07040008, at culvert on county highway, 4.0 miles south of Lanesboro, and 7.4 miles above mouth.

Drainage area.--3.85 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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  | b13.00                  | 73                                  |
| 1974              | June 20, 1974  | 20.20                   | 1,310                               |
| 1975              | Apr. 27, 1975  | 11.47                   | 13                                  |
| 1976              | Mar. 12, 1976  | 15.85                   | 251                                 |
| 1977              | July 17, 1977  | 12.38                   | 48                                  |

b Backwater from ice.

# ROOT RIVER BASIN

05384120 South Branch Root River at Lanesboro, MN

Location.--Lat 43°43'19", long 91°58'43", in NW 1/4 SE 1/4 sec.13, T.103 N., R.10 W., Fillmore County, Hydrologic Unit 07040008, at bridge to ball park in Lanesboro, and 2.5 miles upstream from mouth.

Drainage area.--297 mi<sup>2</sup>.

Records available.--1915, 1940-42, 1965-59 (Discharge measurements only), November 1972 to present. Gage readings available in records of U.S. Army Corps of Engineers.

Gage.--Crest-stage gage at downstream side of bridge. Zero of gage is 815.48 ft, National Geodetic Vertical Datum of 1929.

Remarks.--Flood of March 26, 1950, reached a stage of 19.20 ft from records of Corps of Engineers.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1973              | ---           | ---                     | e5,000                              |
| 1974              | June 21, 1974 | 11.08                   | (/)                                 |
| 1975              | Apr. 28, 1975 | d                       | e3,700                              |
| 1976              | Mar. 12, 1976 | b13.42                  | (/)                                 |
| 1977              | Mar. 11, 1977 | 5.85                    | (/)                                 |

/ Discharge not determined.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# ROOT RIVER BASIN

05384150 Root River tributary near Whalan, MN

(Site No. 6)

Location.--Lat 43°43'03", long 91°56'39", in SE 1/4 SW 1/4 sec.17, T.103 N., R.9 W., Fillmore County, Hydrologic Unit 07040008, at culvert on private road, 1.6 miles southwest of Whalan.

Drainage area.--0.08 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976  | 5.01                    | 6.7                                 |
| 1977              | July 17, 1977  | 7.18                    | 25                                  |

b Backwater from ice.



# ROOT RIVER BASIN

05384200 Gribben Creek near Whalan, MN

(Site No. 7)

Location.--Lat 43°42'26", long 91°54'50", in NE 1/4 SE 1/4 sec.21, T.103 N., R.9 W., Fillmore County, Hydrologic Unit 07040008, at bridge on county highway, 1.9 miles southeast of Whalan, and 2.4 miles above mouth.

Drainage area.--7.80 mi<sup>2</sup>.

Records available.--October 1958 to present.

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

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 (ft<sup>3</sup>/s)</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  | h14.89                  | 175                                 |
| 1974              | June 20, 1974  | 22.24                   | 5,200                               |
| 1975              | Apr. 27, 1975  | 15.01                   | 200                                 |
| 1976              | Mar. 12, 1976  | 16.95                   | 580                                 |
| 1977              | July 17, 1977  | 20.63                   | 2,030                               |

b Backwater from ice.

h Revised.

# ROOT RIVER BASIN

05384300 Big Springs Creek near Arendahl, MN

(Site No. 9)

Location.--Lat 43°49'26", long 91°57'00", in NE 1/4 SE 1/4 sec.7, T.104 N., R.9 W., Fillmore County, Hydrologic Unit 07040008, at culvert on State Highway 250, 2.0 miles west of Arendahl.

Drainage area.--0.14 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976 | b9.27                   | 16                                  |
| 1977              | July 17, 1977 | 7.54                    | 1.6                                 |

b Backwater from ice.

# ROOT RIVER BASIN

05384400 Pine Creek near Arendahl, MN

(Site No. 8)

Location.--Lat 43°50'27", long 91°53'39", in SE 1/4 NE 1/4 sec.3, T.104 N., R.9 W., Fillmore County, Hydrologic Unit 07040008, at bridge on County Highway 25, 1.3 miles northeast of Arendahl, and 4.9 miles above Hemingway Creek.

Drainage area.--28.1 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 12, 1976 | b14.24                  | 1,140                               |
| 1977              | June 5, 1977  | d                       | e60                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

h Revised.

# IOWA RIVER BASIN

05457080 Rose Creek tributary near Dexter, MN

(Site No. 147)

Location.--Lat 43°42'11", long 92°44'35", in SE 1/4 SW 1/4 sec.22, T.103 N., R.16 W., Mower County, Hydrologic Unit 07080201, at culvert on county highway, 0.2 mile above mouth, and 2.2 miles southwest of Dexter.

Drainage area.--1.17 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 12, 1976  | b9.07                   | 97                                  |
| 1977              | July 24, 1977  | 7.99                    | 71                                  |

b Backwater from ice.

# DES MOINES RIVER BASIN

05474750 Beaver Creek tributary No. 2 near Slayton, MN

(Site No. 102)

Location.--Lat 43°59'35", long 95°48'01", in NW 1/4 NW 1/4 sec.17, T.106 N., R.41 W., Murray County, Hydrologic Unit 07100001, at culvert on State Highway 30, 2.4 miles west of Slayton, and 3.2 miles above mouth.

Drainage area.--3.53 mi<sup>2</sup>. (Contributing area)  
5.10 mi<sup>2</sup>. (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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 20, 1976 | b17.95                  | 78                                  |
| 1977              | Mar. 11, 1977 | 18.08                   | 107                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

g Estimated; gage height unknown.

# DES MOINES RIVER BASIN

05474760 Beaver Creek tributary above Slayton, MN

(Site No. 101)

Location.--Lat 43°59'35", long 95°47'12", in NE 1/4 NE 1/4 sec.17, T.106 N., R.41 W., Murray County, Hydrologic Unit 07100001, at culvert on State Highway 30, 0.9 mile above mouth, and 1.7 miles west of Slayton.

Drainage area.--2.20 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 20, 1976 | b20.61                  | 63                                  |
| 1977              | June 16, 1977 | 19.17                   | 101                                 |

b Backwater from ice.

# DES MOINES RIVER BASIN

05475400 Warren Lake tributary near Windom, MN

(Site No. 23)

Location.--Lat 43°54'02", long 95°07'13", in SE 1/4 NE 1/4 sec.14, T.105 N., R.36 W., Cottonwood County, Hydrologic Unit 07100001, at culvert on U.S. Highway 71, 0.2 mile above Warren Lake, and 2.4 miles north of Windom.

Drainage area.--1.39 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 20, 1976 | b5.24                   | 27                                  |
| 1977              | Mar. 11, 1977 | b6.09                   | 36                                  |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# DES MOINES RIVER BASIN

05475800 Des Moines River tributary near Jackson, MN

(Site No. 69)

Location.--Lat 43°41'36", long 95°01'26", in NW 1/4 SE 1/4 sec.27, T.103 N., R.35 W., Jackson County, Hydrologic Unit 07100001, at culvert on county highway, 0.8 mile above mouth, and 5.3 miles north of Jackson.

Drainage area.--1.52 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | b14.62                  | 31                                  |
| 1977              | June 16, 1977 | 13.79                   | 23                                  |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.



# DES MOINES RIVER BASIN

05475900 Des Moines River tributary No. 2 near Lakefield, MN

(Site No. 68)

Location.--Lat 43°40'28", long 95°03'15", in SE 1/4 SE 1/4 sec.32, T.103 N., R.35 W., Jackson County, Hydrologic Unit 07100001, at culvert on County Highway 19, 1.9 miles above mouth, and 5.8 miles east of Lakefield.

Drainage area.--5.18 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 20, 1976 | b6.68                   | 68                                  |
| 1977              | Mar. 11, 1977 | b6.18                   | 48                                  |

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

# DES MOINES RIVER BASIN

05476010 Nelson Creek at Jackson, MN

(Site No. 155)

Location.--Lat 43°36'56", long 94°59'36", in NW 1/4 NW 1/4 sec.25, T.102 N., R.35 W., Jackson County, Hydrologic Unit 07100002, 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 mi<sup>2</sup>.

Records available.--October 1963 to September 1975.

Gage.--Crest-stage gage. Datum of gage is 1,295.50 ft, National Geodetic Vertical Datum of 1929.

Culvert invert elevations.--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 (ft<sup>3</sup>/s)</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                                 |

< Less than.

> Greater than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated.

# DES MOINES RIVER BASIN

05476100 Story Brook near Petersburg, MN

(Site No. 67)

Location.--Lat 43°32'22", long 94°59'38", in SW 1/4 NW 1/4 sec.24, T.101 N., R.35 W., Jackson County, Hydrologic Unit 07100002, at bridge on U.S. Highway 71, 3.5 miles above mouth, and 3.8 miles west of Petersburg.

Drainage area.--25.8 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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

05476900 Fourmile Creek near Dunnell, MN

(Site No. 66)

Location.--Lat 43°34'57", long 94°46'26", in SW 1/4 NW 1/4 sec.2, T.101 N., R.33 W., Martin County, Hydrologic Unit 07100003, at bridge on State Highway 4, 0.6 mile above mouth, and 1.6 miles north of Dunnell.

Drainage area.--14.0 mi<sup>2</sup>.

Records available.--October 1959 to present.

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

Low-steel elevations.--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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 20, 1976 | b12.56                  | 189                                 |
| 1977              | Mar. 11, 1977 | d                       | e20                                 |

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

e Estimated.

# BIG SIOUX RIVER BASIN

06482950 Mound Creek near Hardwick, MN

(Site No. 30)

Location.--Lat 43°48'18", long 96°12'47", in SE 1/4 SE 1/4 sec.15, T.104 N., R.45 W., Rock County, Hydrologic Unit 10170204, at culvert on county highway, 2.2 miles northwest of Hardwick.

Drainage area.--2.47 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976 | b9.19                   | 51                                  |
| 1977              | Mar. 11, 1977 | 9.82                    | 85                                  |

< Less than.

b Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

# BIG SIOUX RIVER BASIN

06482960 Mound Creek tributary at Hardwick, MN

(Site No. 29)

Location.--Lat 43°46'05", long 96°12'44", in NE 1/4 SE 1/4 sec.34, T.104 N., R.45 W., Rock County, Hydrologic Unit 10170204, at culvert on U.S. Highway 75, 0.7 mile above mouth, and 0.9 mile southwest of Hardwick.

Drainage area.--0.19 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976 | b7.88                   | 47                                  |
| 1977              | Mar. 11, 1977 | b8.82                   | 122                                 |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# BIG SIOUX RIVER BASIN

06483000 Rock River at Luverne, MN

Location.--Lat 43°39'15", long 96°12'03", in SW 1/4 NE 1/4 sec.11, T.102 N., R.45 W., Rock County, Hydrologic Unit 10170204, at bridge on Main Street (County Highway 4) in Luverne.

Drainage area.--425 mi<sup>2</sup>.

Records available.--August 1911 to December 1914, 1969, September 1971 to present. Continuous records available. August 1911 to December 1914.

Gage.--Crest-stage gage at downstream side of bridge. Datum of gage is 1,426.26 ft, National Geodetic Vertical Datum of 1929. Prior to December 1914, non-recording gage at different site and datum.

## Annual maximum data.--

| <u>Water year</u> | <u>Date</u>   | <u>Gage height (ft)</u> | <u>Discharge (ft<sup>3</sup>/s)</u> |
|-------------------|---------------|-------------------------|-------------------------------------|
| 1912              | Oct. 7, 1911  | 7.1                     | 2,000                               |
| 1913              | May 22, 1913  | 4.4                     | 434                                 |
| 1914              | June 13, 1914 | 13.20                   | 11,600                              |
| 1969              | Apr. 1969     | 13.13                   | 19,500                              |
| 1972              | Mar. 15, 1972 | 9.23                    | 3,000                               |
| 1973              | ---           | d                       | <1,800                              |
| 1974              | Mar. 4, 1974  | b7.20                   | 595                                 |
| 1975              | Apr. 14, 1975 | 6.20                    | 1,750                               |
| 1976              | Mar. 12, 1976 | b5.51                   | 980                                 |
| 1977              | Mar. 12, 1977 | b7.69                   | 2,550                               |

< Less than.

b Backwater from ice.

d Peak stage did not reach bottom of gage.

# BIG SIOUX RIVER BASIN

06483050 Rock River tributary near Luverne, MN

(Site No. 28)

Location.--Lat 43°34'15", long 96°12'45", in NE 1/4 NE 1/4 sec.10, T.101 N., R.45 W., Rock County, Hydrologic Unit 10170204, at culvert on U.S. Highway 75, 5.8 miles south of Luverne.

Drainage area.--0.21 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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.



# BIG SIOUX RIVER BASIN

06483200 Kanaranzi Creek tributary near Lismore, MN

(Site No. 27)

Location.--Lat 43°45'41", long 95°55'56", in SW 1/4 SW 1/4 sec.31, T.104 N., R.42 W., Nobles County, Hydrologic Unit 10170204, 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 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976  | b18.25                  | 57                                  |
| 1977              | Sept. 30, 1977 | 18.19                   | 83                                  |

b Backwater from ice.

# BIG SIOUX RIVER BASIN

06483210 Kanaranzi Creek tributary No. 2 near Wilmont, MN

(Site No. 172)

Location.--Lat 43°43'32", long 95°52'20", in SW 1/4 NW 1/4 sec.15, T.103 N., R.42 W., Nobles County, Hydrologic Unit 10170204, at culvert on County Highway 15, 3.5 miles southwest of Wilmont, and 3.7 miles above mouth.

Drainage area.--2.14 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                  |
| 1976              | Mar. 12, 1976 | b6.59                   | 104                                 |
| 1977              | Sept.30, 1977 | 5.64                    | 142                                 |

a Backwater from debris.

b Backwater from ice.

# LITTLE SIOUX RIVER BASIN

06603520 Judicial ditch 28 tributary near Spafford, MN

(Site No. 25)

Location.--Lat 43°36'58", long 95°22'58", in NW 1/4 NE 1/4 sec.27, T.102 N., R.38 W., Jackson County, Hydrologic Unit 10230003, at culvert on U.S. Highway 16, 0.4 mile west of Spafford, and 0.6 mile above mouth.

Drainage area.--2.66 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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 | 11.53                   | 400                                 |
| 1970              | Aug. 7, 1970  | 6.95                    | 21                                  |
| 1971              | Mar. 14, 1971 | 8.81                    | 80                                  |
| 1972              | Mar. 11, 1972 | b7.29                   | 40                                  |

b Backwater from ice.

# LITTLE SIOUX RIVER BASIN

06603530 Little Sioux River near Spafford, MN

(Site No. 148)

Location.---Lat 43°36'08", long 95°15'27", in NE 1/4 NE 1/4 sec.34, T.102 N., R.37 W., Jackson County, Hydrologic Unit 10230003, 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 mi<sup>2</sup>.

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 (ft<sup>3</sup>/s)</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                                 |
| 1976              | Mar. 20, 1976  | b8.31                   | 135                                 |
| 1977              | Sept. 30, 1977 | 7.97                    | 153                                 |

b Backwater from ice.